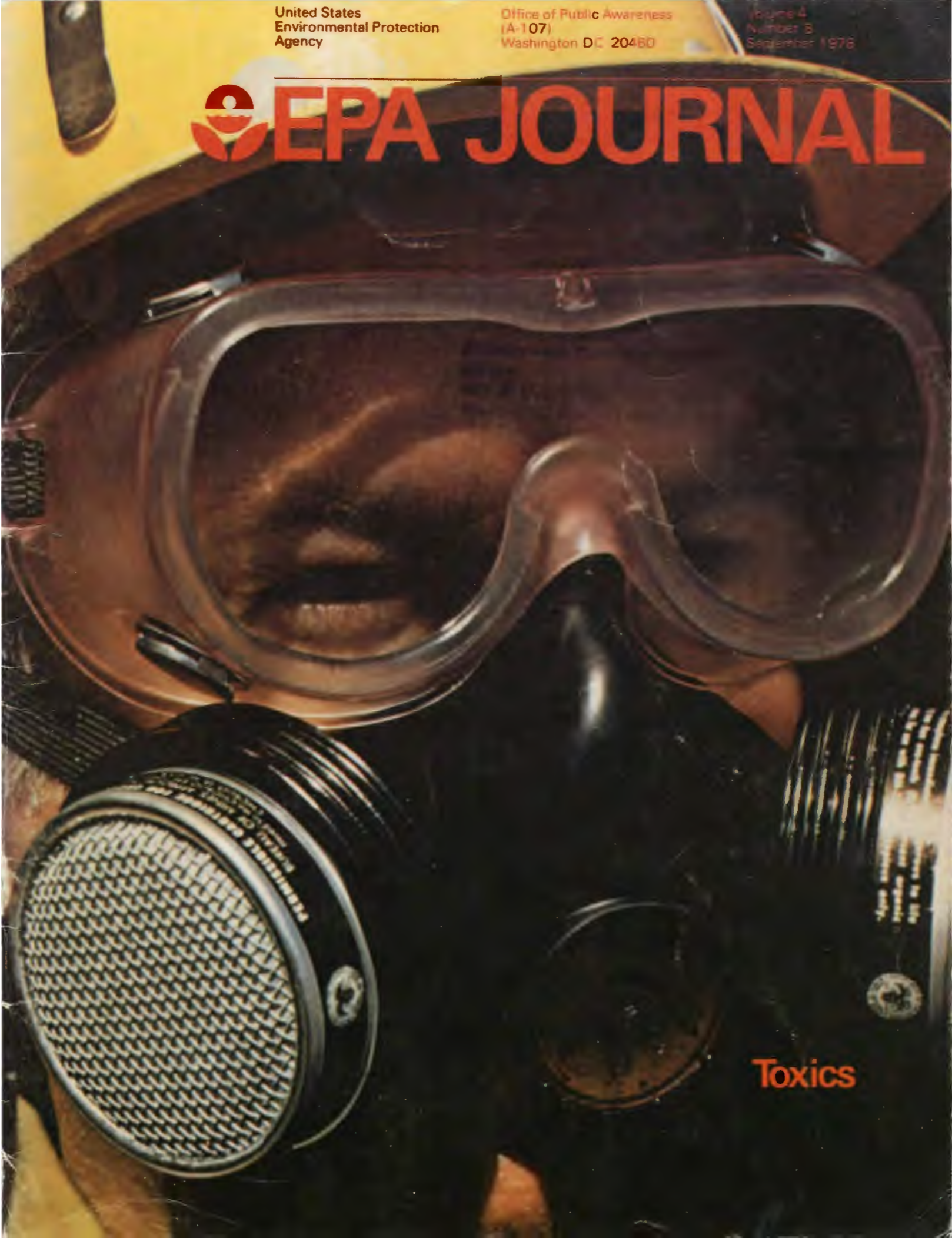
United States
Environmental Protection
Agency

Office of Public Awareness
(A-107)
Washington DC 20460

Volume 4
Number 8
September 1978

EPA JOURNAL



Toxics

Toxics

In this issue EPA Journal examines the myriad ways in which chemicals affect our lives and describes how the industry has become a major force in the economy.

Administrator Douglas M. Costle discusses the "chemical revolution" of the past three decades and explains EPA's current activities in regulating some aspects of the industry. Two of the major laws EPA has for dealing with toxic chemicals are the Toxic Substances Control Act and the Federal Insecticide, Fungicide and Rodenticide Act.

In an interview, Steven Jellinek, EPA Assistant Administrator for Toxic Substances, analyzes the Toxic Substances Act and describes how it is helping government gather information on chemicals while safeguarding industry trade secrets.

The magazine also has an article in which Jellinek reviews the significance of proposed new amendments to the Federal Insecticide, Fungicide and Rodenticide Act.

Dr. David P. Rall, Director of the National Institute of Environmental Health Sciences, in another interview details the mission of his agency and how its research complements the work of others in dealing with health-related questions involving chemicals. A report by the Conservation Foundation describes the need for more toxicologists and the career opportunities for men and women in this exciting and expanding field.

Other articles deal with at-sea incineration of toxic substances; the aftermath of an explosion in Seveso, Italy, and other incidents involving toxics, the effort to curb chemicals in drinking water, and plans for a major conference on urban environmental problems. □

United States
Environmental Protection
Agency

Office of
Public Awareness (A-107)
Washington, D.C. 20460

Volume 4
Number 8
September 1978

EPA JOURNAL

EPA's **Purpose:** To formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

Articles

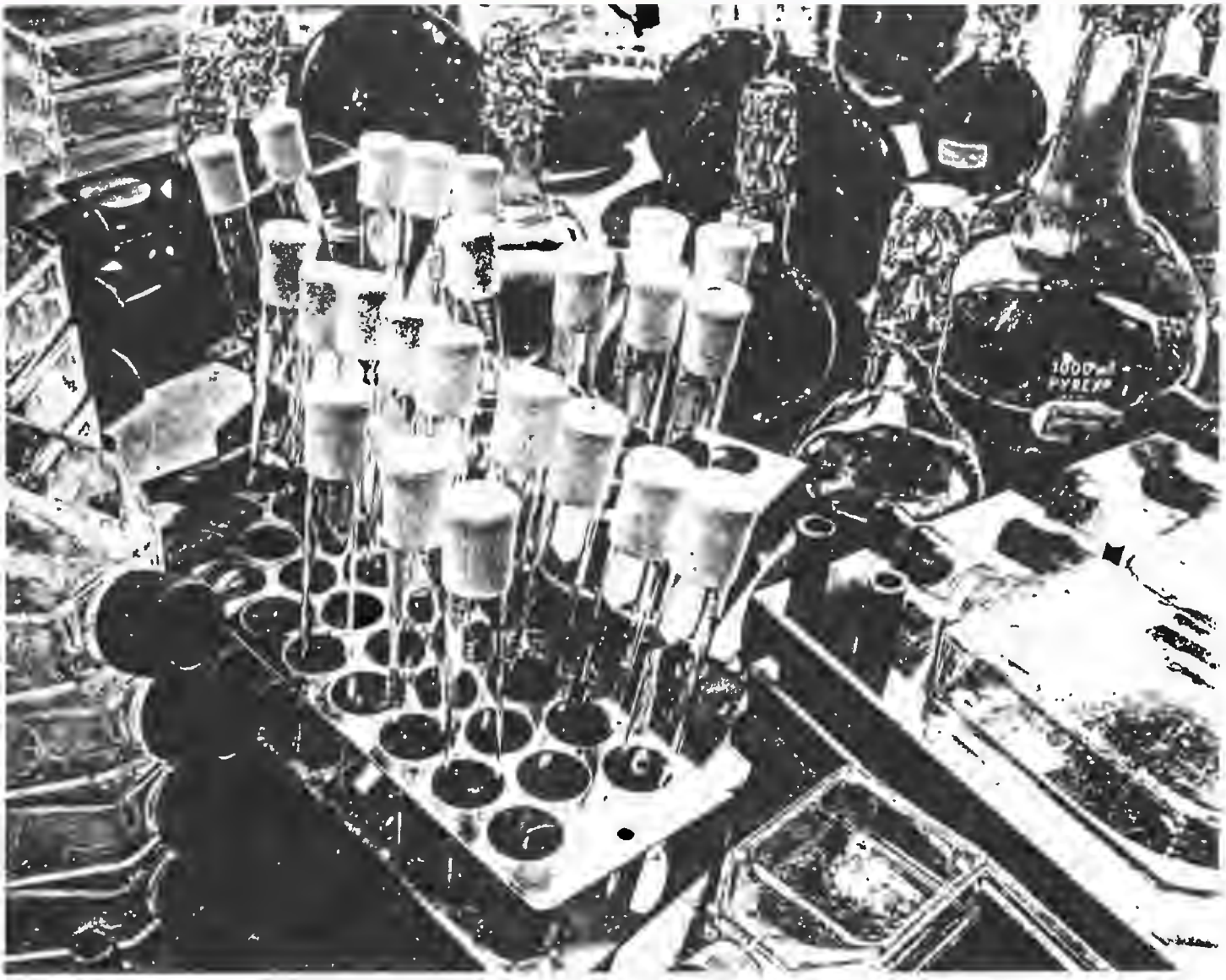
Departments

Front cover: EPA inspector in protective face mask checking pesticide received at Port of Newark, N. J.
Inside cover: Children of Seveso show effects of dioxin exposure. Head of child at rear is covered with a stocking while being treated for chloracne, a skin ailment that is a reaction to the toxic chemical. See P.11

Photo credits: Dan McCoy*, Boyd Norton*, Hope Alexander*, Bill Strode*, Marion Parks, Nick Karanikas, Gene Daniels*, John White*, Silas Mason Co. Inc., Stern/Black Star, Wisconsin Department of Natural Resources
*Documerica

Text printed on recycled paper

The EPA Journal is published monthly, with combined issues July-August and November-December, by the U.S. Environmental Protection Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget. Views expressed by authors do not necessarily reflect EPA policy. Contributions and inquiries should be addressed to the Editor (A-107), Waterside Mall, 401 M St., S.W., Washington, D.C. 20460. No permission necessary to reproduce contents except copyrighted photos and other materials. Subscription: $10.00 a year, $1.00 for single copy, domestic; $12.50 if mailed to a foreign address. No charge to employees. Send check or money order to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.



Dealing with the Chemical Revolution

By Douglas M. Costle,
Administrator
U.S. Environmental Protection Agency

We've undergone in 30 years a chemical revolution in this country. In a sense, our society has become a chemical addict. The U.S. chemical industry has sales of over $112 billion a year.

Practically everything we touch during a day has in turn been touched by man-made chemicals.

The chemicals we use have brought us tremendous benefits, but some of them pose serious problems as well. One of our difficulties in trying to deal with hazardous chemicals, however, is that we don't know as much as we'd like to know about their impact on health.

Anybody knows that carbon tetrachloride is dangerous when people are exposed to relatively large doses. But it's much less clear what happens when they're exposed to small amounts over a long period of time. PCB's are among a number of substances that we have learned are harmful—and learning that only after long years of use. DDT is another one, and so is asbestos, and so is vinyl chloride.

The point I want to make doesn't have to do with the fact that we've now identified several dangerous pollutants.

It has to do with the virtual certainty that we're going to face more grim surprises in the years ahead.

EPA is now in the process of making an inventory of all the chemicals produced in commercial volume in this country, or imported for use here. When we started on this project last year we were estimating there would be 30,000 chemicals on that list. We're now betting the figure will be closer to 70,000. And we know there are another three to four million chemicals in various stages of research and development, although only a small fraction of these are likely ever to get into commerce.

I'm confident that the vast majority of these chemicals will be shown to be harmless, when used properly. But with so many chemicals involved, the odds are strong that some whose effects aren't yet known will turn out to be dangerous.

PCB's symbolize the complex nature of the pollution problem. Once chemicals like these are in the environment, they can be incredibly difficult to get out.

Proposals have been made, for example, to dredge PCB's out of river beds, but this would involve many problems.

The expense is one major obstacle. New York State thought about dredging 40 miles of Hudson River bed, but has estimated that a full-scale effort could cost as much as $200 million.

Even if that kind of money could be found, there would still be other tough questions to be dealt with. For one thing, something would have to be done with the huge amounts of riverbed spoil. Not many mayors would leap at the chance to bring vast quantities of contaminated spoil into their towns or cities.

Assuming the disposal problem can be resolved, there's still the question of environmental damage to the river bed. For numerous waterways, this could be an especially serious concern. So we're going to have to deal with the after-effects of such contamination as best we can.

Our current problems with these toxic chemicals are part of a phase we're going through on the way to a totally new kind of approach.

It's a catch-up phase, and like any such phase it's painful. We're dealing with problems that have developed over decades. That means we've been forced to come up with after-the-fact solutions that are sometimes very complicated, sometimes very costly, and sometimes not as effective as we would like.

As a Nation, we are beginning to recognize the shortcomings of after-the-fact action. Congress recognized this when it passed the Toxic Substances Control Act, or TSCA, in 1976.

With TSCA, we're no longer going to have to wait until the chemicals are in the water, or in the air, or in the ground, before we try to control them. For new chemicals, we're going to be able to get testing done before commerical manufacturing starts, and decide *at that stage* whether controls are necessary.

Unfortunately, this is not going to be a quick or painless process. A great many tough decisions are going to have to be made.

In the case of PCB's, some of the tough decisions have already been made. EPA has proposed that they no longer be manufactured, processed, sold or used except as part of a totally enclosed system. That means the discharge of this substance into the environment is eventually going to be cut to virtually nothing.

As for many other chemicals to be regulated, we're going to have to act on many of them with less than complete, decisive scientific information. And we know that we're sometimes going to face heavy pressure to go slow.

I don't intend to foot-drag if there is evidence that a chemical poses a clear threat to the health of the American people. I have always believed that public health is far too serious a concern to take chances with. I think we should be rational and reasonable, but we must also be firm and think ahead.

There's no way we can calculate the cost of future harm represented by the pollution that's now in the environment. But we know it's potentially enormous. PCB's again provide an example. All manufacturing of PCB's has stopped. Nevertheless, we estimate that there are about 750 million pounds still in use; another 300 million pounds in landfills and dumps (most of it uncontrolled); and 150 million pounds simply loose in the environment.

There is no doubt at all that more PCB's will be turning up in the environment, and they have a half-life of more than 100 years.

We don't know yet what the effects will be in people exposed over most of their lives to some toxic chemicals.

The short-term effects of some of these chemicals are well known. We know that exposure to the pesticide DBCP injures human reproductive systems, and we know that Kepone causes nerve damage. It is less clear exactly what the chronic effects of these and other chemicals are. What is clear, however, is that some do cause chronic diseases, such as cancer.

I mentioned at the outset that we've launched a chemical revolution in this country. In truth we don't know yet what the sure consequences of that revolution are going to be.

Reducing health and other costs related to pollution is the major benefit we realize from pollution-control programs. Other kinds of benefits—harder to "cost out"—are equally important.

How much is it worth to field workers to know that the pesticides they deal with are not going to be deleterious to their health over a long period of time? To the city worker to see a clear sky? What would a child pay to be able to swim in streams that once had been too polluted to permit it? What is the value of knowing that our water is safe to drink?

We cannot put a dollar-and-cents figure on these benefits. Moreover, economists don't know how to "model" the quality of life. Yet most Americans believe that such benefits are real, and they are demanding a clean and healthy environment. We have no alternative but to do our best to help them achieve it. □

Controlling Toxic Substances

An interview with
Steven Jellinek
Assistant Administrator
for Toxic Substances

Can you describe how the U.S. compares with other industrialized countries in controlling toxic substances?

In the case of legislation to control toxic substances, the U.S. is ahead of most of the industrialized world. A number of other countries have toxics-related legislation in place—Japan, Switzerland, Canada, and Sweden. And others are now actively considering toxics-related laws—the United Kingdom, France, and Germany, in particular. Also, the European Common Market is considering a proposal for common review of new chemical substances. With respect to specifics of developing testing requirements and initiating review of new chemical substances, though, we are ahead of other nations.

So the short answer is that we're out front in this?

Japan, Switzerland, Canada, and Sweden had toxic laws before we did. But many aspects of the Toxic Substance Control Act (TSCA) and our plans for implementation go beyond those currently in place or contemplated by the other countries. In general, we have much more powerful and far-reaching authority under TSCA.

Is TSCA going to be a handicap to the U.S. in international trade?

I don't think so. It certainly is the only major law that EPA administers that has the potential for any significant effect on international trade. The automobile emission control portions of the Clean Air Act also have a potential impact on international trade, but some of our foreign trading partners seem to be doing better than American manufacturers in meeting provisions of that law. With toxics, of course, we are dealing with chemical products that as a whole involve tens of billions of dollars annually in international trade. The law requires us to treat importers the same as domestic manufacturers, and that means requiring the same types of controls, information, testing, and so forth. All these requirements must be the same for foreign manufacturers as for domestic manufacturers. Because of this, the international community is very interested in TSCA, and that's why we will continue to meet both with representatives of individual countries and with delegations from groups of countries. They are very interested in making sure that, internationally speaking, efforts to control toxic substances are consistent and basically harmonious. That's why our first contacts with the international community have focused on ways to harmonize approaches to testing chemicals and to assure that tests are done adequately.

Will all these requirements be viewed as helping to fuel inflation and raise costs for manufacturers?

There's no question that there are various ways of implementing TSCA that would make it more expensive for chemical companies to do business than if the Act did not exist. But the chemical industry represents an extremely healthy and profitable sector of the American economy, and I believe that any of the costs we would conceivably impose under TSCA would be absolutely minuscule compared to the industry's sales, assets, and profits. Furthermore, I don't think we're talking about any kind of major economic impact from TSCA implementation. And the benefits that we would realize from these economic impacts—benefits to the Nation's public health and environment stemming from the wise control of toxic substances—would far exceed any adverse economic effects.

You pointed out in a recent speech that there are 14 other major Federal laws concerning some aspect of toxic substances, in addition to TSCA. How does TSCA make a major contribution to solving our problems?

TSCA provides EPA with several unusual authorities that don't exist under any other Federal toxics-related law. The other statutes generally are of two types: those that concern wastes or by-products of manufacturing, such as the toxics-related provisions of the Air Act, the Water Act, the Ocean Dumping Act, and so forth, and those that deal with special categories of toxic chemicals and involve licensing or registering those products, such as pesticide or drug registration laws. There's also the Occupational Safety and Health Act, which in part focuses specifically on worker exposure problems. However, TSCA is very broad and very comprehensive. It deals with chemicals and products, per se, throughout the life cycle of the chemicals —through manufacturing, distribution, use, and disposal. So it encompasses the entire spectrum of interest that one might have in toxic chemicals.

It also provides EPA and the Federal Government with some very important new authorities. In enacting TSCA, Congress recognized that there must be a way for the Government to gather various kinds of vital information on chemicals. One of the things that we knew most about chemicals was that we didn't know enough. For example, we didn't know which chemicals were being manufactured, what volumes were being manufactured, and what health and environmental effects they caused. We kept getting hit with "chemical-of-the-week" or "chemical-of-the-month" scares, and we were unable to anticipate these problems. TSCA has two important provisions to help solve this problem. One gives us the authority to gather basic chemical-related information so we can make more informed decisions. Section 8 is the information-reporting and record-keeping part of TSCA that gives EPA the authority to collect all kinds of information from industry on chemical production, use, exposure, by-products, impurities, and so forth. The section 4 testing provisions of the Act give EPA the authority to require that industry actually perform tests on chemicals in order to develop health and environmental effects information that may not have existed at all or, if it did, was not available to the Federal Government. With that kind of information, not only will EPA be better informed about chemical risks, and therefore better able to control what appears to be the most unreasonable risks, but other agencies such as the Occupational Safety and Health Administration will be better informed about the kinds of chemicals that workers deal with. Right now OSHA doesn't have the authority to require testing or require certain kinds of information from manufacturers. Often, OSHA doesn't know what actually is being produced by a given chemical company. We'll be able to help OSHA do its job better by collecting information that they can use. The information that we get on health and environmental effects through the use of TSCA will be useful to the EPA air and water programs, too. If a problem is so pervasive that it cannot be controlled effectively through any other Act, then the law says that TSCA ought to be brought in to do the controlling. That is one of the new and different things about TSCA.

Another unusual feature of TSCA gives EPA the authority, under section 5, to review notices from manufacturers of their intent to put new chemicals on the market. Based on the results of this review, we can take action to stop or limit the introduction of new chemicals if we think they will cause unreasonable risks to health or the environment. Beginning early next year, every new chemical will be subjected to this premanufacture notification requirement. EPA will have 90 days, extendable to 180 days, to read the notice and decide whether to take action. If we decide not to take action, the chemical goes on the market.

TSCA's premanufacture review authority is different from the pesticides law in that it's broadly applicable to all new chemicals. Pesticides are registered for very specific uses as chemical products that are intended to be poisons and therefore require special attention. With TSCA, every new chemical is considered a potential problem, and the premanufacturing notification process gives EPA a chance to identify and stop those that have the greatest potential to create problems.

Does the Act authorize you to select priorities for which toxics you're going after, and why?

There are all kinds of priorities. Institutionally, we feel that we have to give priority in these first few years to establishing the Act's basic testing, information-gathering, and premanufacturing notification functions so that we can provide the basis for a long-term, effective control program. It takes a long time to build a case against chemicals. You must have information available, you have to know how to use that information, and how to develop it into a risk assessment that identifies what the problems are and demonstrates that the problems are greater than the benefits. So we have a long pipeline to fill, and we recognize that we have to start filling it with adequate risk assessments and information right from the beginning. By law, of course, we have a statutory deadline to get the premanufacturing notication program going, and we are giving priority to that.

In addition, we are identifying high-priority chemicals for early regulatory action. The Act encourages us to give high priority to those chemicals that cause cancer, birth defects, or gene mutations. We're trying to identify those chemicals, based on existing information, that are highly toxic, whose health effects are indisputable, and that are widely used and, therefore, widely exposed to people and the environment. We are placing highest priority for early regulatory action on chemicals that have high exposure, are highly toxic, and for which the case is relatively well made. We don't want to wait two to three years before regulating our first chemical. Right now, we're looking at substances like asbestos, benzene, and some of the other known human carcinogens and highly toxic chemicals.

What about radioactive wastes? Is that out of TSCA's jurisdiction altogether?

TSCA excludes certain substances that fall within the scope of other laws. Radioactive materials that are regulated by the Nuclear Regulatory Commission are excluded for purposes of this Act, for example, as are drugs and food additives, which already are regulated by the Food and Drug Administration. Congress didn't want us to duplicate other regulatory programs, so they specifically prevented us from dealing with them under TSCA.

Are all toxics "poisonous?"

I can't give you a simple answer to that. By definition, all pesticides are poisonous to something. Their purpose is to kill insects, weeds, microorganisms, and so forth. Not all chemicals are poisonous, but any chemical in any amount may be a poison, in the sense that it may have a deleterious effect on the organism it's interacting with. There's no definition of a "toxic substance" in the Act.

I assume in your work you are going to find that some toxic substances are in fact poisonous and require appropriate deliberation to protect human health and the environment.

Yes, of course. We're going to look at individual chemical substances and then decide under what conditions the chemical is exposed to people and the environment. Then we'll try to determine whether those conditions are dangerous or pose unreasonable risk; if so, they will have to be controlled.

How do toxic substances differ from pesticides?

TSCA excludes pesticides, which EPA regulates under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). With pesticides, we have a registration program in the truest sense. You cannot legally put a pesticide on the market without getting EPA approval, or registration, and you cannot change the use of a pesticide without EPA approval. There are a number of other things you cannot do with pesticides without getting EPA approval. TSCA, on the other hand, is wide open. By that I mean it requires EPA to use its own discretion to identify and control problems as they become known. FIFRA puts the burden on the manufacturer, who has to say: "Here, I want to use this pesticide. Approve or disapprove it." TSCA is much more flexible and puts a completely different type of burden on industry and EPA. Other than that, there are a tremendous number of similarities between TSCA and FIFRA when it comes to investigating the health and environmental risks of chemical substances. But under TSCA, we're looking for other chemical products in the industrial process, in consumer products, and in intermediate chemical businesses; we've got to find toxic chemicals, to identify them, and to make sure we're working on the most important ones.

How many chemicals must EPA deal with under the TSCA?

Our rough estimate is that 70,000 chemical substances are in commerce in the United States. About 111,000 chemicals have been reported to us on forms by the entire chemical industry as part of the initial chemical inventory under TSCA. Many of those companies, of course, produce the same chemicals, so there is a lot of duplication in that figure. We are processing those forms and will shake out the duplicates, so the final number will be much lower than 111,000. It may even be lower than 70,000.

Could you give us a thumbnail description of how the Act will enable you to handle this enormous number of chemicals?

Chances are very good that most of the estimated 70,000 chemical substances are not toxic, at least in the ways they are normally used and exposed to people and the environment. Probably 80 or 90 percent of them are not toxic in the sense that they don't present unreasonable risks to human health and the environment. Also, we expect that most of the 70,000 are manufactured in small quantities. And we think that relatively few of them—maybe 10 to 20 percent—are manufactured in significant quantities, meaning over 100 tons or so. We will know more about this when the chemical inventory is completed later this year, because we've asked for production information.

We have to identify the high-volume, high-toxicity chemicals and focus our efforts on those that appear to pose the biggest problems to the most people. If we had all the staff in the world, theoretically we could investigate every one of those 70,000 substances even if only five tons of a chemical were manufactured once every other year for some special, completely enclosed use in a reaction vessel in some small factory in Peoria. But realistically, we can't waste our time on that. The job, as Congress recognized, is to find out which chemical substances are the important ones, and to determine how they affect human health and the environment.

I assume you'll use computers extensively in the inventory work?

Yes, we will. The inventory itself is being put in a computer system so we can easily retrieve the information as it's needed. Much of what industry has reported for the inventory is confidential, meaning that it involves trade-secret information. Consequently, we are setting up two separate computer systems. One will only handle confidential business information, and keep it physically separate from the other system so we can maintain the requested confidentiality. Then there will be a public file of all the information that is not confidential, and it will be available to anyone who needs to use it. That file will include aggregations of some of the confidential data that cannot be identified by any individual company, but we fully expect that enough information will be available for analysis to understand the nature of the chemical industry and the problems TSCA was enacted to control.

What safeguards are being taken to protect the trade secrets?

Over the past several months, an internal EPA task force has developed a very thorough set of security procedures to ensure that this information is handled carefully, and that it is not disclosed inadvertently. In the unlikelihood that some trade secret is willfully disclosed in an unauthorized manner, the Act itself provides some fairly stiff criminal penalties, which EPA employees and others authorized to use the information are subject to.

Can you describe how a fully implemented TSCA might have prevented such past toxics-related disasters as those involving DBCP, PBB's and Kepone?

The Act gives EPA the power to identify problems before they develop, particularly with new chemicals. We will have certain information on a chemical in front of us before it goes on the market. We'll be able to decide at that point whether it's going to be a problem. So if we saw a sterility problem in animal tests—as in the case of DBCP, for example—we could have flagged that for more attention and have gotten ahead of the problem before many people and the environment were exposed to the chemical.

I should mention, however, that our ability to identify problems beforehand will only be as good and as thorough as the competence of our staff. Thus far, the Agency, the Administration, and Congress have been very sympathetic toward our staffing needs, and we expect to be increasing our staff in the months and years ahead. I've been encouraged with the excellent quality of people we've been able to attract to the program so far. And in addition to EPA's own efforts under TSCA, of course, industry knows that we will be looking over its shoulder. Not only that, but we're going to be between industry and the market place. I think these factors will have their own impact on the way industry makes decisions on chemicals. Industry will try to identify and avoid potential problems ahead of time. So TSCA will have some indirect influence that we hope will help prevent many kinds of problems that have occurred in the past.

My understanding of the PBB catastrophe in Michigan is that it largely involved a tragic human error. A highly dangerous chemical was accidentally mixed with cattle feed. As terrible as this was, I doubt whether EPA or TSCA could have done much at the time, or

Continued on page 23

The Team Leaders

Four Deputy Assistant Administrators help Steven Jellinek run EPA's program to regulate toxic substances and pesticides. They are responsible for a national effort involving 1,282 employees and $86.1 million a year.

Marilyn C. Bracken
Deputy Assistant Administrator for Program Integration and Information.
Responsible for integrating the Agency's toxic substances activities, coordinating interagency toxic substances strategies, and for establishing and operating toxic substances information programs and policies. Directs the activities of the Program Integration Division, the Chemical Information Division, the Monitoring Division and the Office of Industry Assistance. Dr. Bracken has also served as Associate Department Head, Environmental Chemistry and Biology, and Department Head, Energy and Environmental Information Systems, at the MITRE Corporation. She was Director of the Division of Scientific Coordination, Bureau of Biomedical Science, U.S. Consumer Product Safety Commission; was involved in developing data-base management systems at the Office of Information Systems, U.S. Department of Agriculture, and was an information systems analyst at the National Agricultural Library. Dr. Bracken was also a chemist at the National Bureau of Standards and Melpar, Inc.

John P. DeKany
Deputy Assistant Administrator for Chemical Control.
Responsible for the planning, evaluation, and operation of the regulatory control program under the Toxic Substances Control Act (TSCA). This includes identifying and initiating needed actions to regulate chemical substances and mixtures; performing, or insuring the performance of, scientific, economic, and technological assessments in support of such actions; holding informal hearings on proposed regulations; developing rules for controlling chemicals; receiving premanufacturing notices for new chemicals, reviewing such notices, and determining the need for any control action. DeKany also supervises the Premanufacturing Review Division and the Control Action Division in the Office of Toxic Substances. Prior to this job, DeKany was Director of the Emission Control Technology Division in EPA's Mobile Source Air Pollution Control Program. DeKany was responsible for the development of regulations, test procedures, and technology assessments for the Agency's motor vehicle and aircraft emission standards setting. Previously he worked in what is now the Office of Research and Development's Industrial Environmental Research Laboratory in Research Triangle Park, N.C. DeKany also has fourteen years' experience in nuclear engineering. He was a manager of marketing strategy for Westinghouse, a venture analyst for Gulf Oil Corporation, and a nuclear project engineer for the U.S. Atomic Energy Commission and Argonne National Laboratory.

Edwin L. Johnson
Deputy Assistant Administrator for Pesticide Programs.
Responsible for managing and directing the pesticide activities of the Agency. Included is the development of strategic plans to control the adverse effects of pesticides and to establish policies and regulations which will lead to more judicious and environmentally-acceptable pesticide use. Johnson's office has responsibility for standards governing the certification of pesticide applicators; the registration of all pesticide products under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); establishing tolerance levels for pesticide residues in food and feed; monitoring pesticide residues in plants, animals, and the environment; reviewing requests for emergency pesticide uses and special local needs; determining research and monitoring needs and requirements, and reviewing environmental impact statements concerning pesticide use. Johnson has previously served as Associate Deputy Assistant Administrator for Pesticide Programs, Director of Operations and Strategic Studies for Pesticide Programs in the Office of Water and Hazardous Materials, and Special Assistant in the former Office of Categorical Programs. Johnson was a program and management analyst, an engineer systems analyst, and then Chief of the Systems Analysis and Economics Branch at the former Federal Water Quality Administration. At the U.S. Public Health Service, he was an engineer and project director and then Chief Economist for Comprehensive Planning and Programs.

Warren R. Muir
Deputy Assistant Administrator for Testing and Evaluation.
Responsible for planning and operation of the program to identify and evaluate the hazards that chemical substances and mixtures may pose to health and the environment. This includes developing criteria for assessing pertinent scientific data, establishing and carrying out policies and procedures for required testing under TSCA, developing and evaluating test procedures and guidelines, selecting chemicals to be tested, and conducting risk assessments in support of regulatory action on existing chemicals and as assistance in judging hazards of new chemicals. Previously, Dr. Muir was Senior Staff Member for Environmental Health at the President's Council on Environmental Quality (CEQ). His personal responsibilities in program development at CEQ included toxic substances and environmental health, occupational health, pesticides and integrated pest management, regulation of chemicals, environmental effects research, environmental health conditions, and chemical substance information. Program development by his staff concerned monitoring, the analysis of environmental conditions and trends, information systems, environmental indicators, and the design of UPGRADE, a computerized system to analyze and display environmental data.

By John Heritage

Major American toxics disasters

Back in 1971, a little girl named Andrea Piatt became mysteriously ill in her Missouri home. She was hospitalized immediately, suffering bladder pain, diarrhea, bloody urine and headaches.

It took more than three years for scientists to find the culprit. Andrea had unknowingly been exposed to a highly toxic chemical, TCDD, a dioxin. The poison was a by-product in the making of hexachlorophene, an antiseptic.

The TCDD that sickened Andrea was so potent that it killed hundreds of birds, dozens of pet dogs and cats, many rodents and even the flies where the chemical had been sprayed. More than 60 horses also died.

Andrea's tragedy is an example of why the Toxic Substances Control Act was enacted. With this new legislation, which went into effect in 1977, Congress acted to head off similar incidents in the future. Here is the rest of Andrea's story and some other disasters that the new law was designed to prevent.

TCDD

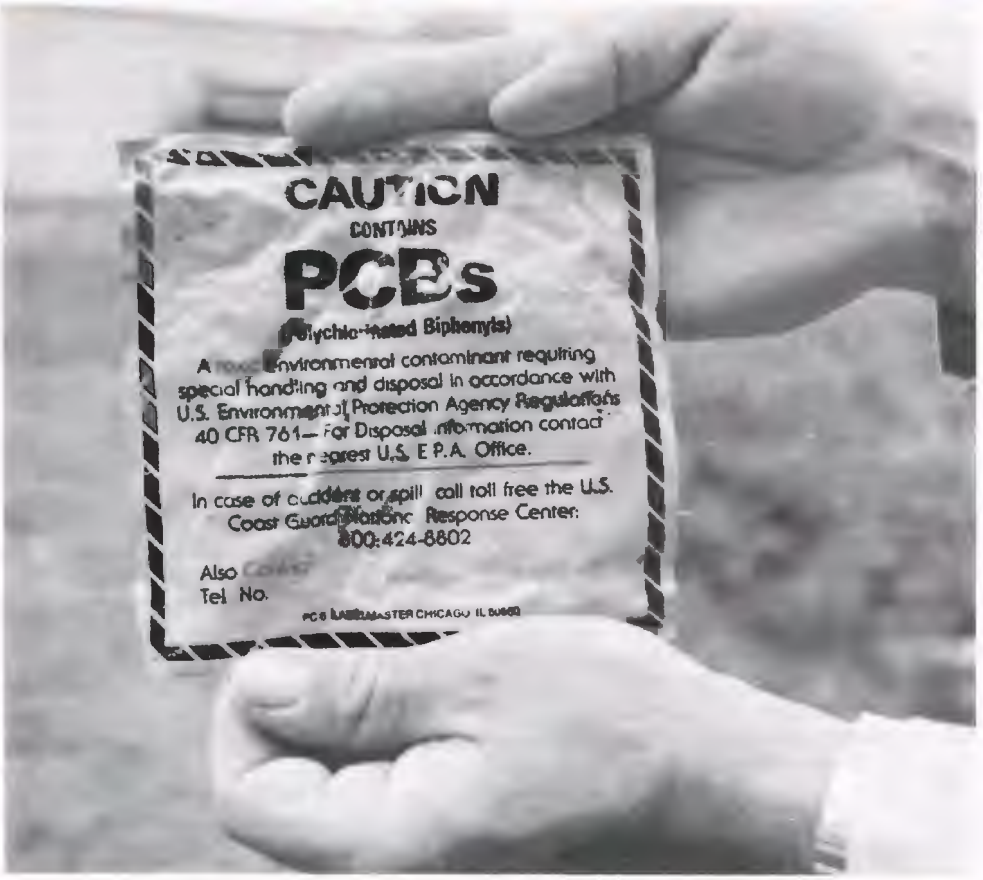
Andrea liked to play in the big barn and horse arena on a farm near Moscow Mills, Mo. Then on May 21, 1971, a truck drove up and sprayed the earthen arena floor with about 2,000 gallons of what Andrea's mother and her business partner were told was salvaged motor oil, to keep dust from blowing around. Three days later, the birds began to die.

By the time Andrea was hospitalized and hundreds of animals were dead, everyone involved suspected that something in the waste oil had caused the epidemic. But no one knew what.

The answer even eluded scientists at the Center for Disease Control in Atlanta. Finally, a toxicologist who had read about TCDD in Germany proposed that soil from the horse arena be tested for it. The test confirmed the poison's presence.

The TCDD was traced to a tank of waste liquids at a chemical plant 350 miles from the farm. The plant was making hexoachlorophene, and TCDD was one of the leftovers.

John Heritage is an Assistant Editor of EPA Journal.



Barrels of PCB wastes carry these labels at a temporary holding site until they can be transferred to a licensed PCB disposal site.

The plant owners had contracted with a chemical distributor to get rid of the wastes. Under subcontract, a truckload of the contaminated liquids had been hauled to a storage yard in St. Louis, and the truck later sprayed the TCDD-tainted wastes on the horse arena where Andrea played.

The TCDD trail showed the consequences of ignorance and lack of effective regulation. When an industrial waste with dangerous TCDD got into circulation, death and illness were the result.

Tris

Children also were involved in another more recent episode. Back in 1972 the U.S. Department of Commerce set mandatory flameproofing standards for children's nightgowns and pajamas. A fire retardant chemical called Tris appeared to be an economical and convenient answer to the rules. Soon it was being applied to about half the children's sleepwear sold in the country.

At the time it seemed that one hazard of childhood had been lessened, because in 1973-74, the first year flame-proofing was mandatory, children's burns and deaths from clothing fires showed a decline.

But then another problem surfaced. EPA-funded research at Columbia Univer-

sity showed that Tris had the potential to cause mutations or changes in cells. In late 1975, EPA reported the results. By February, 1977, National Cancer Institute data showed that Tris was a highly potent cancer-causing agent in test animals. Other research showed the chemical could be absorbed through the skin.

In April, 1977, the Consumer Product Safety Commission halted the production and sale of Tris-treated clothing. Based on available data, it was estimated that 300 out of every million male children wearing Tris-treated pajamas for 12 years would develop cancer.

The dream of an easy answer had disappeared. In the effort to protect children from fire, millions had been exposed to a cancer risk. The threat hadn't been checked before the first safety rules were issued. By the time health action came, Tris-treated nightwear had been used from coast to coast. It was yet another demonstration that the public needed the protection of the new toxics law designed to help detect carcinogens before they found their way into the marketplace.

DBCP

Workers were the victims in still another toxics incident. This time, the workers belatedly learned something was wrong, but damage already had been done.

The story broke on network television in late July, 1977. More than a dozen workers at the Occidental Chemical Company in Lathrop, California, had become sterile or had very low sperm counts. A soil fumigant known as DBCP was believed to be the cause. The chemical was widely used to protect crops from root-destroying roundworms.

In less than two weeks, production of DBCP in the U.S. was halted voluntarily and California banned its production, sale, or use.

Moving with unusual speed, the Federal Occupational Safety and Health Administration completed the complex steps to set an emergency standard on DBCP to sharply restrict the levels of the chemical to which plant workers could be exposed.

EPA suspended and announced its intent to cancel DBCP use on 19 crops with edible roots, and set special handling rules for other DBCP uses. The Food and Drug Administration said it would monitor farm produce headed for market to check the chemical's residues.

Although Government, industry and labor had moved quickly once the national publicity focused on the problem, warning signals actually had been flashing for 16 years. In a 1961 study commissioned by industry, DBCP was identified as damaging to laboratory animals. At the lowest level of exposure studied, breathing DBCP vapors was found to harm the liver, kidneys and various tissues including sperm cells. The report was published in a professional journal.

As early as 1973, National Cancer Institute studies had identified DBCP as a cause of cancer in animals. In March, 1976, an employee at the Lathrop plant, Ted Bricker, was told by a doctor that he had an abnormal sperm count. The diagnosis contributed to worker and union concern about possible hazards at the plant.

The long lag in controlling DBCP had many reasons. Facts were known but not forcefully communicated. Industry's recordkeeping had been spotty. The occupational health establishment seemed to be preoccupied with other ailments. And of course TSCA, with its new requirements to fill in the gaps left in other toxics laws, was not yet in existence.

PCB's

A toxic substance can do far more than harm workers in a chemical plant, or contaminate children's pajamas. It can taint the whole environment—the rivers, the land, the sea, wildlife, humans. The case of PCB's shows how this could occur.

Spring is usually a time of increased activity along the Hudson River in New York. The fishermen turn out to tap the river's wealth.

Samples of dirt taken from the bank of the Sheboygan River showed the site to be a source of PCB contamination to the watershed. At one time hydraulic fluids containing 12 percent PCB's were deposited here and the chemical has since been leaching from the soil.

But since February, 1976, the Hudson has been different. Both sport and commercial fishing have been banned on much of the river by the Commissioner of the State Department of Environmental Conservation.

The river has become contaminated by a class of toxic chemicals called polychlorinated biphenyls, or PCB's. Worse, despite corrective action by the main polluter, General Electric Co., the Hudson probably will be tainted for years.

One eel was found to have 559 parts per million of the chemical. The level was so high that an adult who ate a 7-ounce portion would get 50 percent of his lifetime "allowance" of PCB's in a single serving. Said one long-time Hudson River fisherman, "Shopping in a fish market these days is like picking your way through a minefield."

The concern about PCB's was understandable. In 1968 in Japan, a machine leak of the chemical into rice oil caused a tragic poisoning. The 1,500 victims of yusho, or oil disease, suffered skin lesions, swollen limbs, and eye and liver problems. The accident called wide attention to the danger from PCB's.

Over a period of 30 years some 230 tons of PCB's had built up in Hudson River sediments, mostly from two GE plants that had discharged PCB's with waste water. It would cost as much as $200 million to dredge the contaminated bottom, according to one estimate.

The worst of the buildup was in a 40-mile stretch of the river, but the chemical was reaching far from the Hudson. By 1972, the PCB's had been found in every major river system in the U.S. Prized coho salmon in Lake Michigan were tainted. The substance was found in some of Ohio's milk supply. PCB's were accidentally sprayed on 800,000 pounds of tuna meal in a Puerto Rican warehouse fire when two electric transformers burst.

Like its distant relative, DDT, the chemical was everywhere. It was estimated that 51 percent of the people in the U.S. had some PCB's in their bodies. Meanwhile, research was implicating the compound in cancer and birth defects. Among other results, high PCB doses killed laboratory test animals.

Because the PCB's are chemically stable, fire resistant, and don't conduct electricity, they had been widely used in electrical equipment for many years. Other PCB-aided products included adhesives, paints, insulating tape, printing inks and plastic. Some 450 million pounds of the PCB's had built up in nature and in often-leaky landfills and dumps, according to estimates.

EPA has proposed an end to the manufacture, processing, sale or use of PCB's except as part of a totally enclosed system.

Employees of the Wisconsin Department of Natural Resources post signs on a 24-mile stretch of the Sheboygan River, warning anglers to avoid eating fish because they contain high levels of PCB's.

But the compound remains in lakes, rivers, dumps, fish and people. It is a memorial to nearly half a century of ignorance about the hazards of one industrial compound.

What were the reasons for these various toxics episodes? How could the United States, with a long history of public protection, allow them to happen?

The trouble reaches back to the years after World War II, when an explosive growth in U.S. chemicals began. The trend promised to boost the Nation's living standards, though with a little-noticed drawback.

By the 1970's, the chemical revolution had transformed America, in everything from soap to skyscrapers. As many as 70,000 chemical substances were in the marketplace. Sales in the industry were more than $112 billion in 1977.

But in the birth of the chemical age, a big question was overlooked. It was the possible danger to the public's health, especially from chronic disease. Only a few thousand compounds had been adequately tested for chronic health and environmental effects. Little was known about the long-term risks of existing chemicals being marketed, let alone new ones not yet in commercial production.

Unwittingly, the Nation itself had become a laboratory. People were being tested, not the chemicals. The doses could be heavy from products, wastes, and accidents.

Few Americans had any idea until recently that they were living so dangerously. They didn't know that when they did ordinary things such as eating, drinking and breathing, they could be laying their lives on the line, playing a game of chemical roulette.

It took endangered children, contaminated fish, dying horses and other incidents to alert the public to the long-term risks some chemicals pose.

The new toxics law gives EPA strong authorities. Tests may be required on potentially harmful chemicals. Manufacturers must notify EPA of planned production of new compounds for the marketplace. The EPA Administrator can take action designed to keep a new chemical off the market. The Administrator has the authority to control existing substances as well.

The philosophy of preventive action is now functioning to protect the public from exposure to toxic substances. Although the law is no guarantee against human carelessness or willful neglect of safety measures, it does set up many new precautions and imposes major penalties against violators. While it is too early to gauge its effects precisely, observers agree that the Toxic Substances Control Act has given Federal officials a weapon that promises to greatly reduce the likelihood that compounds like TCDD, Tris and DBCP can reach the consumer in the future. □

An Environmental Calamity

THE SEVESO CASE

By Marion Parks

More than two years ago in Seveso, Italy, an explosion in a small factory producing trichlorophenol for export to the United States brought in its aftermath all the kinds of costs and consequences that environmentalists have anticipated and sought to forestall through timely and appropriate regulation. The Seveso case has shown through a tragic disaster why we need to protect the health of people and the environment from accident or misuse in the management of toxic substances, under the conditions of massive chemical production of our times. It shows as well the enormous costs to the public and the burdens and losses for the industry that can ensue when such protective regulations fail

Marion Parks is vice president of the Rachel Carson Trust for the Living Environment, Inc

or are lacking. The story is still far from ended and the toll of its costs on society will continue for a long time into the future.

The explosion on July 10, 1976, at the ICMESA chemical plant in Seveso, some 12 miles north of Milan, showered a populated area of more than six square miles with a fallout of trichlorophenol, ethanol, caustic soda, and tetrachlorodibenzo-para-dioxin (TCDD), a substance characterized by the President's Science Advisory Committee Panel on Herbicides as "extraordinarily toxic." No other agent, indeed, has yet been discovered to be more toxic. In research as small a dose as 0.0006 milligrams of TCDD per kilogram of body weight killed one-half of the female guinea pigs to which it was fed. Its effects vary with different animal species that have been tested, but only slightly.

It has been established that TCDD is teratogenic; i.e. it causes birth defects in developing animals and may be lethal to the fetus or cause abortion. It tends to cling or bond with particles of dust, silt, or organic matter and may be ingested or inhaled. It has poisoned humans and large animals such as horses through skin contact. Extensive records of sickness due to contact with TCDD show that its most conspicuous symptoms are chloracne, a severe skin disease that is very resistant to treatment, and in some cases hirsutism, an unnatural and disfiguring growth of hair over the forehead and sides of the face, as well as serious liver and kidney ailments. Many other symptoms occur, including persisting debility and psychoneurotic reactions. Whether TCDD is cumulative in living tissues has not been determined but is under investigation in several research studies. Some research in Germany and France has indicated that it may be carcinogenic, i.e., a cause of cancer. This has not been confirmed.

There is no antidote that can reverse or modify the effects of TCDD. The tetra-dioxin molecule itself is nearly indestructible. Its biodegradation in soil takes place very slowly. To some extent the process may be stimulated or aided by sunlight; when the TCDD becomes embedded deeply into soil cracks and crevices, this action has little effect. TCDD is insoluble in water but can be transported mechanically by water and lodges and persists in silt. It can be removed from various surfaces with solvent or diesel oil, but is not quantitatively diminished or altered in its action. Therefore it remains unchanged in the washing agent and containers, which are then permanently contaminated and can induce chloracne in handlers.

Tetra-dioxin can be disintegrated and consumed by heat, but only at sustained temperatures above 2500°F, much above the capacity of any ordinary incinerator. Application of heat at lower temperatures seems to intensify its reaction. According to some analysts it may have the potential of multiplying its own quantity under certain conditions of heating.

It is possible to synthesize TCDD in pure form for research purposes, but no refinement of the manufacturing process has succeeded in eliminating its occurrence as a contaminant in trichlorophenol and related compounds. These include phenoxy-acetic acid herbicides such as 2,4,5-T; hexachlorophene, a bacteriocide used in deodorants and germicidal soaps; and pentachlorophenol, used as a wood preservative. In most current production of these compounds, TCDD contamination is kept at levels below 0.1 part per million. The products are used in agriculture, forestry, cosmetics, and in hospitals (surgical soaps, for example), on the theory that at a very low level the presence of TCDD does not constitute a threat to human health, although there is disagreement among scientists regarding this theory and its interpretation.

The trichlorophenol products are synthesized from the basic material ethylene, a refinery by-product. The manufacturing process requires several steps in several types of chemical plants, which may be located in a single complex or widely separated from each other. The ICMESA chemical plant of Seveso is owned by the Givaudan corporation, a subsidiary of the giant Hoffman La Roche pharmaceutical company based in Switzerland. ICMESA's production, according to company spokesmen, was limited to trichlorophenol, all of which was shipped to the Givaudan plant in Clifton, New Jersey, for conversion into hexachlorophene.

The ICMESA installation is relatively old, a small establishment, employing about 157 workers, a Swiss manager and engineer, and an Italian chemical engineer. It is situated in an enclave of former farmland which is in the process of suburban conversion. The area around it is not an industrial zone but typically suburban, with large, substantial business centers in the towns or communes of Seveso, Cesano Maderno, Meda, and Desio, which all blend into each other. In a mixed pattern on the fringes of each one there are houses with garden plots large enough to grow a few fruit trees and vegetables and to keep chickens, rabbits, and a type of small Asian goat which has been popular in the area; two- to four-story apartment buildings; and scattered throughout the four communes a multitude of small and medium artisan shops, with some 25,000 employees. The shops produce furniture, mostly for export to Switzerland and other European countries.

The heavily traveled modern freeway running northward from Milan to the Swiss frontier skirts the east side of the ICMESA plant. The housing development, which was hardest hit by the chemical fallout, is situated between the freeway and the factory. About a mile-and-a-half to the west of ICMESA is the Seveso City Hall, a large dark stone and brick building. Between it and the factory lies a street of rather

large homes with tree-filled grounds, and opposite them the stretch of land and large buildings owned by the Seminary of St. Augustine, and between there and the factory a few blocks of mingled shops and dwellings.

The local health and labor authorities did not know what was produced at ICMESA. They did not know where the product was shipped or in what quantities, whether toxic wastes were generated, or what disposal was made of them. No information on that score is available now. A few years before the accident, the Seminary sued the company because some of their cows

Barbed wire fences cordon off some of the most badly contaminated areas of the town.

were poisoned by water from the Seveso river, which runs near ICMESA, but did not obtain a judgment. The factory Workers' Council had requested information through the local authorities about the chemicals they handled in order to determine occupational hazard two years before the explosion, but a reply from the company was still pending.

Italy has no government agency for environmental oversight. Its laws regulating industrial pollution are old and bear little pertinent relation to conditions of modern petrochemical operations. The almost unlimited expansion of this industry, under few restrictions and lax inspection policies, has been encouraged in order to gain its input into the weak national economy. As an outcome of the Seveso disaster a government census of industry throughout the country has been urged and demands for regulation under new laws and more enforcement of such regulations as exist, have been voiced in Parliament.

On Saturday, July 10, 1976, at noontime, the runaway explosion took place in the ICMESA reactor, as a crew of six or eight workers were shutting down the plant for the week-end. In a split second the chemicals in the 2,000-litre tank roared up with a force that the control valve failed to contain, and shot out through the vent opening to the outside of the building in a rolling greyish-white cloud. It later was estimated to contain some 500 kilograms of sodium hydroxide methanol and tetrachlorobenzine, the basic components of trichlorophenol. By official estimate two to three kilograms of TCDD were suspended in this mass. Some observers believe it may have been much more. At the lowest estimate, considering the extraordinary toxicity and persistence of the tetra-dioxin, it was a staggering amount. The manager of ICMESA said that 1,000 kilos of trichlorophenol and perhaps some TCDD remained in the reactor. Volunteers were trying to clean it out. One worker developed severe chloracne.

Similar, indeed practically identical, accidents have happened in the production of trichlorophenol over a stretch of years since 1948, twice in chemical plants in the United States, twice in Germany, once in England, once in Holland. In each instance workers and others in contact either with them or something in the plant have suffered chloracne and other sickness requiring medical care for prolonged periods. Contamination of the buildings and equipment with the tetra-dioxin was ineradicable to a degree requiring demolition (under extreme precautions) and the rubble was put under cement and buried or dumped at sea. In every instance, prior to the explosion at Seveso, the poison was contained within the factory. The injury and sickness of workers, their treatment and compensation, dismantling of equipment, demolition of buildings, and disposal of the rubble all were internal matters for owners, managers, and company physicians. The reports of the latter, published in some scientific journals in England and Germany, were of prime importance to the Italian health officers in identifying, confirming, and coping with the Seveso disaster.

In Seveso for the first time, such an accident became a public affair, a regional disaster. No health officials were prepared for it. The body of reference information they needed was extensive but not codified, readily accessible or definitive. The more they learned from it, the more appalled they became. Responsible officials nonetheless had to take the terrible risks of decision in that nightmare situation with no firm precedents to guide them and under enormous pressures to find a quick fix and avoid public panic. On July 30, twenty days after the explosion, the Minister of Health, in defending the government for not having acted faster than it had, said that "no similar accident has occurred before in the world," adding that it was not possible yet to decide the best way to decontaminate. That decision, in fact, has not been fully settled on up to this time.

A momentary wailing whistle accompanied the escape of the chemical cloud out of ICMESA and a stench filled the air. The day was fair with almost no wind. The vaporous mass settled to the ground, bounced upward, descended again, and vanished. Its load of sticky vapor and fine white crystals settled visibly on vegetation and walls and drifted invisibly far beyond the apparent area of its fall. ICMESA offered the first map of the area contaminated. It ran in the shape of a triangle with the apex at ICMESA, south and eastward from the factory. The first estimate was 12 hectares or 26.8 acres. Day by day, for many weeks afterward, the zone of impact was to be extended by new discoveries of the presence of TCDD. As of now, a plot of some 150 acres has been sealed off from any access, and is deemed unusable for at least 10 years, perhaps longer.

People for the most part were indoors at their noonday meals when the explosion occurred, but a few little children were playing outside. Some of them ran to the cloud, laughing, with arms outstretched. It looked to them like snowflakes. Those children are still sick, disfigured with stubborn chloracne over faces and arms, destined to years more of treatment and eventual plastic surgery. Many adults became nauseated and had headaches after the cloud came down. But they were accustomed to the occasional noisome emissions from ICMESA. They ignored this latest one and waited for the effects to pass.

On Sunday afternoon, two representatives of the management of ICMESA sought out the health officer and the Mayors of Seveso and Meda. They said the people should be warned not to eat fruit, vegetables, poultry, or rabbits from their yards. Samples of soil and vegetation from around ICMESA were collected and sent to the company laboratory in Dubendorf, Switzerland, for analysis. Flowers and leaves touched by the fallout were beginning to wilt. There was evident damage to crops in the path of the cloud. On Monday and Tuesday some adults reported illness and children were suffering with body rash. Domestic animals were sickening. On Tuesday they began to die. The veterinarians found hundreds of wild birds, seemingly including a whole flock of swallows, dead on the ground. Wherever they went, they encountered dead field mice and moles.

Friday, July 16, the workers closed down ICMESA. At 6:30 that evening the management told the health authorities that the emission "was toxic." The acting health officer stated that the people should be evacuated from the contaminated zone. Twelve children were hospitalized. The Mayor ordered the preventive destruction of the vegetation and the animals in the zone, the carcasses to be picked up by truck squads from ICMESA and held there. At five o'clock the next morning, ICMESA sent trucks with spray equipment around to douse the vegetation with lime. The workers refused to go back to the factory. The Mayor ordered it closed and on July 18 a judge ordered its sequestration. The only other factory in the immediate area, a plant which made children's clothes and employed about 80 women workers, was ordered closed. Fourteen children were now hospitalized with rash and skin lesions. The doctors noted that the lesions were of a type not encountered before. On Tuesday, July 20, ten days after the explosion, it was confirmed both for the health authorities and the public, that the poison they were dealing with was TCDD. The following day 444 people were evacuated from their homes and housed in a large hotel complex about ten kilometers away, near Milan. Eighty children were sent to summer camp at Lake Como.

Physicians and scientists began to mobilize. Health and public authorities held meetings daily. From some quarters a demand was raised to burn everything to the ground. A military contingent arrived with armored trucks and flamethrowers and remained on call for weeks, to the intense alarm of some of the scientists and health officers. Burning was held in abeyance while other possibilities were studied. It was proposed to remove a layer of soil to the depth necessary to remove the tetra-dioxin penetration and spray the earth taken away with a layer of plastic.

Two American military officers, believed attached to NATO, appeared, took soil samples, and went away mysteriously. The memory of U.S. military use of herbicides in Vietnam intruded frequently, and was like a stage ghost every little while stalking through the scene. Insistent demands were made on the public authorities to summon the Vietnamese doctor Thon That Thun as a consultant. His advice, electronically transmitted to the press, was to watch for the protection of the natural defenses of the body organism in exposed people, apply antibiotics, immunostimulants, and prescribe Vitamin C. His advice regarding decontamination was picturesque if not practical: wash everything down with white Marseilles soap. This was no stranger than another scientist's proposal to put olive oil on everything. There was logic in both suggestions, as TCDD, like other organochlorine chemical formulations, is lipophilic, or fat-attracted.

Worker clad in protective garb is cleaning dioxin residues from a home inside the affected area in Seveso.

The problem always remained, with any proposal, of disposing finally of the TCDD however it might be removed from the soil, house walls and roofs, school interiors, wherever it was encountered. It was soon shown that the seriously contaminated zone was much larger than first estimated, and beyond it a still greater area was designated as a "zone of caution". The final estimate of the amount of soil into which TCDD had penetrated and lodged, by depth and area, was 99,000 metric tons. Removal in the foreseeable future was an impossibility. Burning was perhaps the worst of all proposals, since some of the TCDD, released from where it lodged but not destroyed, could be distributed more widely than ever in smoke and ash and carried into the soil somewhere else by rain.

A serious study was made of constructing, probably close to the ICMESA site, a special incinerator capable of consuming TCDD by subjecting it to the necessary high temperature. Public fear and resistance to this idea led to citizen protest demonstrations. For the present, the scheme remains in abeyance. Some people, however, looking at what has become not only a national problem of Italy but a world problem —the safe disposal of chemical wastes—have thought of put-

ting up such an incinerator on a part of the wasted and ruined ground of Seveso as a point of disposal for toxic chemical wastes from all Italy and possibly a larger area.

On July 23, ten days after the explosion, a heavy rain fell on the Seveso region. Many fears were expressed that the runoff would carry the poison into the underground water basin (most of the area is supplied by wells) and the river system emptying into the Po. These fears have neither been borne out in experience nor entirely allayed. The soil of the contaminated area is largely clay; it tends to crack when dry but is not very porous. It is thought that most of the tetra-dioxin was washed into these crevices and for the most part remains there. This would account for much of the high concentrations and persistence of the poison and the ultimate decision to seal off such a large part of it against any occupancy or use—for ten years or longer as may turn out.

The Givaudan company spokesmen in Switzerland told the press shortly after the explosion that the company was financially able to pay the costs of rehabilitating the contaminated area and would take charge and do so, but this proposal was rejected by the government of Lombardy Province and the local authorities. Givaudan hired the British chemical engineering firm of Cremer and Warner as consultants and they conducted tests on the ground in Seveso.

In the last week of July, 1976, and early August, the formulation of lawsuits against ICMESA and Givaudan was begun by the Lombardy Regional government, the labor union, and other entities. The technical director of ICMESA was placed under arrest charged with "culpability of causing a disaster and harmful disregard of the misfortunes caused by his actions." His release was later obtained but the scope and duration of litigation stemming from the Seveso case will undoubtedly be costly and trying for all concerned for years to come.

The number of families evacuated from the poisoned zone continued to rise until some 750 individuals were housed in the Residencia Leonardo da Vinci. By October the evacuees, angry and desperate at the uncertainty of their situation, one day went out and stormed the barricades, demanding the right to reoccupy their homes. They were persuaded to return to the Residencia. In the next weeks people began agitating for permission to go into the Seveso cemetery to clean the graves in preparation for All Souls' Day, November 2. The area around the cemetery had been declared a military zone and the army maintained a vehicle park nearby. The people were permitted to enter and did so provided with materials for washing and polishing the large flat slabs of marble with which most graves in Italian cemeteries are covered. Nearly all of those who performed this task suffered skin rashes afterward and some complained of respiratory discomfort.

A great effort was made by the authorities to clean the schools so that the children could enter them again. The walls were vacuumed and washed with detergents, always by a work force wearing protective clothing, gloves and usually masks. After the schools reopened some 200 children developed skin rash. Some of their teachers believe that they have more respiratory ailments and colds than in past years, but this cannot be counted as an epidemiological statistic.

The knowledge that TCDD is a potent teratogen fell on the doctors and the public with enormous impact soon after its presence in the poisonous cloud from ICMESA was confirmed. In addition to emergency clinics where more than 10,000 people were examined and given blood and urine tests, a special maternity clinic was established both for counseling and for therapeutic abortion, which the Italian Supreme Court recently declared to be legal in some circumstances. Twenty-seven abortions were performed and the fetal material was sent to a German university for examination by a team of Italian and German specialists. No confirmation of birth defects was derived from this study. A very stormy period of religious and political controversy arose over the abortion question and the clinic was closed. Some women of the region, who believed they had been too dangerously exposed to TCDD to risk bearing a child that might be deformed, went to other countries for abortions in order to avoid the agitation and controversy surrounding this issue at home.

It is unlikely that any reliable or extensive epidemiological studies of birth defects have been made in any country. In the United States as in Italy, very little data have been kept or compiled in this regard over past years with which new data, for example, relating to a mass exposure to a toxic chemical that is teratogenic, can be compared. Continuing research is required and the Seveso case will be a stimulus in that direction.

Innumerable meetings of health officials, toxicologists, physicians, and public administration officers were held in Seveso, Milan, and Rome over the Seveso case. Many foreign specialists were called to Italy on consultation. An Italian team of scientists and administrators came to the United States and met with Americans in special sessions at the Department of State and the National Academy of Sciences. No one could really help very much beyond exchanging the hard information. There is no antidote for tetradioxin poisoning, they had to agree. There is no technological magic with which to counteract or repair the damage done in Seveso to the big physical area touched by the cloud and its drift, and to the segment of human society whose lives were disrupted and certainly in some cases brought to irreparable tragedy.

It was only too natural, in the charged state of political tensions and economic strain under which Italy has lived for some years now, to accuse public officials of ineptitude or poor performance. In a moment of passion, an angry citizen shot one of the health officials of the Seveso area in the legs. As a matter of fact, the Italian scientific community mobilized rapidly and the doctors worked selflessly in a day-and-night effort to cope with the emergency. A pharmacological institute equipped with the expensive, sophisticated instrumentation for the technique of gas chromatography and mass spectrometry, which are required for the detection and quantification of TCDD, already existed in Milan under highly competent specialists. They were in the Seveso action from the beginning.

As the full significance of what had happened began to be appreciated, the government declared Seveso a disaster area, provided assistance funds, and named a special national commission to deal with the problem, under the Ministry of Health. In Seveso, the unfolding situation with all its shocks and complexities involved the four Communal administrations, the Province of Milan, and the Regional Giunta of Lombardy. Their ability to get together and steer a relatively straight and basically safe course through the emergency was something of a marvel. An interesting thing about it in retrospect is that despite disagreements or conflicting opinions, or questions of lines of authority, no dictatorial figure seems to have been brought to the surface by the difficulties encountered. Perhaps this was because, in the presence of a massive poisoning of the earth with a chemical so dangerous as TCDD, the alternatives were very limited, and everybody had to come back to exactly what had been done, whether he wished to or not.

Not everyone is satisfied that enough has been done. Laxness in sealing off and guarding the contaminated zones can be charged. Many will disagree with the recent official estimate of 67 proven cases of chloracne, ascribing the hundreds of other incidents of severe skin irritation to burns from the sodium and methanol content of the fallout. Some people believe that the epidemiological surveys of the general area have been deliberately incom-

Continued on page 35

Twin chimneys at the stern of the Vulcanus mark the location of the incinerator, which destroys toxic substances by burning them at extremely high temperatures.

Seagoing Furnace Destroys Toxics

When the U.S. Air Force began casting about eight years ago for a way to dispose of its surplus stock of Herbicide Orange, the defoliant used in Vietnam, it ran into unexpected problems.

Herbicide Orange has been under heavy criticism from scientists who warned that the dioxin contaminant in the mixture caused birth defects in laboratory animals. The Defense Department had ordered the herbicide withdrawn from use in 1970 and the Air Force found itself stuck with about 2.3 million gallons of it. (Herbicide Orange was a half-and-half mixture of 2, 4-D and 2, 4, 5-T. The latter was banned for a number of uses years ago, and the dioxin was a contaminant from the process used to manufacture it.)

One proposal to bury the herbicide in Utah ran afoul of former Governor Calvin L. Rampton, who asked Federal officials to drop the idea. His administration earlier had tried to show that Army nerve gas killed some 6,400 sheep in Utah in 1968, and State officials were understandably leery of the new toxic. Another plan called for diluting Herbicide Orange and selling it to South American farmers at cut-rate prices, an idea that encountered objections by the State Department. The Air Force also met resistance with a draft environmental impact statement proposing to incinerate the stocks on land in Illinois and Texas. Opponents said this was technically unsound, environmentally dangerous and expensive, and the plan was abandoned.

Still another major alternative the Air Force pursued, at EPA's insistence, was reprocessing the herbicide to remove the dioxin by means of special coconut shell charcoal filters. This was tried on a pilot scale in Mississippi, and the experiment was successful, but it created a new problem: There was no known way to destroy the contaminated charcoal.

In the meantime, however, a relatively new technology for managing toxic substances had been gathering impetus in Europe. German and Dutch engineers since 1969 have been using at-sea incineration to destroy organochlorine wastes. (The release of such compounds to the environment is undesirable because they are very persistent and can enter the food chain. Even small quantities of some types are acutely toxic.)

The technique employed by Europeans to manage such wastes involved specially equipped ships that burned the material at high temperatures in the North Sea. The first of these vessels was the Matthias I, a small tanker of about 1,000 metric tons that had been fitted with an incinerator and was used by a German firm for half

a dozen years. A larger tanker of 3,500 tons, the Matthias II, was modified in the same way and is still in service. Then in 1975 the Matthias III, a much bigger tanker of 19,300 tons was modified in a Germany shipyard to perform similar work. Matthias III was designed to carry 15,000 tons of liquid waste in its tanks plus several thousand 55-gallon drums on its main deck. However, this ship did not perform satisfactorily, and rather than invest any further in modifications, the company decided to take it out of commission.

But in the meantime the idea of at-sea incineration already was being examined seriously by several specialists in EPA as a way of disposing of hazardous toxics like Herbicide Orange. These men included John P. Lehman, Director of the Hazardous Waste Management Division; Russell Wyer, who had been specially appointed by Kenneth Biglane, Director of the Oil and Special Materials Control Division, to study the technology; and Ronald A. Venezia, EPA project officer for environmental assessment of organochlorine waste incineration, Office of Research and Development.

The ultimate answer to the problem turned out to be the M/T (for Motor Transport) Vulcanus, a Dutch-owned vessel that had been converted from a cargo ship to a chemical tanker fitted with two large incinerators at the stern. Unlike Matthias I and II, the Vulcanus was big enough to operate worldwide. Twin diesels gave her cruising speeds up to 13 knots and she met the requirements of the Intergovernmental Maritime Consultative Organization (IMCO) and the U.S. Coast Guard for transport of dangerous cargo by tanker.

Operated by Ocean Combustion Service, the Vulcanus had many safety features, including a double hull with 15 tanks inside the inner hull to carry the waste liquid. During normal operation the tanks could be discharged only through the incinerator feed system.

The Vulcanus had been incinerating wastes from European countries since 1972 and had acquired considerable operating experience. In late 1974 EPA issued a research permit for incineration at sea of 4,200 metric tons of organochlorine wastes from the Shell Chemical Company's plant at Deer Park, Tex. The wastes had been generated during the plant's production of vinyl chloride and other industrial products.

The burn, conducted in the Gulf of Mexico about 150 miles from land, was monitored by two research vessels for possible pollution of surrounding monitored waters and also by a specially equipped EPA aircraft to measure air emissions downwind.

EPA granted permission for incineration of another shipload a month later with some corrections in monitoring, and in December issued a third permit for incinerating another 8,400 tons of wastes.

Based on these tests, the Agency determined that the process did not result in any significant adverse impact on the environment, although some modifications in the ship and its operations were required. Measurements of emissions from the incinerator stacks showed that more than 99.9 percent of the wastes had been oxidized, that is, destroyed, by the intense heat.

Observers found no measurable increases in concentrations of trace metals or organochlorides in the surrounding sea or in marine life, and no adverse effects on migratory birds.

EPA determined that at-sea incineration was a viable alternative to other means of disposal. When it was found that the disposal of contaminated charcoal canisters was not possible, the go-ahead was given for using at-sea incineration to destroy the Air Force stocks of the Herbicide Orange. Two-thirds of the Air Force stockpile was stored at Johnston Island, a lonely and remote speck in the Pacific some 850 miles southwest of Hawaii. The other third arrived there on the Vulcanus July 11 last year from storage in Mississippi.

One of the most important features of the ship was the very high temperatures that could be generated in the incinerators. The U.S. permit for destruction of Herbicide Orange called for a minimum operating temperature of 1,250 degrees Celsius (about 2,280 degrees Fahrenheit). But as matters turned out, the temperature during the burn actually approached 1,500 Celsius (2,732 Fahrenheit), hot enough to melt steel, and more important, also hot enough to destroy the toxic materials. In fact Herbicide Orange burned so well that operators had to throttle back on the flow to keep the heat from destroying the furnace.

Along with the cargo, the ship carried a special portable laboratory on her deck just forward of the bridge where specialists could study samples and monitor instruments. Elaborate precautions were taken to assure the safety of the crew as well as of the surrounding environment. In addition to normal equipment, for example, all personnel within the incinerator area had gas masks available for instant use and those exposed to high temperatures wore fire–fighter entry suits. Pesticide gas respirators, portable monitors, Scott air packs and even portable emergency eye baths were on hand. No workers were allowed to enter the incinerator area without wearing disposable protective clothing, and upon leaving they had to throw the clothing into a barrel, take a shower, and don fresh coveralls. Contents of the barrel were routinely incinerated.

Fortunately, emergency equipment was never needed. In three separate burns about 1,000 miles southwest of Hawaii in July and August last year, the Air Force supplies of Herbicide Orange were carefully incinerated without mishap.

Instruments measured combustion effluent, and the crew took wipe samples of selected areas on the ship to confirm that no traces of the herbicides found their way into living areas. In a mop-up operation, each of the tanks that had stored the herbicide was rinsed with diesel oil which was then incinerated.

In its official report to EPA on the operation, TRW, Inc., which performed monitoring, sampling and analysis to assure compliance with the EPA permit, declared, "Destruction and combustion efficiencies measured during the Research and Special Permit burns met or exceeded requirements. All other conditions of the permits related to at-sea incineration operations were met, including adherence to a comprehensive safety plan."

The significance of the Johnston Island project, however, extended far beyond destruction of the 10,400 metric tons of Herbicide Orange. According to Lehman, some 30 to 40 million metric tons of toxic waste are produced annually in the United States, and the volume is steadily increasing.

At the same time, disposal has become more difficult because of increasingly stringent controls in the new Resource Conservation and Recovery Act to protect the environment.

Long-term storage of these wastes in above-ground tanks is unsatisfactory in many cases because of the potential for leaks, accidental ignition, and spills from natural disasters such as earthquakes.

So the at-sea incineration offers another approach to disposal of these potentially dangerous by-products. Although only about half of the annual output of hazardous waste is organic and amenable to incineration, the experiments demonstrate that under appropriate safeguards, at-sea incineration can be managed safely. As an indication of growing interest by both government and industry in this relatively new procedure, the U.S. Maritime Administration has commissioned a cost study by Global Marine, (builders of the Glomar Explorer), of ship conversion for future incinerator vessels. It is believed there are enough wastes to support the operation of four such ships under the U.S. flag. If true, then an infant industry in safe, seaborne waste disposal appears to be in the making. □

The Challenges in Environmental Health

An Interview With Dr. David P. Rall, Director, National Institute of Environmental Health Sciences

Could you explain briefly the mission of NIEHS and how it differs from other organizations, such as EPA, the National Cancer Institute, and so on?

Let me point out first that we are part of the National Institutes of Health and I think that's the key to understanding how our mission is different from the more regulatory-oriented agencies like EPA, or FDA, or OSHA, or NIOSH. We try to understand in basic biomedical terms how environmental chemicals act to produce their damage to human health. We are basically interested in mechanisms. Now I know that some people think that studies on mechanisms are ivory-tower and basically irrelevant to the urgent needs of regulatory agencies. But it seems to me they are the necessary backup for effective, well-balanced regulatory action.

Stephen J. Gould, a brilliant Harvard scientist, discussed some years ago the fact that scientists are reluctant to deal with data, even though the data seem very solid and reliable, if they don't understand the basic mechanism that appears to be producing the data. He cited as an example the fact that for decades it's been known that the West Coast of Africa and the East Coast of South America fit almost perfectly, like a jigsaw puzzle cut-out. But scientists refused to accept this fit because they couldn't understand how these two continents could have belonged to each other at one time when they are now over a thousand miles apart. When the theory of plate tectonics came along, the theory that continents are on shifting, floating plates and can move and bump against each other and come apart, all of a sudden everybody said those data are nifty. Let's believe them. But what the scientists needed was the mechanism, the understanding of why the data were there in the first place. That is what I call the comforting dogma—that scientists like to be able to understand what's going on above and beyond just getting data.

Mechanism studies have another great importance to regulatory agencies. For instance, they provide the basis for developing rational, short-term tests for toxicity. One of the problems in regulating for human health protection is that our standard toxicity tests take literally years, are extremely expensive in terms of dollars and scarce professional staff, and frankly are still at a pretty crude stage. What we hope to do with our mechanism data is to be able to develop much more precise, meaningful tests for chemicals for predicting human toxicity in much shorter time frames. In addition to this basic research, which is really the essence of NIEHS, we do short-term research. We are interested in pragmatic problems. We have a large study underway on the toxicity of asbestos ingested orally, which grew out of the Reserve Mining Company's Lake Superior case. We are supporting an excellent epidemiological study at Harvard University on air pollution levels and human health. We feel that an imaginative mixture of the basic mechanistic research and relevant real-time research, (meaning directly relevant to PBB's and similar problems) is the most effective way to make the Institute strong and exciting.

We are different from the other agencies also because we deal with the entire spectrum of environmental problems, whether they be in the air, the water, or the workplace, or whether they be a result of a mixture of a therapeutic medicine and an environmental pollutant. So our mandate is broad: to look at all aspects of those chemicals that can come in contact with people and might damage human health. In addition to chemicals we have small programs on non-ionizing radiation research, (i.e., microwave effects) which I think will be increasingly important in the future, and on the harmful effects of noise.

Our current budget is around $65 million. We have about 366 full-time employees, and with the part-time and post-doctoral students, and so on, over 500 people work at our Institute every day.

How many mice and rats does your lab keep on hand for tests?

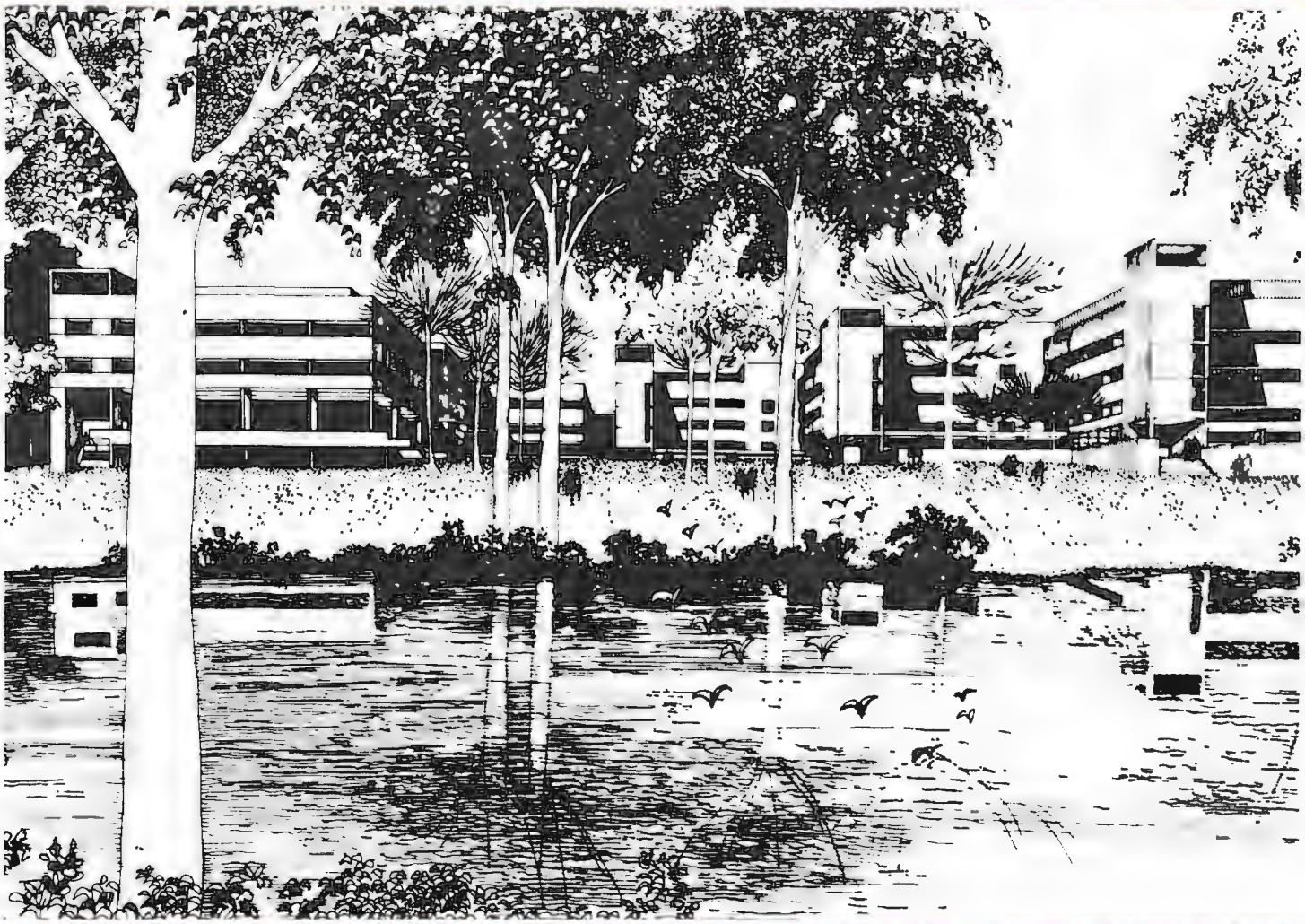
About 20,000 in our current excellent animal rooms. We are building a new facility across the street on a portion of 500 acres of land the Research Triangle Foundation gave to the U.S. Government that could have up to 120,000 mice or rats. When those quarters are finished—they should be ready in 1980—we are hopeful that this will let us expand our program significantly. Our new building is on an artificial lake which we will begin to fill in a month or so, and there is a lovely site across the lake from our building in the pine trees that's reserved for the Environmental Protection Agency.

You mentioned two studies—oral asbestos, and the noise study. Are either of these being done in cooperation with EPA?

We work closely with EPA on the noise, but there is no direct collaboration. I am pleased that EPA is contributing to the cost of the oral asbestos experiments, and I think it is another example of how we do work very closely with the regulatory agencies on matters of urgent regulatory need. That study was designed by an interagency group with NIEHS, EPA, FDA and other scientists.

At one time in your career you were very active in the National Cancer Institute in the use of chemotherapy to meet the cancer challenge. Why did you change course and take the environmental route?

Well, I hope it was a well thought-out philosophical change in course. As I began to look at the toxicity of anticancer agents I began to be concerned about how to predict for toxicity. Not for one or ten or a hundred patients, but hundreds of thousands to millions of people, and it seemed to me that a totally unsolved problem at that time, which was close to ten years ago, was the concept of population toxicity:



An artist's rendition of the National Institute of Environmental Health Science building under construction at Research Triangle Park, N.C.

What about the danger of a chemical to which many if not most people in the country are exposed? How do you predict or project the toxicity to this enormous spectrum of well people, ill people, males, females, young, old, those on good diets, those on bad diets? And this concept of population toxicity began to intrigue me, and that is really what led me down to North Carolina and the National Institute of Environmental Health Sciences.

With enactment of the Toxic Substances Control Act we have discovered there is a woeful shortage of toxicologists. Can you explain why that is and the NIEHS role in helping train new ones?

The Office of Management and Budget decided in the mid-1960's that we were training too many biomedical scientists and I happen to think there was some truth in that judgment. Unfortunately they did not look at some of the smaller specialties within the biomedical sciences and as they cut back all training programs they also cut back our training program for environmental toxicologists, epidemiologists, and pathologists. In fact in 1975, our training budget had fallen from about $5 million a year to $1.7 million, and we were literally being phased out. I was very concerned about this. The scientists at EPA were very concerned about it, and with help from the Administration, Congress put an extra $3.5 million in our 1976 budget and we are now at about a $5 to $5.5 million a year level for training toxicologists and scientists in other fields. This will help. The Conservation Foundation, with support from EPA and NIEHS, held a meeting to look at toxicology and toxicology training. They project a need for an additional 1,000 toxicologists over the next three or four years with modest continued support after that time. Our training budget for the next fiscal year has not been authorized or appropriated, but we are hopeful we will be able to train even more toxicologists in the future. The shortage is very real and very dramatic, and its continuation can have nothing but dire consequences for the Federal regulatory program as well as for industry, which increasingly wants to ensure that the chemicals it produces are safe.

We understand that NIEHS was instrumental in funding work by a physician, Dr. Philip S. Guzelian, at the Medical College of Virginia to help remove Kepone from the bodies of workers at Hopewell during the Kepone crisis. Can you describe that and comment on your organization's ability to meet future crises of this kind?

This was really very exciting. We were, of course, aware of the Kepone problem and I got a phone call from Dr. Guzelian, who said, "You know, I have most of the Kepone patients on my service at the Medical College of Virginia." Dr. Guzelian had been trained as a physician, an internist, and a pharmacolo-

gist, and he said, "We think this would be an unparalleled opportunity to look at the pharmacokinetics, the fate and distribution and excretion of this chemical in these twenty or thirty people and try to see if we can develop mechanisms to help them rid their bodies of Kepone." We were able to get a sole-source contract for Dr. Guzelian to get his work started. This was truly sole-source, since he had all the patients that were ill of this particular disease. We got that funded within two or three months, which is probably a record. He then applied for a standard NIH research grant through us and that was funded, and he now has a long-term project supported by our grants mechanism to look not only at Kepone but the possibility of eliminating other agents.

His project was successful. He discovered, which had not been known before, that a significant amount of the Kepone appears to be excreted in the bile, or at least somewhere in the gastrointestinal tract and that if you administer a binding agent, called cholestyramine, this agent can bind the Kepone, prevent it from being reabsorbed into the body, and you can increase the excretion about seven-fold. He has done this in a double-blind study and not only do the chemical levels of the Kepone go down in the bodies of the patients, but their symptoms are going away. They are becoming less sick. This, to me, is one of the great success stories of well-applied basic research in the environmental field.

Assuming that we might have another Kepone-type crisis in the future, do you have a mechanism within your organization to give a quick grant to an institute for research?

A quick contract under certain circumstances. The contracting procedure is now very complex and, as a matter of fact, if you cannot fulfill the narrow definition of sole-source, it becomes very difficult to rapidly fund people doing research of high urgency in a critical area of environmental health. And I think we should look for new means to develop the rapid support mechanism.

Do you think it would be useful for the government contracting procedures be modified so that agencies like yours can grant money to researchers rapidly?

I think it would be wonderful if there could be a mechanism whereby the various agencies involved in environmental health, such as NIEHS, EPA, and some of the others could have access to a small contingency fund each year which could be used very rapidly to explore situations where there are real human health problems and it is important to move rapidly to study and solve them, such as Kepone, PCB's, and the PBB problem in Michigan.

On that subject, are you comfortable with the laws now in place to control environmental hazards, or do you believe there should be amendments or new laws?

I think now we are really in pretty good shape. The Toxic Substances Control Act is really a landmark law. It is extraordinarily complex, as I am sure everybody at EPA understands. I guess I am conservative enough to suggest that I would like to see how implementation of the Act works before we recommend any drastic changes. If you look back over the last ten years, the growth of the ability of the government to regulate toxic chemicals, other than food additives and drugs, has gone from about zero to potentially close to one-hundred percent. This is a dramatic accomplishment and I think having bitten off this large mouthful, we probably ought to try to digest it and see how it works before we talk about new legislation.

The Act will require much more testing of toxics in laboratories, but industry often has questioned the validity of comparing results of tests on mice to the cancer hazards of a chemical to humans. Can you comment on this?

Well I am very concerned about that argument for basically two reasons. The first is almost a moral issue. If you don't test chemicals in laboratory animal situations you have no choice but literally to test them on the human population, to make the people exposed to the chemicals "guinea pigs," which means you have to have (if a chemical is toxic) a full round of human diseases, and possibly, death and/or disability, before we know that chemical is toxic and can take appropriate regulatory action. It seems to me modern society cannot, will not, and should not accept using society itself as the test animal. The alternative is to use laboratory animal tests to predict the toxicity and then take regulatory action on the basis of that prediction. I think the evidence is increasing that laboratory animals predict very well—not perfectly, but then nothing in biology is perfect—for toxicities in the human population. It has only been recently that we have begun to take a hard look at the results of laboratory animal tests and the results when the human population is inadvertently exposed to the same chemicals. Fortunately the latter doesn't happen that often. We are finding that the results are surprisingly similar.

Dr. Philip S. Guzelian of the Medical College of Virginia, who has done extensive research in toxicology, developed a method for treating Kepone victims.

The International Association for Research on Cancer at Lyons, France, has now looked at close to 400 chemicals for carcinogenicity. With roughly half of them, they feel, there is evidence at the animal level for carcinogenicity, but with most of those there is absolutely no information one way or the other as to whether these chemicals are carcinogenic in people. On the other hand, for 26 of them there is clear evidence that the chemicals are carcinogenic in humans. Now six of those are unknown chemicals from industrial processes, and in each of those industrial processes laboratory animals have identified carcinogenic components. So that for those six, there is a good relationship between animals and humans. For 16, there is also a clear positive effect in laboratory animals, and a clear positive effect in people. There are four left where there is reasonably good evidence at the human level. For two of these, arsenic and benzene, there is beginning evidence at the animal level that arsenic may be a co-carcinogen and there are two studies with benzene, as yet unpublished, that show it probably is a carcinogen in animals. The other two are chemicals which simply have not been tested in animals yet. So that suggests there is really very good concordance between laboratory animals and human results. I think we can begin to put more confidence in animal tests.

Can you explain the Ames Test for the general public?

The Ames test uses bacteria which have been genetically engineered to be very sensitive to mutations. Mutations are a way of describing what happens to the DNA, which is the way life reproduces itself with fidelity. A mutation occurs when that process is messed up. The reproduction from mother-cells to daughter-cells is no longer proper. There is a change, and that change is mutation. Most scientists now believe that most cancers have an origin in a mutation in a cell in the body somewhere, due either to chemicals or to ionizing radiation, or to ultraviolet radiation. That is the so-called initiating event in the cancer process. It is likely that other things may have to happen for that to develop into a clinical tumor or cancer. The initiating event is the disturbance of the DNA in trying to send information from one cell to the next, and that is called a mutation. These bacteria have been designed so that they pick up in a very simple way these mutations.

Is the Ames test chiefly useful to your laboratory as a quick screening or has it broader value than that?

I think the Ames test will have enormous value. We use it all the time. There are problems with it right now, which I don't think are well appreciated. The problem is there is no one Ames test. The specifications of the test, which strain of bacteria, details of the nutrient broth, details of adding the microsomal mixture are still flexible and are still being studied. It is going to be very useful, but we need to begin to apply quality control procedures to the Ames test to standardize it in one of three or four or five forms and then begin to do this very careful comparison between the results using chemicals in the standardized Ames test as well as in laboratory animals, and from what we know, in people. A good example of what I am talking about is the fact that initially the Ames test was negative with respect to saccharin. As you adjusted the conditions of the tests, made changes, you showed that under certain circumstances saccharin could become positive in that particular Ames test. So I think with the Ames test and a number of the other very promising assays, like sister-chromatid exchange, and some of the others, we need to standardize them. We need to do the testing of the test to see how predictive it is. I think it has a great future.

Is NIEHS now doing tests on saccharin, and if so, does it appear now that it is the impurities in the saccharin that are the carcinogens?

No, I don't think we are. A lot of other laboratories are. It is still intensively being studied and the saccharin story is fascinating. The so-called Canadian study really was not addressed to whether saccharin caused cancer in the bladder of rats. That had really been well established in two or three previous studies. The problem it addressed was the fact that there was at that time, and probably still is, a contaminant in saccharin, orthotoluene sulfanomide, which many people thought was the carcinogen. The Canadians spent most of their efforts trying to determine whether the contaminant was a carcinogen. The importance of their study was that the contaminant clearly was not a carcinogen, in a well-designed, well-controlled test. This immediately validated the two previous positive American studies for saccharin. The Canadians also threw in another group of animals given saccharin that in fact absolutely duplicated the two previous American studies. There are still probably other contaminants in saccharin and they are being intensively studied, and I must say today I don't know whether one of these contaminants is the mutagen-carcinogen, or whether it is saccharin itself.

Do you think it would be useful to merge the various environmentally related agencies such as yours, EPA, and the environmental functions of others, such as the Food and Drug Administration, or are they more effective as separate independent bodies?

I think you can make good arguments one way or the other. I have been impressed as I have lived within the bureaucracy that there is importance and strength to diversity. Each of the agencies really has a unique mission and needs the opportunity to focus on that mission. Whereas FDA is concerned about drugs and food additives, EPA is concerned about air pollutants and water pollutants, pesticides and toxic substances and, although many of the techniques and the methodologies are different, there needs to be a focus on the particular chemicals of concern. I think the diverse organization allows for strength in focusing on particular concerns. At the same time, I feel there needs to be much stronger coordination and information exchange between the relevant agencies, and this has moved a long way in the last six or seven years. Within HEW we have the Committee to Coordinate Toxicology and Related Programs, which has had EPA representatives on it since Day One. The Interagency Regulatory Liaison Group is now functioning very effectively. So I think I would recommend diversity but with effective coordination of the various agencies.

Recently you expressed some concern over the amount of cadmium in the environment and its effect on humans. Do you think we need an EPA standard on this and a curb on its use by the Defense Department and others?

I think it's a little early to propose a standard. I think we still need better information on emission sources. We need better information on the tracing of cadmium through the environment and how it ultimately gets to human beings. I think we need that information fairly urgently and I don't think we are quite at the stage where we know how to control cadmium. We need the information dealing with how it moves from its production and use through the environment to people before we can find those critical areas in that flow of cadmium that can be controlled.

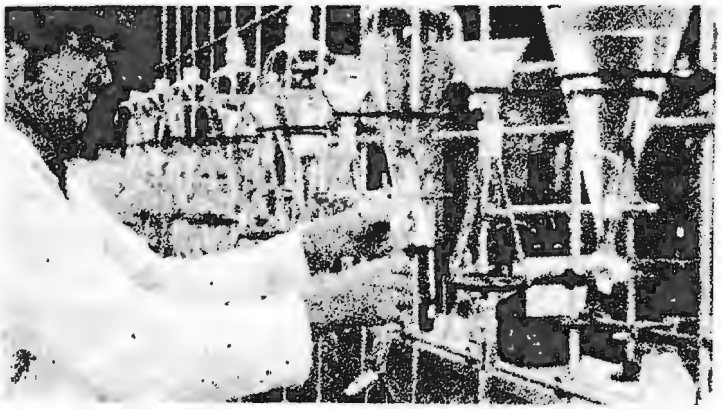
In what way is cadmium hazardous to humans?

There is some evidence that it may cause cancer of the prostate. It does damage the kidneys and it is implicated in causing hypertension. With hypertension being one of the major killers today, it could have enormous importance, but I don't think we know quite enough about it to talk about standards. I think we need to learn quite a bit more about its effect on people and how it reaches them.

What do you see as the greatest challenge in environmental health in the next decade?

I think it is what I talked about earlier. Developing and validating a series of efficient tests using laboratory animals or laboratory systems so that in a reasonable length of time, and with a reasonable amount of money we can look at a new chemical and suggest that it will likely be safe when it is put into the environment by whatever commercial process is used. I think that is the urgent need—to develop predictive tools for chemical toxicity. □

This interview was conducted by Truman Temple, Associate Editor of EPA Journal.


Wanted: More Toxicologists

Environmental health legislation, particularly the Toxic Substances Control Act, has created major new demands for toxicologists. How many are there at present? How many are needed? Is there a gap between need and supply?

To find out the answers, the Conservation Foundation organized a workshop with representatives from the chemical industry, environmental organizations, Federal and State agencies, academic institutions, and the press. Results of their discussions were published last April in a report, "Training Scientists for Future Toxic Substance Problems." Sponsors of the workshop were EPA, the National Institute of Environmental Health Sciences (NIEHS), the Chemical Industry Institute of Toxicology, and the Foundation.

According to the report, it's estimated that about 5,000 professionals now work in the field of toxicology. There is an immediate need for about 1,000 additional professionals, of whom 500 would be senior professionals with doctoral or postdoctoral training in toxicology. Some consider these projections too conservative. But in any case, they suggest the magnitude of the problem.

One thousand additional toxicologists may not appear to be a very large figure, but it represents about 20 percent of the present professional work force. In addition, there is a continuing need for new men and women to replace those who leave each year because of retirement, career changes, and so on. It's estimated that this replacement need is about 200 professionals each year, or half that number of senior professionals.

NIEHS is the major institution through which training grants are made in toxicology and other environmental health sciences. The number of predoctoral and postdoctoral NIEHS grants (including renewals) declined from 409 during Fiscal Year 1971 to 194 during 1976. The 1977 figure is 331. Predoctoral training requires an average of about three years to complete (three to four years after a bachelor's degree or two to three years after a master's degree); postdoctoral training takes an average of about two years. So the 1971 level of trainee support through NIEHS, if continued, would produce about 150 new senior professionals per year or about 135 per year for the 1977 figure.

"Such statistics confirm that current training programs are inadequate to cope with the anticipated bulge in demand," the report declared. "This shortfall is a serious national problem that deserves prompt, high-priority attention, both by infusion of adequate training funds and by a variety of other strategies. . . ."

The problem of expanding toxicology training programs, while critical, is strictly limited, both in size and time. The report warned that it would be unfortunate to set up training programs that ignore the limited nature of the need and produce an excessive number of highly trained specialists, a situation that occurred in training aerospace engineers in the 1960's.

"There is a very large price to pay for not giving priority to funding of toxicology training: that price is mistaken decisions by government and industry about the marketing and use of chemicals," the report emphasized. "Decisions on environmental contaminants, toxic chemicals, and other environmental health issues will be made regardless of the level of knowledge and professional skill brought to bear on them, because, through legislation, the public demands it. If training is inadequate in quality—or if insufficient numbers of trained toxicologists are available—the price for society can be enormous. Not only are poorly conceived and administered chemical testing programs expensive, but the cost may also be measured in lives or jobs unnecessarily lost."

Recruitment

Conferees at the workshop agreed that recruitment of outstanding trainees is essential in meeting the need for good toxicologists. The challenges and rewards of a career in environmental toxicology may not be known or appreciated by the public. Recruitment of trainees also appears to have suffered from widespread adverse publicity involving the reliability of test results in a few situations. Steady funding is critical both for trainee support and for continuity in developing competent and respected training centers, they noted.

Professional Challenges

The study of environmental contamination problems—whether the effects of chemicals on animals or people or the movement of contaminants into the human food chain—offers intellectual and professional challenges, the report declared.

"Toxicology also has a strong moral appeal as a career with clear potential for social benefit in its concern with prevention of disease and disability. And toxicologists have the opportunity to see their work used in the social judgments applied to toxic chemical questions—for instance, risk/benefit analyses and other kinds of decision making," the report stated.

From a purely practical viewpoint, toxicology was highlighted as an attractive career because TSCA and other new laws have created many professional opportunities.

The conferees suggested that toxicologists have the opportunity to spread a sense of excitement about the profession, directed toward other professions, undergraduate, graduate and high school students. While this could overstimulate interest and lead to over-expansion if carried too far, the need for new toxicologists is great enough to warrant a major effort, the report said.

Professional societies have a real opportunity to increase public awareness of toxicology as a profession, and they should consider holding meetings with chemists, pharmacologists, and other associa-

Continued on page 37

Controlling Toxic Substances

Continued from page 6

could do much in the future, to prevent such errors, per se. The possible exception to this is that TSCA gives us the authority to require special labeling of toxic chemical containers transported or otherwise used in commerce. We now are developing a labeling provision under TSCA. If such a provision had been in place at the time, the Michigan PBB tragedy *might* have been prevented.

Kepone, of course, involved willful violation of existing law. TSCA will enable us to identify those areas where Kepone-like substances are being produced; we will be able to alert regional and State officials that a dangerous chemical is being produced at a given site, and that they may want to do some monitoring to see if any of it is escaping into the environment, so in that sense, TSCA will help. But neither TSCA nor any other law can be effective in the case of willful violations.

Are you comfortable with TSCA, or are there some improvements or amendments you would like to see?

Well, I think we need to have a little more experience working with the Act before we start talking about amendments. But when we have some experience under our belt and learn that some parts of the Act may not operate the way we think Congress intended, we certainly will approach Congress about amending it; it's just too early to do so now, however.

Is it fair to characterize TSCA as a law that covers some of the loopholes in the other laws, plus gives us a broader authority?

Yes, that's a good way of putting it. It's both an umbrella and a gap filler. It covers a whole series of other laws, and at the same time fills in the gaps among them.

What about "turf" problems with other agencies? Since some other agencies also regulate toxics, do you foresee jurisdictional disputes?

There are a couple of things that can be said on this subject. One, of course, is that the other chemical regulatory agencies—OSHA, FDA, and the Consumer Product Safety Commission—have joined EPA as members of the Interagency Regulatory Liaison Group. The very reason for this group's existence is to avoid turf problems, and to take advantage of common knowledge and develop consistent approaches to dealing with chemicals. Considerable effort is going into this group to help us work together more effectively. I think this has been very successful.

The other thing is that Congress recognized that there are potential overlaps among TSCA and toxics-related portions of other statutes, and that these overlaps should be avoided. So section 9 of TSCA requires us to defer to other agencies or to other laws, if deferral represents the best way to deal with the problem. We can't just move in and poach on someone else's territory. We are obligated to assess the problem and then to decide whether the most effective solution is through TSCA or some other law. Congress was sensitive to that, and provided a mechanism within TSCA for avoiding problems of this kind.

Getting back to some of the international aspects of toxic substances control, is there a mechanism within TSCA to handle chemicals imported from other countries?

Yes. As I mentioned earlier, importers are treated the same under TCSA as domestic manufacturers. This is why there is so much international interest in TSCA. Any regulation that we promulgate for the U.S. market applies to foreign importers, as well.

If I am a Japanese exporter and I'm bringing in a boat-load of arsenic, what will U.S. Customs officials at the dock do?

Assuming that we had decided to regulate arsenic, they would be on the lookout for arsenic shipments. EPA's own enforcement people would too. If Japanese or any other foreign manufacturers develop some new chemical, we will have arrangements with customs and our own enforcement people to assure that the chemical is not introduced without proper notification under TSCA section 5.

Is there any way to control our exports of toxics to protect other countries?

Congress decided that it wouldn't give us the authority to prevent the export of chemicals that we think are too dangerous to be used in the United States. The only way we can deal with that is if the actual production of that chemical for export purposes poses such a risk that the chemical should be banned within the U.S. However, TSCA directs us to notify foreign countries if chemicals we have acted against are being exported. Congress decided that it's not appropriate for EPA to tell a foreign country that it should not use a chemical, but it is entirely appropriate that we tell them what we think the problems are with the chemical, and let them make up their own minds. The pesticide law is very similar to the toxics law in this respect, I might add.

TSCA has some very powerful penalties, including up to $25,000 a day and a year in prison for some violations. Is there any way to assure the small chemical company official that he or she won't be put in leg irons for some minor infraction under TSCA?

I can't speak directly for the Assistant Administrator for Enforcement, but I think we will take a common-sense approach to enforcing the Act—one that is firm but also recognizes that there may be unique situations that don't require as stiff or stringent approaches as others. That characterizes EPA's enforcement program generally—tough but realistic, sensitive to special concerns.

The public is hearing so many stories these days about everything causing cancer—like the recent story on fried hamburgers as carcinogens. Is there a danger they may not believe us any longer? Are you worried about whether the public will stop supporting the effort to control toxic chemcials?

This is a real problem, and a real concern to me personally. There are a couple of aspects to it. One is that it appears the public wants to make its own risk-benefit decisions in situations where individuals have personal control—such as smoking, using saccharin, or even eating hamburgers. EPA, though, is concerned about involuntary exposure to chemical risks that are unreasonable. The public has generally shown that it doesn't want to be exposed to risks it doesn't necessarily benefit from or have any direct control over. There's a big difference between exposure to a naturally-occurring risk, such as aflatoxin, and exposure to risks that do not occur naturally and are introduced by human activity. By definition, one has to live with some naturally occurring risks. □

This interview was conducted by Leighton Price, OPA Associate Director for Toxic Substances; Charles Pierce, Editor, and Truman Temple, Associate Editor, of EPA Journal.

Sharing Environmental Knowledge with Japan

By Kirk D Maconaughey

The U.S. Government will host the Third Annual Joint Planning and Coordination Committee Meeting this month with Japan, a country that led the world in enacting broad toxic substances control legislation. Deputy Administrator Barbara Blum assisted by Alice B. Popkin, Associate Administrator for International Activities will be the U.S. Chairman at the September 11-13 meeting, which will be held at the Department of State. Blum led the delegation at last year's meeting which was held in Tokyo. Hisanari Yamada, Director General of Japan's Environment Agency, will lead his country's delegation.

Although formal cooperation in environmental matters dates back to August 5, 1975, when the bilateral environmental agreement was signed, the United States and Japan have enjoyed a much longer history of working together. Considering our close political and economic ties with Japan, and the fact that we face many common environmental problems, it is not surprising that cooperation in this and related areas dates back many years.

In 1964, for example, the two countries established the US-Japan Cooperation Program in Natural Resources. It was from this program that the Environmental Agreement emerged. Informal cooperation on environmental topics also has been pursued at other levels. In 1971, Russell Train, at that time Chairman of the Council on Environmental Quality, met with Japanese officials to discuss ways in which the two countries could broaden the scope of their environmental cooperation. In the context of these discussions, regularly scheduled, high-level meetings were arranged for the purpose of exchanging technical information. With the establishment of the bilateral agreement, these meetings have been expanded and are now called the Joint Planning and Coordination Committee Meeting. The purpose of the Joint Committee Meeting is to discuss major environmental policy issues relevant to both nations, to coordinate and to review activities under the Agreement, and to make necessary recommendations to the two governments to implement the Agreement.

The US-Japan Agreement is one of nine bilateral environmental agreements in which EPA participates. These environmental agreements are in turn part of much broader science and technology agreements between the United States and other nations. Under the broad science and technology agreement between the United States and Japan, there are nine separate agreements, the Environmental Agreement being one of the most active.

Japan—World Economic Power

Japan has been called the world's most rapidly changing society. Although somewhat small in terms of land mass, there can be no mistaking Japan's importance in the world economy. Over the past quarter of a century, the country has successfully mounted an industrial and development campaign which has made her the world's third largest economic power. This same tremendous industrial and technological surge which has resulted in Japan's recent prosperity also accounts in part for her environmental problems.

To begin dealing with these concerns Japan established its Environment Agency (EA) in 1971. EA has the task of setting and implementing the country's national environmental policies. In addition to these responsibilities, EA administers national programs in the areas of nature and park conservation. Over the past seven years, EA has worked diligently to improve Japan's environmental quality. Major programs have been enacted to improve pollution controls in both air and water. A significant percentage of Japan's pollution abatement technology is directed towards four major categories: desulfurization, dust collection, industrial wastewater treatment, and sewage treatment equipment. Great strides have been made in reducing pollution levels of sulfur oxides and nitrogen oxides.

In 1976 the Organization for Economic Cooperation and Development (OECD) completed a survey on the environmental policies of Japan. In its report OECD stated that Japan has established a successful environmental program. Impressive pollution/abatement programs have been successfully introduced and pollution trends have been reversed. In such areas as air quality and toxic chemicals, the OECD concluded that environmental quality has greatly improved.

Information on Toxics

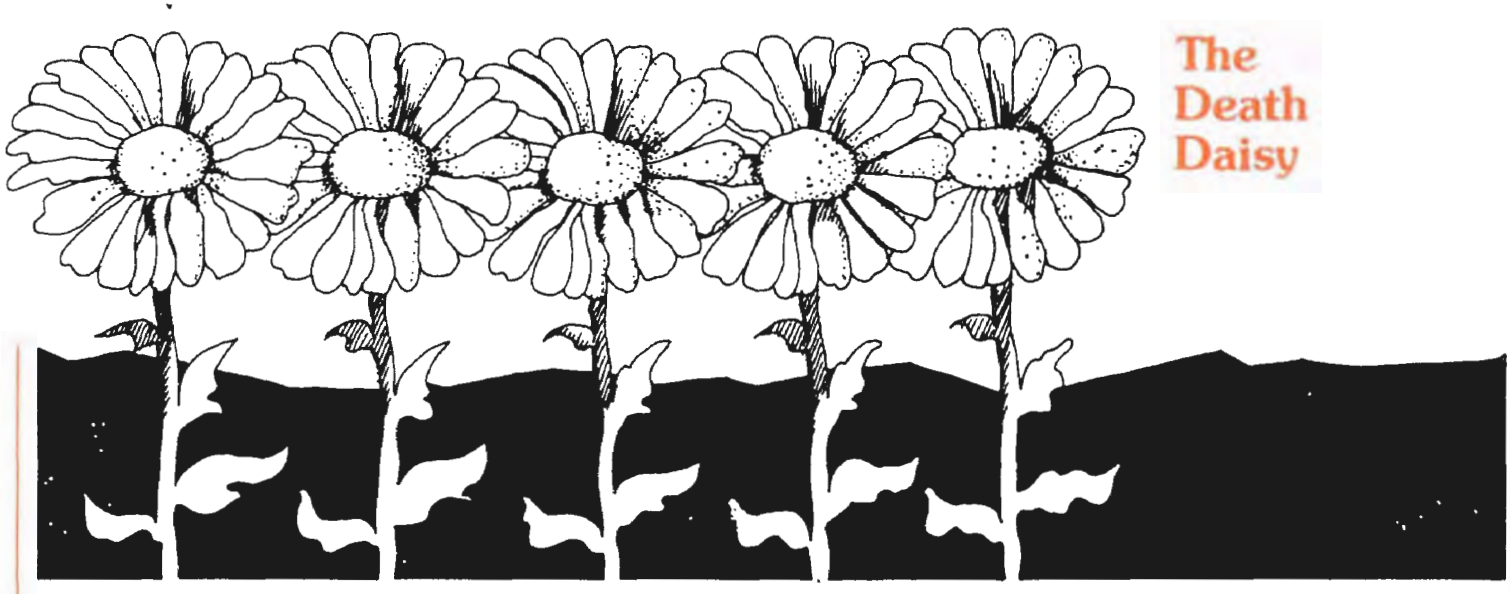
Much useful information has been exchanged at the US-Japan Joint Meetings in the past three years. It was in these sessions that we learned firsthand of Japan's experiences in controlling PCB's under its new Chemical Substances Control Law. At the second meeting, the two countries discussed respective experiences in dealing with and implementing national toxic substances control legislation.

In addition to policy level discussions each of the individual projects under the Agreement is reviewed during the meeting. EPA, the State Department, and the President's Council on Environmental Quality (CEQ) are the principal U.S. agencies that participate. EPA has primary responsibility for managing ten projects. (See box.)

Continued on page 33

Projects	U.S. Chairman
Sewage Treatment Technology	Frank Middleton MERL-Cincinnati, Ohio
Management of Bottom Sediments Containing Toxic Pollutants	Dr. A. F. Bartsch ERL-Corvallis, Oregon
Identification and Control of Toxic Substances	Dr. Marilyn Bracken Office of Toxic Substances Washington, D. C.
Air Pollution Related Meteorology	Dr. Herbert Wiser ORD-Washington, D. C.
Photochemical Air Pollution	Dr. A. P. Altshuller ERSL-RTP, N.C.
Stationary Source Air Pollution Control Technology	Richard Stern IERL-RTP, N.C.
Automobile Pollution Control	
Solid Waste Management	
Health Effects of Pollutants	Dr. F. Gordon Hueter HERL-RTP, N.C.
Technology for Closed Systemization of Industrial Waste Liquid Treatment	Dr. Eugene Berkau MERL-Cincinnati, Ohio

Kirk Maconaughey is the U.S. Executive Secretary for the US-Japan Environmental Agreement and is a member of the Office of International Activities.



The Death Daisy

Farmers in the mountainous areas of Kenya in equatorial Africa are now busy harvesting as many flowers as they can from the pyrethrum plant, a member of the chrysanthemum family sometimes referred to as the "death daisy" because of its effectiveness as an insecticide.

At present there is a shortage of pyrethrum because there have been unusually heavy rains in Kenya, the main producer. Kenya normally has two rainy seasons, a short one in May and June and a long wet winter.

As a result the thousands of farmers who grow this flower on small plots are trying to harvest as many of the blooms as possible before the arrival of winter.

After being picked, the flowers are dried in the sun. A flower extract is then shipped to the United States and other countries. The powder obtained from the dried flower heads provides the potent insecticide.

Another factor contributing to the current world shortage of natural pyrethrum is that the prices of coffee, tea, corn, and other crops raised in Kenya have gone up more swiftly than the government-controlled price for this natural insecticide. However, pyrethrum is still one of Kenya's main agricultural export crops.

In addition to the approximately 85,000 farmers in Kenya who raise pyrethrum, there are farmers in Tanzania, Rwanda, Zaire, New Guinea, Ecuador, Brazil, and Japan who grow this flower. But Kenya has dominated the world market.

Pyrethrins, the bug-killing substance obtained from the flower, are practically non-toxic to warm-blooded animals but have a very rapid "knock-down" effect on many insects.

The pyrethrins break down quickly when exposed to light and their effect is fleeting. They can be stabilized, however, and their effect intensified (synergized) by the addition of piperonyl butoxide and other compounds.

Although the flower is often grown for its decorative value in the United States and many other countries, the plant will produce satisfactory amounts of the insecticidal substance only if grown under certain conditions.

Effective generation of the pest-killing chemical is only assured if the plant is grown in a nearly continuous Spring-like climate with no frost and with nearly equal day and night intervals, conditions found in the uplands of Kenya.

Attempts made to grow pyrethrum as a commercial crop in Colorado and other locations in the United States have been generally abandoned. In addition to the exacting climatic conditions required to grow pyrethrum for its pesticidal uses, the high cost of the labor needed to pick the flowers just at the right time has also discouraged attempts to grow it in the United States.

The commercial use of pyrethrum is believed to have originated in Persia. The fame of these peculiar flowers spread after someone noticed dead insects surrounding flowers which had been discarded after they withered.

The pyrethrum insect powder was first imported into this country in 1860, according to a book "Pyrethrum, the Natural Insecticide," edited by John E. Casida.

This work contains an evaluation of pyrethrum by Emil M. Mrak, a noted scientist. Mrak said that pyrethrum is one of the earliest insecticides and "controls certain insects as effectively and more safely than most of the currently used synthetic organic insecticides. There is no evidence of harm to humans, domestic animals, or wildlife, when used as directed."

The shortage of natural pyrethrum has helped to stimulate interest in the pyrethroids, man-made imitations of this natural pesticide. Last summer EPA gave emergency permission to 14 States to allow cotton farmers to use five experimental insecticides, including three new pyrethroids, to help combat serious outbreaks of destructive caterpillars.

Approximately 4,000 of the 35,000 pesticides registered with EPA contain pyrethrum or synthetic pyrethroids.

Hopes that the natural pyrethrum could replace many dangerous pesticides have not been fully realized because of growing problems, cost and efficacy factors. Attempts to fully duplicate this natural product have not been successful.

Scientists have reported that pyrethrum is so complicated a substance that it has evaded complete analysis. They have noted that its very complexity may be responsible for the inability of insects to develop resistance to it.—C.D.P. □

Curbing Chemicals in Drinking Water

By Victor J. Kimm

Are organic chemicals in the Nation's drinking water a cancer risk or not? EPA says they are. The waterworks industry generally says such dangers are unproven.

EPA set off the debate last February when it proposed regulations to start limiting the amount of organic chemicals in drinking water. The controls would initially apply to public water systems serving over 75,000 people. The waterworks industry has generally opposed the standards.

The cancer risk question is the critical one for EPA. Under the Safe Drinking Water Act, the Agency must set standards if there is such a health danger. The objective is to reduce the risks to the extent feasible.

In proposing the standards, EPA is convinced the risks are there. The Agency feels that organic chemicals in drinking water pose a big enough health problem to justify action under the law. EPA realizes though that details of the proposed rules may be modified based on public comments.

The health basis for the proposed EPA standards is supported by Federal agencies experienced in dealing with environmental carcinogens. The agencies include the National Cancer Institute, the National Institute of Environmental Health Sciences, and the Food and Drug Administration. The approach EPA is taking in the drinking water proposal has evolved as these and other health-oriented agencies have wrestled with the problems of regulating human exposure to carcinogens.

Several important scientific conclusions about the nature of cancer have played a role in this evolution. First, there is the simple fact that exposure to chemicals can cause cancer. The first evidence of chemical carcinogenesis in humans dates back to 1775, when Percival Pott noted that there were high rates of scrotal cancer in men who had been exposed to soot as chimney sweeps. During the 20th century, a number of industrial chemicals, such as benzidine, asbestos, and vinyl chloride, have been shown to produce cancer in workers exposed to high levels. In addition, it is generally agreed that cigarette smoking and excessive exposure to sunlight can cause lung and skin cancer, respectively.

Second, there is significant evidence that environmental rather than genetic factors are causing a significant amount of human cancer. A classic epidemiological study was done of Japanese immigrants to the United States and their descendants. Japan has high rates of stomach cancer and low rates of colon cancer, compared to the U.S. When the Japanese immigrated to the U.S., their rates of stomach cancer fell and their rates of colon cancer increased. Among their children, the difference was even more marked: closer to the U.S. pattern and further from the Japanese pattern.

Something about the U.S. diet, lifestyle, or environment produces lower rates of stomach cancer and higher rates of colon cancer than Japan. We don't know what these causative factors are but we can presume that it is something in the environment. (The term "environment" here refers to everything humans are exposed to, including such things as cigarette smoking, food, and sunlight, as

Victor J. Kimm is EPA's Deputy Assistant Administrator for Drinking Water.

well as the results of environmental pollution in the usual sense.)

Third, scientists have developed methods for testing suspected carcinogens in laboratory animals. This approach seemed necessary. Studies of cancer patients have been able to identify only a small number of human carcinogens. Also, our society doesn't allow intentional testing of humans with suspected carcinogens. So some method was needed to test the thousands of existing chemicals as well as the new ones that are constantly being developed.

Although the differences between humans and rats and mice introduce uncertainty in the use of animal data, the test results have been well confirmed: of the known human carcinogens, all but a few also cause tumors in laboratory animals. These tests have been criticized for using doses much higher than those actually encountered by people. The high doses are necessary to produce a response in enough of the animals so that conclusions can be reached without requiring thousands of animals to be tested. Additionally, the size of the dose is less important than its effect: if the result is cancer and not simply an overburdening of the animals' systems, there is reason for concern. In view of the conclusion discussed below that even very small doses of carcinogens carry some risk, the animal tests at high doses are valid for indicating the presence of a cancer risk and the relative potency of the chemical tested.

In the case of organic contaminants in drinking water, there is also a series of human epidemiological studies that have attempted to relate high human cancer rates to indicators of such contamination. This research has generally shown such a relationship. Such studies are difficult to interpret because other factors are also likely to be present in the large cities that have high levels of organics in their water. However, the fact that the research does show a relationship reinforces the concern about organic chemicals in drinking water, especially since some of the organics cause cancer in animal tests.

Finally, and perhaps the most controversial, is the conclusion by the mainstream of scientific thought that there is no safe level for a carcinogen and that any exposure, no matter how small, will result in some risk of cancer. The reason for this conclusion is that cancer seems to be the result of a small number of discrete events in the structure of a single cell which transforms it into a cancer cell that can evade the body's defenses and grow in an uncontrolled way, ultimately producing death. We understand very little about how a chemical carcinogen interacts with a cell's DNA to transform it, but it is believed that any case of chemical carcinogenesis is the result of a single molecule (or a small number of them) interacting with a single cell. It follows that exposure to a small amount of a carcinogen produces some small risk of cancer.

The "no safe level" conclusion has important consequences. It means that exposures of large numbers of people even to very low levels of carcinogens are still a matter of concern, even if the risk to any particular individual appears negligible. For example, if everyone in the U.S. had a one-in-100,000 chance of getting cancer as a result of such an exposure, certainly a very small risk, that would still mean 2,200 or so additional cases of cancer nationwide. It also means that the animal tests are valid bases for inferring human risk even with the very high doses which must be used in those tests for technical reasons. Although the environmental exposures are usually orders of magnitude lower than those used in the animal tests, the number of people exposed is orders of magnitude higher.

It should be noted that there are reputable scientists who do not accept the "no safe level" conclusion. However, in the disagreement, which isn't likely to be resolved in the foreseeable future, the preponderance of scientific opinion does accept it. So the regulatory agencies have found it prudent, as a matter of public policy, to take a conservative position and adopt the "no safe level" approach.

Since exposure to any amount of a carcinogen carries some risk, regulatory decisions cannot be based on determination of a safe level. But in many cases, complete elimination of the chemical from the environment is not feasible or has costs that society would be unwilling to pay. EPA and other regulatory agencies have therefore adopted the policy of minimizing any human exposure to carcinogens, provided the costs are reasonable. This is the rationale that has guided the development of the proposed regulations to limit organic contaminants in drinking water.

EPA believes that the costs of the proposed regulations are quite reasonable. While a complete discussion of costs would exceed the space available here, the bottom line is that, in a city that would have to install granular activated carbon treatment, the average family's water bill would probably increase by about $10-$20 *per year.*

EPA's evaluation of the health risk has been endorsed by the Director of the National Cancer Institute, Dr. Arthur C. Upton. In a letter to EPA Administrator Douglas M. Costle, Dr. Upton stated:

"I have reviewed the health basis of EPA's proposed regulations for control of organic contaminants in drinking water. . . . Briefly, we support the judgement that these chemicals present a potential risk of cancer that should be reduced to the extent feasible.

Although it is not possible at this time to quantify the actual hazard from exposure to chemically contaminated drinking water or to determine the contribution to national cancer rates from drinking water, several conclusions can be drawn from the current thought on cancer cause and prevention:

1. Chemicals which have been shown to cause cancers in animal studies are commonly found in drinking water in small amounts.

2. Some known human carcinogens have been found in drinking water.

3. Exposure to even very small amounts of carcinogenic chemicals poses some risk and repeated exposure amplifies the risk.

4. Cancers induced by exposure to small amounts of chemicals may not be manifested for 20 or more years and thus are difficult to relate to a single specific cause.

5. Some portion of the population that is exposed is at a greater risk because of other contributing factors such as prior disease states, exposure to other chemicals, or genetic susceptibility.

In addition, a number of epidemiological studies have been conducted which show a pattern of statistical association between elevated cancer risk rates and surrogates for organic contaminants in drinking water. While such studies are far from conclusive, when taken together with the toxicological data from animal testing, they constitute a further basis for public health concern.

While we do not have [the] expertise to reach judgement on the feasibility of the treatment that would be required by the proposed regulations, we do believe that the potential risk justifies action and would encourage you to reduce the amounts of chemicals in drinking water to the extent that is consistent with reasonably available means . . ."

To summarize, we know that a great deal of human cancer is caused by unknown factors in the environment. We also know that certain chemicals that cause cancer in animals are found in low levels in air, food, and drinking water. These chemicals, and others that have not yet been tested, contribute to the total incidence of cancer, although the magnitude of the impact of each is unknown. Thus EPA believes that it should take the first step toward removing such chemicals from the Nation's drinking water. □

Ocean Dumping off New York

By Peter W. Anderson

Disposal of municipal sewage sludge, industrial wastes, and dredged materials in ocean waters off New York is a regional issue of intense public interest and concern. The majority of these activities, past and present, in the U.S. occur at dump sites managed by Region 2 in the New York Bight, an 11,000 square mile ocean area off the Eastern coastline extending from Cape May, N.J., to Montauk Point, N.Y.

The honorary title of "Big Dumper" given to us by our friends stems from the fact that in 1977, for example, about 80 percent by volume of all dumping of sewage sludge, acid wastes, construction debris, and chemical wastes in the United States took place at four EPA-designated ocean dump sites in the Bight. When industrial dumping activities at a site off the north coast of Puerto Rico (also in Region 2) are included, this figure increases to 91 percent.

This volume of municipal and industrial wastes being dumped in the Bight, and scientific evidence that the sewage sludge and dredged material are adversely impacting the marine environment, has resulted in "high public visibility," for the problem. Scientific investigation, mainly by the National Oceanic and Atmospheric Administration, has documented several adverse environmental impacts at the sludge and dredged material sites.

These include elevated concentrations of heavy metals, organic matter, and bacteria in the water and bottom sediments with attendant threat of bioaccumulation in the food chain. Reduced catches of bony fish in high-carbon sediment areas also have been noted. Extensive areas have been closed to shellfishing. Nutrient enrichment has resulted in increased phytoplankton productivity. Fin rot, exoskeleton erosion, and gill clogging have occurred in certain types of marine life—and sediments have been found in the vicinity of the dump sites devoid of normal bottom-dwelling marine life.

Ocean dumping is by no means the only waste in the Bight. Pollutants from the Hudson-Raritan estuarine system, including raw sewage, inadequately treated municipal and industrial effluents, agricultural and urban runoff, combined storm-sewer discharges, and oil spills far outweigh ocean dumping in terms of total pollutant loading. Thus, it is difficult to ascribe these adverse impacts entirely to ocean dumping; however, it is a significant component in some instances.

Most environmental incidents in the New York Bight are attributed to ocean dumping. For example, reports of sewage sludge (the popular "sludge monster") on the beaches of Long Island and New Jersey are common, although unsubstantiated, every spring and summer. The washup of "floatables"—wood, plastic, tar-grease balls, paper, and similar debris—on Long Island beaches and an extensive kill of bottom-dwelling, fish and shellfish off the New Jersey coast in the summer of 1976 were attributed to ocean dumping in most early press reports. However, subsequent evaluation of technical information found that these two incidents were brought on by atypical atmospheric and hydrologic conditions aggravated by pollutants, primarily from inland sources. Ocean dumping was at most a minor contributing factor.

Recognizing the magnitude of environmental problems in the Bight and its responsibilities under several Federal statutes, particularly the Marine Protection, Research, and Sanctuaries Act, Region 2 has carried out an ocean monitoring program involving several Federal, State, and local agencies. This is designed to collect and evaluate reliable environmental information, to support enforcement actions, and to determine the overall status of the marine environment. An effective program also was developed under the Region's permit program to require technically feasible, environmentally acceptable, and economically reasonable alternatives to ocean dumping.

Implementation of the Act in April 1973 spurred industrial ocean dumpers in the Region to construct land-based treatment facilities or to carry out other environmentally acceptable alternatives for handling their wastes. Of the roughly 150 industrial ocean dumpers in 1973, only eight remain. During 1977, these eight dumped almost 1.5 million wet tons of aqueous wastes. Typical wastes include water solutions of inorganic salts with trace amounts of organic compounds, liquid wastes from the manufacture of non-persistent organophosphate pesticides, acid wastes from the manufacture of titanium dioxide and fluorocarbons, and residual wastes from the manufacture of pharmaceuticals.

Five of the eight waste dumpers have agreed to stop ocean dumping on or before April, 1981. The remaining three have promised to bring their wastes into compliance with EPA's restrictive ocean dumping criteria by 1981 and to investigate innovative treatment technology. An additional eight industrial waste sources in Puerto Rico are under firm compliance schedules to cease ocean dumping by 1981.

Ocean dumping of municipal wastes has a less favorable record. It became clear shortly after passage of the Act that the construction of new and improved publicly-owned wastewater treatment facilities, scheduled for completion between 1977 and 1983, would increase by 250 percent the amount of sludge generated by municipalities that practice ocean dumping in the Bight. In 1977, these sources dumped almost 4.5 million wet tons; by 1981, the time set by law to stop the ocean dumping of harmful sewage sludge, these same sludge generators will be dumping an estimated 11.1 million wet tons.

The problem of handling, in an environmentally acceptable manner, not only the present volume of sludge, but also the projected increases due to upgraded treatment, is only now being resolved. In 1974, in conjunction with the States of New Jersey and New York, the Region funded a study by the Interstate Sanitation Commission to determine feasible and environmentally acceptable alternative disposal methods for sewage sludge in a metropolitan area. In mid-1976, after evaluating the results of this study, the Region concluded that acceptable land-based alternatives such as composting, incineration, and pyrolysis were available. However, it also was recognized that the major municipal dumpers in the metropolitan area could not implement an alternative disposal method before the end of 1981, and even then only if no institutional or legal problems hindered implementation.

Thus, since August 1976, all permits for the ocean dumping of sewage sludge have included a strict compliance schedule to cease ocean dumping on or before December 31, 1981. (It should be noted that the Act was amended on November 4, 1977 to include this 1981 phase-out date for the disposal of sewage sludges, which unreasonably degrade the marine environment.) These schedules include milestones for the preparation of facility plans and environmental assessments on the selected alternative(s), public hearings, preparation of plans and specifications, and initiation and completion of construction.

All permittees are given the opportunity to comply with this permit condition using Construction Grant funds, and most have chosen this path.

All of the alternate disposal options available to sludge dumpers have substantial environmental impacts associated

Dr. Peter Anderson is chief of Region 2's Marine Protection Program

with them. Metropolitan area sewage sludge contains elements that are environmental problems in themselves, such as human pathogens (viruses, fungal spores, parasitic cysts, and bacteria), heavy metals (cadmium, mercury, chromium, etc.), and organohalogens (pesticides, PCB's, etc.).

Aerobic composting, which is being considered by many sludge dumpers as an alternative, is a beneficial use (recycling) of the sludge. This process reduces the health risks from bacteria and viruses, reduces odor problems, and dilutes the metal and toxic organics content. However, the risks from other pathogens (fungal spores, parasitic cysts) are not controlled, nor is the threat of bioaccumulation of heavy metals and toxic organics through the agricultural use of the composted material. Of additional concern are the potential environmental problems associated with percolation of nutrients, heavy metals, and toxic organics into adjacent streams and groundwater aquifers. These concerns are particularly keen in Long Island and southern New Jersey, which depend on groundwater for potable water supplies. Thus, the use of composted sludges is being limited by State and Federal action to non-agricultural uses in accord with specific application rates.

The other option actively being considered is incineration. While pathogens and some toxic organics are destroyed, sewage sludge incineration results in waste gases, particulates, and a sterile ash that retains most of the heavy metals originally present. The discharge of particulates, odors, volatile toxic organics, airborne metals (cadmium, mercury, and lead), and other waste gases could cause air pollution problems.

Facility plans developed by the 55 remaining sludge dumpers, out of the roughly 250 plants in1973, are being submitted to the public for review. The decision point on which alternative disposal method to implement is at hand. It won't be an easy choice. □

Around the Nation

REGION 1

Environmental Town Meeting Set

Region 1 and the Maine Audubon Society will cosponsor an environmental town meeting in that State on October 12. William R. Adams, Jr., Regional Administrator and Henry Warren, Commissioner of the Maine Department of Environmental Protection, will answer citizens' questions about the impact of Federal and State environmental programs on Maine residents. Specific discussion topics will include environmental laws dealing with clean water and air, toxic substances, and solid waste. The town meeting will be held in the Main Lounge of the Moulton Union, Bowdoin College, Brunswick, Me. from 7:30 to 10 p.m. A similar meeting was held in Rhode Island earlier this year as part of a series being sponsored by the Regional Office.

Environmental Secretary Named

Brendan J. Whittaker, a 44-year old forester and Episcopal priest, has been named Vermont's Secretary of Environmental Conservation by Governor Richard A. Snelling. Whittaker had been serving as the State's energy director, and was previously Director of Information and Education for the State Agency for Environmental Conservation.

REGION 2

Sole Source Designation

EPA has designated the Long Island aquifer as the sole water supply source for Nassau and Suffolk Counties in New York State, in response to a petition filed by the Environmental Defense Fund in January, 1975. Under the Safe Drinking Water Act of 1974 any future project in the two counties that involves Federal assistance (through a grant, loan guarantee, contract, or otherwise) will be subject to review by EPA for potential impact on the groundwater system. In making his decision Administrator Douglas M. Costle noted that the aquifers are the principal source of drinking water for approximately 2.5 million people; that there is no economically feasible alternative to replace the groundwater system; that the system could become contaminated through its recharge zone, and that contamination of the aquifer would pose a significant public health problem. Eckardt C. Beck, Regional Administrator, called the designation "an important additional safeguard for protecting the health of Long Island residents." Beck added, "EPA will now carefully examine Federally-assisted projects to ensure that the high water quality of Long Island's natural underground reservoir is preserved."

REGION 3

Water Pollution Jail Sentence Issued

U.S. District Court Judge Edward R. Becker recently sentenced Manfred DeRewal of Pennsylvania to a six-month jail sentence for dumping poisonous chemicals into the Delaware River in violation of the Federal Clean Water Act. DeRewal, who has owned or been associated with waste disposal companies in Pennsylvania, New Jersey and North Carolina, was also fined $20,000 and placed on four and one-half years probation. He has been cited for more than 100 State pollution violations over the past 13 years. Following a detailed investigation by the U.S. Attorney's office and Region 3's Enforcement Division, DeRewal pleaded guilty to five counts of violating Federal pollution laws in March, 1977. DeRewal and three accomplices had rented a warehouse near the Delaware River in Philadelphia where they stored over 730,000 gallons of waste solicited from various companies. The wastes were poured into a storm sewer through a manhole in the warehouse, and into the Delaware River near Philadelphia's Torresdale drinking water plant. Regional Administrator Jack J. Schramm said, "The sentencing serves notice on all persons involved in illegal dumping practices that the Federal Government will not tolerate anyone who risks the lives of others by illegally discharging dangerous chemicals into our waterways."

Pennsylvania Gets Permit Authority

The Pennsylvania Department of Environmental Resources has been given the authority to administer the National Pollutant Discharge Elimination System permit program in that State. Pennsylvania is the fourth State in Region 3 to be given that authority and only the West Virginia program remains under Regional administration.

Research Funding Set

Through the Chesapeake Bay Program, Region 3 will be awarding approximately $9 million in Federal grants to State agencies, citizen groups, and research institutions to study environmental problems of the Bay.

REGION 4

Leaded Gas Violator Fined

A Miami, Fla., service station operator has paid $8,300 in fines for putting leaded gasoline into vehicles marked "unleaded gasoline only." The company, Alpine Enterprises, Inc., signed a consent agreement with Region 4 about the penalty. The firm had been observed introducing leaded fuel into three cars. It also was charged with mislabeling dispensing pumps and failing to equip pumps with the proper size nozzles.

Forest Industries Comply

Air pollution controls are being installed at three major forest industries in Region 4 before their facilities switch from burning oil to coal. The Westvaco Corporation in Charleston, S.C., expects to complete conversion by the end of 1979. Continental Forest Industries in Savannah, Ga., and Weyerhaeuser Company in Plymouth, N.C. should have completed the change-over by mid-1981. Pollution from these coal-fired boilers, it is believed, will be less than present emissions from oil-fired units. There should be no delay in compliance with air pollution regulations because controls will be installed before the conversion is completed.

Chemical Disposal Approved

EPA has approved a chemical waste landfill near Livingston, Ala., for the disposal of polychlorinated biphenyls (PCB's), a chemical compound toxic to aquatic life and harmful to humans. The landfill, in east-central Alabama, is operated by Waste Management, Inc.

REGION 5

Agencies Cooperate

Region 5 has reached an agreement with the Food and Drug Administration to have water samples analyzed for pollution at the FDA laboratory in Minneapolis, Minn. The innovative agreement was arranged under a cooperative program announced last year by EPA, FDA, the Consumer Product Safety Commission, and the Occupational Safety and Health Administration to share resources. Acting Regional Administrator Valdas V. Adamkus said the agreement will cut down on duplication of laboratory facilities by the two agencies for the Minneapolis area. "Not only will this agreement increase our field monitoring capacity, but it is expected to save about $25,000," he added.

Cleaning A Lake

EPA is funding half the cost of a $2.6 million project to clean up Lake Lansing, a 435-acre lake in Ingham County, Mich. Funds from the Agency's Clean Lakes Program are being matched by local sources. The project will attempt to restore the recreational potential of the lake through hydraulic dredging, which will remove aquatic vegetation and sediments that clog the lake. The project will be used to evaluate hydraulic dredging and determine the impact it would have on similar projects.

PCB's Discovered in Sludge

Scientists at EPA's Central Regional Laboratory in Chicago have found levels of polychlorinated biphenyls (PCB's) as high as 13 parts per million in samples of Nu-Earth, a fertilizer made from sludge processed by the Metropolitan Sanitary District of Greater Chicago. This level exceeds the recommended limit of 10 parts per million set by the Food and Drug Administration for the protection of human health. Nine other chemicals classified as polynuclear aromatic hydrocarbons were also found in the sludge. Some polynuclear hydrocarbons are believed to cause cancer. Composted sludge has been distributed free of charge in the Chicago area by the Sanitary District for 5 years.

REGION 6

Land Treatment Systems To Be Promoted

With the encouragement of Regional Administrator Adlene Harrison, a cooperative effort to stimulate use of land treatment systems for cleaning up municipal wastewater will be set up at the Robert S. Kerr Environmental Research Laboratory in Ada, Okla. The wastewater treatment facility construction grant program, part of EPA's Office of Water and Waste Management, and the Agency's Office of Research and Development will combine their efforts to encourage and accelerate use of land application systems, in response to the 1977 amendments to the Clean Water Act and the policy on land treatment processes adopted by Administrator Douglas M. Costle. The Ada Lab has already been involved in research related to land treatment processes and protection of groundwater. Land application is especially advantageous for smaller communities where land prices are comparatively low and the costs of sophisticated treatment systems are prohibitive.

REGION 7

Utility Companies Briefed

The Air and Hazardous Materials Division recently held a series of one-day meetings with representatives of utility companies concerning the regulations for handling polychlorinated biphenyls (PCB's) under the Resource Conservation and Recovery Act. The regulations contain provisions covering recordkeeping, marking, and storage. The meetings, held in Lincoln, Neb., Jefferson City, Mo., and Bettendorf, Iowa, explained EPA's responsibilities under the new regulations as well. More than 135 people attended the meetings, where EPA staff set out inspection procedures and enforcement activities, and stressed the Region's commitment to carrying out the regulations. State environmental agency staff members also participated in the meetings. In addition to the PCB regulations, the Regional Office employees discussed with the utilities the future regulation of coal ash disposal.

REGION 8

Noise Control Institute Set

The region is cosponsoring the second annual Noise Control Institute with the Colorado Department of Health, the University of Colorado, the Community Noise Control Association, and the City of Boulder Environmental Protection Office. The institute, which will be held at the University of Colorado in Boulder, October 9-13, will be attended by noise control specialists from across the country. Sessions will cover all aspects important to the operation of a successful community noise control program including training in the use of noise measurement tools, the physiological and psychological effects of noise, and issuing summonses to noise violators. This year's institute will put special emphasis on land-use planning for noise control, including information on criteria development; dealing with noise from traffic, airport/aircraft, railroads and industry; and reviewing plans for proposed development. Academic credit is available for people who attend the full five days. Special two- and three-day sessions also are available. A program brochure is available from the Bureau of Conferences and Institutes, 217 Academy, 970 Aurora Ave., Boulder, Colo. 80302. Attn.: Second Annual Noise Control Institute.

REGION 9

Water Quality Management Planned

The Pima County, Ariz., Association of Governments' plan for areawide water quality management for the Mt. Lemmon area points out new solutions to eliminate discharges to a local creek. Sabino Creek is the only free-flowing stream in the area and is used heavily for recreation. Under the plan, prepared under section 208 of the Clean Water Act, the central collection and treatment systems in the area, which were functioning poorly, will be abandoned in favor of individual treatment systems, which will cost less and be more reliable. All discharges into the creek will be eliminated under the current plan.

Minority Contracting Improving

Region 9 has awarded a contract to Homitz, Allen and Associates of Oakland, Cal. to improve participation of minority architectural and engineering firms in the EPA construction grants program. The contractor acts as a "communicator" with minority firms; informing them of available jobs, explaining regulations for contracting with EPA, and presenting seminars on organization skills. The contract has significantly increased minority participation in Agency programs.

REGION 10

Boat Noise Studied

Last summer Region 10 helped the Washington State Department of Ecology gather information that will be used in the development of noise regulations for powerboats. EPA and the State noise personnel set up buoys just off the Seattle shore of Lake Washington and invited powerboat dealers and distributors to run their boats through a course that allowed sound-level measurements to be taken offshore. The regulations being developed are intended to reduce intrusive boat noise that bothers residents of beach houses, and other people on the shores of Washington's lakes, rivers, and marine waters.

Disposal Sites Approved

Region 10 has recently approved two State-licensed waste disposal facilities. The facilities, located in Arlington, Ore., and Grand View, Idaho, may now accept discarded electrical equipment, soil, and other debris contaminated with polychlorinated biphenyls (PCB's). Both disposal sites are commercially operated. Each will be subject to permits that contain eight pages of rigorous technical and operational requirements to ensure that the PCB's in the contaminated waste never enter the surrounding environment. □

Major Urban Conference

A major conference on the urban environment has been scheduled for April, 1979, by three Federal agencies and several urban, labor and environmental groups. The goal is to gain a consensus on how to improve the quality of life in the Nation's depressed urban areas.

"What we are trying to do is get a definition of 'urban environmentalism,' " said EPA's Deputy Administrator, Barbara Blum, in a press conference announcing the April plans. This is a "very new concept," she added, and if it is going to work, the definition for it has to come from the people who live in the cities, based on their priorites.

Another conference aim, Blum said, is to forge "sort of an unholy alliance." It isn't unholy, but would have been thought so a few years ago, she explained. It would include "the people in the inner city, the environmentalists, the minorities, the labor unions." Such a coalition would "help us in our fight to preserve the inner cities."

Blum predicted that the conference participants will include ". . . housewife groups . . . butterfly groups . . . neighborhood groups . . . everyone who wants to participate in the city."

The announcement of the conference was made jointly by Blum; Jay Janis, Undersecretary of the Department of Housing and Urban Development (HUD); James Joseph, Undersecretary of the Department of the Interior (DOI), and by representatives of private co-sponsoring groups. They included Vernon Jordan of the National Urban League, Frank Wallick of the Urban Environment Conference and Foundation, and Neil Goldstein of the Sierra Club.

The fact that the three Federal agencies are helping fund the conference with a joint $115,000 grant is an acknowledgement that the Federal Government can't do the job alone, Blum said. "The keystone of the Administration's urban policy is the forging of a new partnership among the various levels of government, the private sector and the voluntary and neighborhood organizations," she said. "Urban environmentalism must become a key factor in this new partnership."

Deputy Administrator Barbara Blum shared the announcement of an urban environmental conference with Vernon Jordan (left), of the National Urban League and Jack Watson (right) Assistant to the President for Intergovernmental Affairs.

The environment is important in the Administration's urban policy, Presidential Assistant Jack Watson added. "When we talk about urban policy, we are not just talking about roads and houses. We are not just talking about jobs. We are talking about the quality of life in cities where people live. . . ." He called the participation of three Federal agencies in the urban environmental press conference "a harbinger of some very, very positive things to come." Watson is Assistant to the President for Intergovernmental Affairs.

Jordan, President of the National Urban League, explained the common grounds for action in the urban environment. "With the advancement of technology and the subsequent urban sprawl, the urban areas have borne the brunt of air and water pollution, auto-dominated transportation, restricted housing opportunity and deteriorated neighborhoods."

Now, he said, the damages, compounded by unemployment and energy shortages, demand a common effort by environmental and urban reform forces. The aim, he said, must be "a meaningful attack on the environmental problems that now plague the American cities."

Jordan added that "there may be situations where blacks and whites violently disagree, but if the air isn't pure, it may not make any difference. That is one thing that is very difficult to separate on the basis of race."

In a speech to the Sierra Club last May, Blum also made a strong case for urban environmentalism. "The flight to the suburbs is binding inner city and suburban people together in ways that the suburban escapees did not anticipate. The air, water, and noise may be most lethal downtown, but increasingly the metropolitan environment is one continuous airshed, watershed and noise basin."

"It's time to recognize that there is no place to hide," Blum added. "It's time for *all* urban residents, inner-city and suburban, to acknowledge that they share a common destiny. And it's time for the environmental movement to forge a new urban vision and make a sustained commitment to create a healthy urban environment."

The conference will be a key in shaping such a vision and launching a joint effort to achieve it. Conference objectives include identifying a national agenda to advance cooperation among labor, environmental and community groups, melding the socio-economic environment more closely with the physical environment; identifying racial and economic factors camouflaged as environmental matters; and discussing technical subjects such as pollution control, transportation, land use and drinking water quality.

Goldstein, National Conservation Representative of the Sierra Club, supported the need for an urban environment vision. "The Sierra Club," he said, "well known for its leadership in wilderness preservation, is determined to be a leading force for improving America's cities as well."

Goldstein said he believed his group could aid cities by "better focusing our urban environment efforts, forging coalitions with other organizations, and calling upon a vast reservoir of volunteer talent. . . ." These steps needn't detract from "our current efforts in other areas. . . ." he added.

Also supporting the vision of a better urban environment was HUD Undersecretary Janis. "It is clear, for example, that quality housing requires quality surroundings, such as clean air and water standards. It is clear that resources spent wisely for the environment are dollars spent wisely for housing. And it is also clear that dollars misspent for social programs are dollars misspent for the environment."

Janis argued for "a sound balance between our environmental and urban needs in order to achieve the most good for the greatest number."

Undersecretary Joseph of the DOI said the urban environmental conference "can provide a valuable springboard in bringing together these diverse groups and assist in the establishment of a national grass roots network. . . ."

"There is an assumption in some places," he added, "that the concerns with ecology and equality are antithetical, that one movement focuses on economic justice, while the other is concerned not so much with power but with pollution. . . ."

But Joseph believed that many who were raised in ghettos and barrios are now convinced that a clean environment, "must go hand in hand with our other efforts to build a society which is healthy, humane and just."

Wallick, Chair of the Board of the Urban Environment Conference, also saw a change in consciousness. "The environmental awareness of 1970—Earth Day—has given the whole country a feeling that we have to do something about the environment," he said. "And the environment is not restricted to the outdoor environment. It is a part of our lives; it is a part of the work place."

Wallick commended the Administration for its aid for the environmental conference scheduled for April. "I think the fact that the Administration is willing to give us some sort of national visibility is very much a feather in their hat, and I hope we can make it successful." □

Sharing Environmental Knowledge with Japan

Continued from page 24

CEQ has responsibility for the 11th project, which is entitled, "Environmental Impact Assessments." At the Second Joint Planning and Coordination Committee Meeting, the U.S. proposed that five new areas be added to the Agreement: water conservation and flow reduction, non-point source control and water quality management, measurement of by-product coke oven emission control technology, management and disposal of radioactive wastes, and environmental economics and incentives for pollution control. It is hoped that useful exchanges of information will soon begin in each of these areas.

The participants in each of the eleven established projects meet on a regular basis. The sessions are held in Japan one year and in the United States the next. It is from these technical meetings that the real fruits of this cooperation are realized, for they provide each country with first-hand information on how each nation deals with common environmental problems. Visits to field facilities are also arranged during the sessions to provide participants with an opportunity to see technical innovations and modifications in pollution control equipment. For example, a team representing EPA's Kepone Mitigation Feasibility Task Force, the Management of Bottom Sediments Containing Toxic Pollutants project, and members of the U.S. Army Corps of Engineers recently returned from a visit to Japan where they met with representatives of several industrial firms.

This EPA-sponsored team observed newly-developed dredging technology and advanced techniques for handling contaminated sediments and sludges. From this visit and further discussions, it is highly probable that this Japanese technology will be useful in aiding the United States in handling its in-place toxic pollutant problems and refining its technology. To date, the Japanese technology has been used effectively on sludge and sediments contaminated by mercury, copper, zinc, cadmium, lead, chromium and PCB's. Subsequent investigations are underway to determine whether this technology can aid in any future clean-up of Kepone in the James River, Virginia.

The two countries have also worked together in the area of radioactive waste disposal. For example, this past June Japan sent a scientist to participate in EPA's low-level radioactive waste recovery dive program. This team surveyed and conducted tests in a radioactive waste dump site located approximately 200 miles off the Maryland/Delaware coast. The Japanese participant from Japan's Atomic Energy and Research Institute not only took part in the analysis and survey segment of the program but also participated in several of the scheduled dives.

Sharing Expertise

Still another benefit derived from our bilateral cooperation is the exchange of technical experts. Over a dozen qualified Japanese research scientists have visited our laboratories and facilities. These scientists have stayed in the United States for as long as one year, and have performed valuable work for EPA and for their own national programs. Individual areas of study are agreed upon prior to their arrival. Detailed reports are written for both nations once the assignments have been completed. Over the years, Japanese scientists have visited our laboratories in North Carolina, Ohio, New Jersey, Oregon, and Nevada. The benefits derived from this exchange program come not only in the completion of the agreed upon scope of work, but also in the development of lasting professional and personal relationships.

While EPA does not send researchers to Japan for such extended periods, we do send fact-finding teams to gain valuable information on a variety of industrial pollution control topics. Teams have visited Japan recently to gain information in the areas of flue gas desulfurization and noise pollution control. A team is tentatively scheduled to conduct a survey of Japan's pollution control practices in the iron and steel industry.

Several officials from Japan's Environment Agency have visited EPA's headquarters to become familiar with our national policies and to observe how environmental matters are handled at the national level. In addition, EPA receives approximately 2,000 Japanese visitors each year. Their interests range from such topics as the preparation of environmental impact statements to the role public interest groups play in setting national environmental policy.

These are some of the numerous ways in which Japan and the United States have been cooperating in the environmental area in recent years. The basic culture of the Japanese lays great stress on harmony between man and nature, and we have much to learn from this philosophy. In similar fashion, as Japan has moved into a world role as a highly industrialized country, she has profited by studying our legislation and technology in the field of pollution control and abatement. The U. S.-Japan Agreement augurs well for a continuation of the useful exchange of environmental information between the two nations. □

Congress Expedites Pesticide Program

Both EPA and farmers "should be particularly optimistic about the future of our pesticide program" as a result of recent amendments to the Federal Pesticide law, Steven D. Jellinek, Assistant Administrator for Toxic Substances, has declared.

A House and Senate Conference Committee at press time had approved a number of amendments to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Jellinek, in an address to the Southern Commodity Producers Conference in Birmingham, Alabama July 27, said there were several aspects to the amendments that merited attention:

- Conditional registration permitting EPA to register products similar to old chemicals or providing new uses of them;
- A "generic standards" approach allowing EPA to make broad decisions for an entire group of products containing the same ingredient;
- A diminished requirement for reviews on the efficacy of pesticides;
- A liberalized approach to uses of a pesticide that are not in literal accord with the printed label on the product.

Jellinek, who spoke at the invitation of the Alabama Farm Bureau Federation, said that the "conditional registration" amendment "will greatly improve our ability to register products that are similar to or are actually new uses of old chemicals." He said it was "very frustrating" to have to turn down numerous applications because of a double standard that allows continued use of products already registered but requires a full complement of registration data before identical new products can be registered. Jellinek added that EPA planned to issue regulations for conditional registration within the new few months, and begin issuing such registrations immediately thereafter.

The generic standards approach to re-registration of existing pesticides will make possible a more streamlined procedure rather than the present practice of regulatory decisions on a product-by-product basis.

With respect to efficacy reviews, Jellinek explained that under the amendments EPA will depend more and more on farmers for information on how pesticides are actually performing under field conditions. "We will look to the Department of Agriculture and the land-grant university system for feedback on efficacy," he declared, "rather than relying on data from the registrants that becomes rapidly outdated owing to regional and climatic variations and changing degrees of pest resistance."

On the final point, the Assistant Administrator said the amendments provide a new definition of "use inconsistent with the label." It makes clear that certain practices, which may not be in strict or literal accord with the printed label, are nonetheless legally consistent with label directions.

"Specifically," he said, "farmers and other pesticide applicators will be able to use less than the specified label dosage, to treat for a pest not listed on the label, to mix pesticides and fertilizers, and to employ responsible methods of application not specified on the label.

"We expect that these changes will introduce a welcome measure of common sense to pesticide use enforcement, which incidentally under the new legislation will become even more of a State responsibility than it is now."

The agreement by House-Senate conferees on the FIFRA amendments was reached in July after eight months of negotiations. Still awaiting action at press time was approval by the full House and Senate and the President's signature before the amendments could become law.

Jellinek told the Commodity Producers Conference that a fundamental dilemma is reflected in FIFRA:

"First, pesticides are among the riskiest chemicals used in our society.

"And second, pesticides are necessary for modern agricultural productivity and progress."

In essence, he said, the Federal pesticide law "requires EPA to balance the risks of pesticides exposure to humans and the environment against the benefits of pesticide use to society and the economy. On one hand, we must protect society from the risks of using pesticides. On the other we must assure that American agriculture has, and will continue to have, the necessary pest-control tools to meet the Nation's—and to an ever-increasing extent, the world's—needs for food and fiber.

"I assure you that this task is neither simple nor easy. The pressures that prevail upon us are enormous," he added.

Pesticide use has been increasing rapidly since the mid-1960's. Jellinek pointed out that about 35,000 pesticides are now registered for use in the United States. The U.S. market for pesticides in 1976 was $2.4 billion and by 1984 is expected to grow to $3.3 billion. Production of pesticides in the United States grew from one billion pounds in 1966 to 1.4 billion in 1976, with more than half the total used by agriculture. The figures indicate that the increase is likely to continue, he said, along with chance of widespread human and environmental exposure to dangerous chemical pesticides.

At the same time, agriculture is a more highly competitive endeavor than ever before, he declared, with farmers expected to produce more food and fiber at lower prices to the consumer while maintaining profit levels that enable their businesses to survive. "That isn't easy, either, and we know it," Jellinek said.

He cited a number of recent decisions by EPA on various pesticides to illustrate that "we have not—as some of our critics have charged—stuck to a predetermined, knee-jerk pattern of decision-making that favors any particular constituency."

The Assistant Administrator conceded that the Office of Pesticide Programs has a number of deficiencies to overcome and is working hard to do so. "And we need to do a better job of conveying the message," he said, "that we are neither weak-kneed apologists for the pesticide industry nor rampant crusaders against the use of every pesticide on the market today—because we are not."

In summarizing the complex decisions on certain pesticides in recent times, he emphasized that in each case the science was examined, costs and benefits carefully and objectively evaluated, alternatives explored, and as fair a decision as possible was rendered.

Modern agriculture, he concluded, "is one of America's most promising economic advantages in a time when our country needs economic advantages perhaps more than ever before. I am convinced that we can continue to strengthen this advantage while at the same time prevent the adverse human health and environmental impacts that sometimes accompany agricultural progress." □

Update

A listing of recent Agency publications and other items of use to people interested in the environment.

General Publications

Pollution: A Common Concern (June 1978)
In this 8-panel pamphlet ten prominent black leaders explain how cleaning up the environment can play a part in efforts to improve the quality of life for black and other Americans. Those included in the pamphlet are Benjamin Hooks, Coretta Scott King, Vernon Jordan, Richard Hatcher, Parren Mitchell, Dorothy Height, M. Carl Holman, Dr. Carlton Goodlett, Bayard Rustin, and Eddie N. Williams. Copies of the pamphlet are available from Printing Management (PM-215), EPA, Washington, D.C. 20460.

Bicycle Strategies to Reduce Air Pollution (1978)
This 20-page booklet explains ways in which bicycles fit into plans to clean up air pollution. It gives an outline for bicycle program plans, points out advantages of bicycles over other forms of transportation, and lists bicycle coordinators to contact in various regions of the country for more information. Copies of the booklet are available from Nina Rowe, (AW-445), EPA, Washington, D.C. 20460.

Federal Register Notices

Copies of Federal Register notices are available at a cost of 20 cents per page. Write Office of the Federal Register, National Archives and Records Service, Washington, D.C. 20408.

Water Pollution

EPA amends guidelines for ore mining and dressing point source category effective; 7/11/78. Pp. 29771-778, in the July 11 issue.

Pesticides

EPA establishes a maximum permissible level for oxamyl residues on apples; effective 7/12/78 P. 29946, July 12 issue.

Clean Water Act

EPA publishes a list of four conventional pollutants. Pp. 32857-859, July 28 issue.

Toxic Substances

EPA requests public comment on Chemical Use List: Comments by 9/22/78, Pp. 3222-251, July 25 issue.

Coming Events

EPA and Federal Design

EPA's Office of Public Awareness will explain the history and significance of changes in that Office and how the changes are reflected in both management and graphics design at the Fourth Federal Design Assembly this month.

More than 800 Government officials are expected at the sessions September 21 and 22 in the Pension Building, F and G Streets between 4th and 5th Streets N.W. Administrator Douglas M. Costle, Deputy Administrator Barbara Blum, and William Drayton, Jr., Assistant Administrator for Planning and Management, are among EPA officials invited to the meeting.

Joan M. Nicholson, Director of the Office of Public Awareness, will outline the measures that are being taken to improve EPA's communication with various segments of the public. She will describe the reorganization of OPA and how that relates to the Agency's graphics program in reaching various constituency groups. Ivan Chermayeff, design consultant, also has been invited to participate.

The Assembly is sponsored by the National Endowment for the Arts and is aimed at providing a better understanding of the design process and how to integrate it into Federal decision-making and policy. In addition to Agency officials, participants will include Members of Congress, representatives of State agencies, professional design societies, and industry. □

An Environmental Calamity: The Seveso Case

Continued from page 15

plete. It is evident that a powerful impulse exists to put a good face on the matter, concentrate on the final decision to fence off the zone that simply cannot be handled in any other way, and dampen down public concern over any other sequels to the disaster.

A particular effort was made to get people out of the Residencia Leonardo da Vinci and back in their homes, as the evacuation was certainly the most traumatic and conspicuous social consequence of the accident. Of 140 families evacuated, 120 have now been returned to their homes. Their houses were decontaminated by removing the tile roofs, vacuuming and scrubbing the walls with detergent and solvent and clearing the grounds around them. New roofs, appliances, and furnishings have been provided. Only limited use can be made of the land around them. The area still looks desolate. But the houses were treasured as many of the owners built them with their own labor.

In the fall of 1977, the remaining problems and the long-term management of the contaminated area were turned over from the Lombardy Region to a new commission which has established offices in the Augustinian Seminary in Seveso. Its tasks will be to supervise medical monitoring, continuing land decontamination studies and work, and maintenance of vigilance over the closed area. Eventually they will have to deal with the disposal of all of the contaminated waste. The ICMESA factory will have to be demolished. Its rubble will be added to the other TCDD-contaminated material which is held within the closed zone. This consists of mounds of plastic bags filled with the vegetation collected from the whole contaminated area; thousands of items of protective clothing, coveralls (changed daily), gloves, masks, head coverings, boots, worn by the cleanup squads, to which more is being added as any work goes on; plus the roof tiles and the furnishings taken from the vacated houses; together with the carcasses of 35,000 animals that died or were slaughtered, preserved in metal containers stacked up row on row; and also the trucks, tools and other equipment contaminated by use in the poisoned area. The costs of all this has amounted to billions of lire already, with a great deal more still to be required, by some means, from public funds. □

The Hoffman-La Roche Company faces damages of up to $50 million for the contamination of Seveso, according to a company official.

Adolf Jann, chairman of the Swiss chemical company, told a news conference recently that La Roche had bought properties in the worst-hit areas from the former inhabitants, and all other families had now been allowed to return.

Jann said a final decision on the company's liabilities was expected soon, but he did not expect total damages to exceed $50 million. He added that three boys from Seveso were still suffering from a serious form of acne.

Environmental Response Team

Environmental response team member wears a one-piece chemical protective garment while trying to close off a leaking tank truck during a simulated environmental disaster.

The television news may one evening picture a figure clothed in protective suit with self-contained air supply entering a sewer or approaching a tank car. This is not an astronaut or the man from SWAT. It's someone from EPA, a member of a new group set up to improve the Agency's ability to cope with environmental emergencies.

The Environmental Response Team will have a core staff of six with new skills required by provisions of the Clean Water Act. Now that the initial list of hazardous substances has been issued under the Act, EPA will have new responsibilities for protecting public health and the environment from chemical spills into waterways.

But the team's charge will be more comprehensive than just responding to spills. It encompasses, for example, averting contamination of public water supplies, aiding in the disposal of solid and hazardous wastes, Federal disaster assistance, and preventing the release of toxic air pollutants. The team will permit EPA to provide around-the-clock support to the Regional offices with personnel whose sole responsibility is to respond to environmental emergencies.

Establishment of the Response Team comes at a time when EPA is becoming increasingly concerned with environmental emergencies. The designation of hazardous substances under the Clean Water Act, the task set by the Toxic Substances Control Act, and the emphasis on hazardous wastes in the Resource Conservation and Recovery Act all signal greater responsibilities in the area of environmental emergencies.

Reflecting this new concern, EPA Administrator Douglas M. Costle in October 1977 requested the Office of Planning and Management to study the Agency's capabilities in preventing and responding to environmental emergencies. Paul Elston, Deputy Assistant Administrator for Resource Management, set up an emergency response task force to analyze the Agency's activities. In December the work of the task force expanded when the Interagency Toxic Substances Strategy Committee was established and EPA was designated the lead agency for developing an interagency plan to deal with chemical crises.

Staffing of the Response Team is just getting underway. All are likely to be already employed by EPA as emergency response experts or other specialists. The membership will probably include chemists, toxicologists, biologists, sanitary engineers, and a specialist in waste disposal techniques such as incineration and landfilling.

Since the work will be physically demanding and require considerable travel, team members will be subjected to rigorous physical examinations before they are selected and will have periodic examinations to ensure that they have not been affected by exposure to low levels of toxic chemicals. When not responding to environmental emergencies, they will conduct training sessions for EPA and State employees, developing contingency plans, and prepare operating manuals and other technical documents.

To ensure that the regulations for responding to chemical crises are appropriate and feasible, the Emergency Response Task Force held a meeting recently at EPA Headquarters in Washington, D.C. to consider suggestions from various organizations. The meeting was chaired by Office of Public Awareness Director Joan Martin Nicholson and included representatives from trade associations, labor organizations, chemical firms, and environmental groups. They stressed the need for cooperation, coordination, and public information both before and after an emergency situation occurs.

According to Kenneth Biglane, Director of the Oil and Special Materials Control Division, the team will function as a special unit in his Division. Although its location has not been selected, it is likely to be started in the heavily industrialized areas of the eastern United States. In general, requests for the team will come from the Regional Administrator's Emergency Coordinator once he has concluded that the Region needs assistance. The team will be particularly valuable when more than one Region is involved. An incident on the Ohio River, for example, could involve Regions 3, 4, and 5.

On the scene, the Emergency Response Team will be more than a "Band-Aid" operation, according to Ken Biglane. Taking as an example a chemical spill into a stream on a Friday evening, Biglane says, "The Response Team will pro-

vide immediate assistance to the Regional On-Scene Coordinator monitoring the chemicals, predicting when they will pass, providing emergency water treatment technology or arranging to have water trucked in. The team will come up with solutions, techniques, and measures to minimize the immediate threat, giving other EPA program offices time to marshal their resources."

The Emergency Response Team concept has its origin in Section 311 of the 1972 Water Act, which called for preparation of a National Contingency Plan to handle spills of oil and hazardous substances when the spiller is not taking proper cleanup actions.

The plan, published in 1973 by the Council on Environmental Quality, coordinates Federal cleanup efforts. Responsibility for on-scene coordination rests with EPA for spills into inland waters, while the Coast Guard in the Department of Transportation is responsible for spills in coastal waters and the Great Lakes.

EPA draws its on-scene coordinators from the 56 emergency response specialists in the Regional Offices. They are trained in disciplines such as biology, chemistry, engineering, and oceanography and are experienced in cleaning up and removing spills or mitigating their environmental effects. They also view and inspect the spill control and countermeasure plans that facilities handling oil and hazardous materials must prepare. EPA is involved in about 3,000 spills a year, but only 50 require an on-scene coordinator to take over the cleanup operation.

EPA's emergency response has not been confined to oil spills, however. Although the list of hazardous substances was not designated until March 1978, EPA responded to such spills in the interest of public welfare. For example, EPA provided an on-scene coordinator in October 1973 when 15 railroad cars derailed near Rush, Ky., spilling acrylonitrile into a nearby creek, and in September 1974 when 260 gallons of PCB's were spilled in the Duwamish Waterway in Washington State.

The Response Team will also provide EPA with new skills in situations like that at the Kentucky acrylonitrile case, where the choice had to be made between permitting the spilled acrylonitrile to continue to burn or to try to put the fire out. Local officials decided to extinguish the fire although they were uncertain about the air pollutants resulting from open burning.

One member of the team will be an expert in this area, although predicting combustion products under the highly variable conditions of open burning is tremendously complicated.

The Response Team is likely to be less hardware-oriented than the Coast Guard's strike forces, although it will have some special mobile equipment. The team will be responsible for running the Environmental Emergency Response Unit, now operated by the Industrial Environmental Research Laboratory in Edison, N.J. The unit is a trailer mainly intended to remove chemicals by carbon adsorption, but it uses a series of physical and chemical processes in a versatile system suitable for on-site removal and treatment of both chemicals and oil.

The team will also have compact laboratory and monitoring equipment that can be transported to the scene of an emergency. Other special mobile equipment will be added to the Response Team's arsenal in the future. Among them are a special mobile incinerator now being designed by the Office of Research and Development and the Dynactor, a reaction chamber in which chemicals are diffused into small particles so that they can be treated very quickly.

Eventually, Biglane plans to have teams in Edison, Cincinnati, and on the West Coast. With these teams, Biglane says, "We hope to bolster State and local programs for disaster assistance. After all, the local communities are the ones on the receiving end of all environmental catastrophies. They need help. These teams are programmed to provide that help through EPA's Regional Offices." □

Wanted: More Toxicologists

Continued from page 22

tions of scientists in health-related areas. These societies should also consider scholarship programs, prizes, awards, and other activities that might increase awareness of toxicology as a profession, conferees declared.

The Role of Institutions

"The absence of a Federal Civil Service job category entitled 'toxicologist' is a severe impediment to effective recruitment of outstanding toxicologists into the regulatory agencies, since the entire existing Federal apparatus for advertising and hiring, as well as for career advancement, is based on the existence of a carefully defined Civil Service professional ladder," the report noted. Without this job category, if a Federal agency needs to hire a toxicologist it must fill a job category called "biologist" or "pharmacologist/toxicologist," and the qualifications most central to toxicology cannot be taken into account and rewarded adequately. For example, if a GS-13 biochemist acquires additional skills in toxicology, there may not be a job category into which he or she can be promoted that recognizes them. Yet it is this kind of retraining that is badly needed to meet the demand for toxicologists, the report noted.

"We strongly recommend that the Civil Service establish a career category and promotional ladder for 'toxicologist,'" the report said. "Toxicology is a profession; the establishment of a career ladder will aid the Federal Government in the recruitment and retention of qualified professionals. The Society of Toxicology, we believe, should address this issue, as should the officials in the Federal Government whose departments and agencies must recruit and retain highly qualified toxicologists."

Industry

The report added that there are many opportunities for industry to recruit trainees in toxicology. Some companies have programs for training technicians and junior scientists, and these programs could be expanded, perhaps in cooperation with local universities. Industry also might explore cooperative programs with universities, such as joint staff appointments which would involve the appointee more fully in the industry and the university.

Industry is routinely asked to expand its support of university programs in toxicology, and some have argued that industry has a principal responsibility for this training, since chemicals are manufactured and marketed by industry, and roughly one-third of the pool of trained toxicologists find employment in industry, according to conferees. The consensus was that industry can and should contribute to training toxicologists at universities. They noted the training of toxicologists at universities is in large measure a public responsibility.

"At the same time, the rate of development of industrial research centers is staggering," the report declared. It is estimated there was a 70 to 100 percent increase in industrial toxicology facilities from 1975 to 1977, and that there will be a further 100 percent increase during the next few years.

"There are not enough well-trained people to go around, and the hiring of toxicologists from one institution to another has already reached 'robbing Peter to pay Paul' proportions," the report stated. "Clearly, industry has a major stake in expanding the supply of trained professionals just to meet its own needs. Greater financial support of toxicology training programs by corporations would both serve the national interest and contribute to meeting the need for toxicologists which many industrial toxicology laboratories already feel acutely." □

Copies of the full report on which this article is based may be obtained from the Conservation Foundation, 1717 Massachusetts Ave., N.W., Washington, D.C. 20036.

News Briefs

EPA Studies Birth Mishaps In Oregon Town

EPA is probing the cause of 10 miscarriages between 1973 and 1977 among eight women in a small Oregon town to determine if the mishaps were caused by herbicide spraying in nearby forests. "We're uncertain at this point whether herbicides are responsible for the miscarriages," said EPA Administrator Douglas M. Costle recently. "But one of the herbicides in question, namely 2,4,5-T, has caused birth defects and stillbirths among laboratory animals such as mice, rats, hamsters and birds. Another of the brush killers, Silvex, is being studied by EPA for the same reasons." Also, Costle added, the Oregon women have stated that the times of their miscarriages correlate closely with the times of herbicide treatments in the forests.

Blum Testifies On Inflation

"EPA's regulations are not a major contributor to inflation, although we acknowledge our responsibility to seek least-cost approaches to reaching environmental goals," EPA Deputy Administrator Barbara Blum recently told a House Subcommittee. Although EPA's regulatory actions have an impact on the Consumer Price Index (CPI), Blum said, "any conceivable modification of current regulations would not substantially alter the nation's underlying inflation rate." Environmental cleanup results in a number of positive and anti-inflationary effects such as fewer illnesses, fewer lost work days, and lower medical bills, Blum told the Subcommittee on Economic Stability of the Committee on Banking, Finance and Urban Affairs.

EPA Tightens Limit For Fuel Evaporation

EPA Administrator Douglas M. Costle recently announced a tougher standard for the reduction of evaporative emissions for gas-fueled cars and light trucks, starting with the 1981 model year. The new standard will reduce nationwide hydrocarbon emissions from all mobile sources by as much as 10 percent in 1985, and 25 percent by 1990. It will replace the standard which began with the 1978 models. Evaporative emissions are the hydrocarbon molecules in gasoline vapors that escape from cars and trucks in addition to emissions in the exhaust.

States Served by EPA Regions

Region 1 (Boston)
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
617-223-7210

Region 2 (New York City)
New Jersey, New York, Puerto Rico, Virgin Islands
212-264-2525

Region 3 (Philadelphia)
Delaware, Maryland Pennsylvania, Virginia, West Virginia, District of Columbia
215-597-9814

Region 4 (Atlanta)
Alabama, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky
404-881-4727

Region 5 (Chicago)
Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota
312-353-2000

Region 6 (Dallas)
Arkansas, Louisiana, Oklahoma, Texas, New Mexico
214-767-2600

Region 7 (Kansas City)
Iowa, Kansas, Missouri, Nebraska
816-374-5493

Region 8 (Denver)
Colorado, Utah, Wyoming, Montana, North Dakota, South Dakota
303-837-3895

Region 9 (San Francisco)
Arizona, California, Nevada, Hawaii
415-556-2320

Region 10 (Seattle)
Alaska, Idaho, Oregon, Washington
206-442-1220

People

Lewis Hughes
He has been appointed Deputy Associate Administrator, Office of International Activities.

Dr. Hughes previously served as Acting Chief of the Institutional Operations Office of the National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif. From 1972-78 he was Chief of the Health and Safety Office at Ames Research Center where he worked closely with members of the European Space Agency and other foreign organizations using the Center.

Dr. Hughes was Radiological Safety Officer at the University of California in Berkeley 1965-72 where he also lectured in the School of Public Health on radiation safety measures. He was a health physicist at Lawrence Livermore Laboratory 1956-65. Earlier he served in the U.S. Army Field Artillery with the rank of 1st Lieutenant.

He received the NASA Exceptional Service Award in 1976 and the NASA Group Achievement Award in 1977.

He received an A.B. degree from West Virginia State College in 1951, an M.S. from West Virginia University in 1958, and a Ph.D. from the University of California, Berkeley, in 1972. Dr. Hughes is author of 34 scientific reports and manuals.

Guanita Reiter
The Special Assistant to Region 6 Administrator Adlene Harrison recently won the Barbara B. Tennant Award from Federally Employed Women (FEW), an organization dedicated to winning equal opportunity for working women. Reiter won the award for her efforts in handling the International Women's Year National Conference in Houston, Tex. She was responsible for registering over 23,000 participants at the Conference. She also won the EPA Bronze Medal for excellence in the Federal Women's Program in June, 1977.

Joseph Padgett
The Director of the Strategies and Air Standards Division at Research Triangle Park, N.C. was recently elected to a 3-year term on the Air Pollution Control Association's Board of Directors. Padgett began his professional career in 1948 with Westinghouse Corporation as a design engineer. Since then he has worked for a number of private companies in various engineering and managerial positions, including the USI Technical Center, Parsons Corporation, and the Atlantic Richfield Corporation until 1970, when he began working for the United States Postal Service. In 1971 he joined EPA as Chief of the Systems Analysis Staff in the Office of Air Programs and assumed his present Directorship in 1972. Padgett received his B.E. Degree in Mechanical Engineering from the Johns Hopkins University in 1948 and an M.S. in the same field from the California Institute of Technology in 1951. He is a registered Professional Engineer in the State of Ohio and holds several patents.

Lam K. Lim
He has been cited by President Carter for initiating and implementing the EPA Value Engineering Program as part of the Construction Grants regulations at a savings to the government of $75 million. Lim is a sanitary engineer with the Municipal Technology Branch, Municipal Construction Division. He heads an independent team of design engineers who review proposed construction projects for unnecessarily high costs and suggest cheaper alternative methods of completing the project. Although voluntary at first, Value Engineering analysis is now required of all projects costing $10 million or more which seek grants. Lim also received the EPA Bronze Medal for his services in June 1977.

James A. Chamblee
He has been cited by President Carter for outstanding accomplishments as Chief of the Priorities and Needs Assessment Section, Water and Waste Management Program. In a recent letter the President specifically thanked him for his money-saving efforts in reducing government forms. Chamblee, who is responsible for conducting the 'State Facility Needs Survey', redesigned the Survey questionnaire from its old 37-page length down to just one page, saving the government an estimated $1.2 million in related processing costs. He also was cited by Administrator Douglas M. Costle for his accomplishments in carrying out the Survey itself. He was previously awarded the EPA Bronze Medal in June 1977, and in December of that year received a $2,300 cash award as a Special Achievement Award for Special Service.

Sarah T. Kadec
She has been appointed Assistant Director for Information Services at the Executive Office of the President, reporting to Richard Harden, Director of Administration.

Mrs. Kadec has served as Chief of the Library Services Branch at EPA Headquarters since May, 1971. In 1975 she was awarded the EPA Silver Medal for Superior Service. The previous year she received a commendation from the Administrator for helping to establish the Federal Energy Administration's National Energy Information Center.

Mrs. Kadec received an A.B. degree in 1952 from Madison College and a Master's degree in library science in 1961 from the Carnegie Institute of Technology. She has been involved in library and information systems work for a number of Washington-area industries and agencies and taught at the University of Maryland and Catholic University library schools. In 1969-70 she served as a consultant to the Center for Scientific and Technological Information in Tel-Aviv.

region 8 Report

The Rocky Mountain Region

By Alan Merson
Regional
Administrator

Every Region contains, in some measure, what Region 8 epitomizes: areas of clean air, clean water and land largely unspoiled by man. While EPA's foremost priority must, of course, be protection of the public health, Region 8 must necessarily interpret that goal in the context of a prevention strategy.

The factor driving that strategy more than any other is the rapid economic growth overtaking the six States of Region 8, but largely concentrated in the energy-rich inter-mountain region, where a majority of the Nation's energy resources for the next hundred years will probably be found. The clash between Region 8's still relatively undeveloped land mass and the rapidly accelerating pace of energy development is producing, in some areas, a dramatic discord which can only reach a crescendo in coming years.

Virtually every major issue confronted by our Regional Office is an outgrowth of this clash. Exploding population growth in Denver, Salt Lake City, Billings, Casper, and Grand Junction all represent variations of this theme in addition to the smaller, more obvious, energy boom towns, such as Craig, Colorado, and Rock Springs and Gillette, Wyoming.

It seems appropriate, therefore, to depart from the format of previous Regional Office narratives in order to illustrate in anecdotal fashion the working out of this theme. This is not to say that Region 8 neglects EPA's more traditional environmental clean-up functions. Our Enforcement Division, for example, recently secured a settlement with a major steel mill in Colorado, which will result in probably the cleanest coke oven emissions in the Nation. We maintain an active permit enforcement program against major polluters of the numerous streams rising within our region, although it is more likely to be concerned with mining than manufacturing activities. We have active solid waste, radiation and noise programs which, although short on resources, have been long on innovation and creativity. We have had an extensive involvement in pesticides, and are currently administering one of the few EPA-run pesticide certification programs in the Nation. We have a special concern with toxic substances in the Denver area.

Still and all, Region 8 remains basically clean. How to keep it clean is our greatest challenge. Let us examine four cases, begining with the City of Denver itself.

Once famous for pristine air, Denver has witnessed a gradual worsening of air quality over the past decade until it now ranks as the second dirtiest metropolitan area in the Nation. For many years, efforts to improve Denver's air quality met with little interest or commitment on the part of the public. Last fall and earlier this year, however, Denverites experienced a growing number of increasingly serious air pollution alerts. Public opinion surveys indicated that air quality was the single most disturbing issue to residents of the Denver area. Last November the Regional Office detailed 15 of our employees to a Denver Air Task Force to work exclusively on Denver's air crisis, first to mobilize the 43,000 Federal employees of the Denver area to end their reliance on single occupancy vehicles, and, second, as Federal efforts in such example-setting became visible, to assist the private sector in doing likewise.

This strategy, developed with State and local officials and with our sister Federal agencies, was commended by President Carter during his visit to Denver on Sun Day last May. The President pledged his personal support for Denver's clean air campaign and asked that EPA and the Federal Regional Counsel coordinate an aggressive Federal effort to support local initiatives. The President catalogued some $42 million that will ultimately be made available for the Denver air project, including money for transit-related construction, free off-peak hours bus service, electric car demonstrations, an inspection and maintenance awareness campaign, measures to prevent tampering with emission controls, and a directive to our Regional Office to report to him on a monthly basis on the progress of this initiative.

Another regional issue of major importance is closely linked with the Denver air quality picture and is an excellent example of the interrelationship between air, water, and land use. The Foothills Project is a proposed water treatment plant, dam, reservoir, and tunnel system designed to nearly double the Denver Water Department's treatment capacity. Since some public lands are involved in the project area, an environmental impact statement (EIS) was prepared. It fell to this regional office to review that statement under the National Environmental Policy Act and section 309 of the Clean Air Act.

After extensive review, Region 8 concluded that the impacts of the project were substantial and that alternatives to the project had not been adequately considered.

On that basis, we referred the matter to the President's Council on Environmental Quality. CEQ agreed with our assessment and recommended that right of way permits be denied by the Federal agencies managing the lands in the project area. The permits were nevertheless issued.

Alan Merson

Region 8 was then asked to advise the Army Corps of Engineers as to the propriety of granting a dredge and fill permit for the proposed dam under Section 404 of the Clean Water Act. The Region conducted two lengthy public hearings primarily to determine whether in fact less environmentally damaging alternatives to the proposed dam had been adequately investigated. Concluding that they had not, the Region recommended against issuance of the permit, leaving it now for the Corps to decide that issue. In response to considerable Congressional interest, the Corps has agreed to undertake an exhaustive analysis of alternatives before rendering its decision. This in itself goes a long way toward meeting the Region's concerns.

Whatever the outcome, the link is established. Water availability helps shape growth patterns which in turn largely determine the quality of air in the region.

That same link exists in wastewater treatment, a fact which has led us to the preparation of an "overview" environmental impact statement to examine the cumulative impacts of funding ten wastewater treatment projects in the Denver metro area.

Funding of additional wastewater treatment capacity supports growth. Growth without commensurate air quality controls will result in continued air pollution problems in the Denver region. In the framework of the EIS and of the 208 planning process, we developed policies which will guide our future funding of treatment works, including:

The philosophy behind the overview EIS assumes that Federal expenditures in many of our urban areas shape growth. Here, as in 208 and State Implementation Plan revisions, Region 8 is working to insure that Federal managers carefully evaluate the impacts of these expenditures as they affect environmental quality and to do so in cooperation with other agencies whose programs may cross-cut one another.

This is the plains country EPA has been seeking to protect near Colstrip, Mont.

Back cover: One of New York City's sludge-dumping vessels carries waste from sewage treatment plants into the Atlantic Ocean for disposal.

Yet another example of the responsibility placed upon our Region to perform its function of safeguarding environmental quality in areas of rapid development is the coal-fired power plants at Colstrip, Montana. Two plants there now generate some 700 megawatts of electricity. Construction of two additional units which would each generate an additional 700 megawatts has been proposed.

Approximately twenty miles from Colstrip lies the Northern Cheyenne Indian Reservation, an area of Class I air quality under the Prevention of Significant Deterioration policy. Montana Power Company, representing a consortium of utilities, applied for pre-construction permits under this policy, which is, of course, designed to protect the quality of air already cleaner than that required by the National Ambient Air Quality Standards.

Extensive analysis of data generated by computer modeling and actual meteorological data led us to conclude that Colstrip Units 3 and 4, if built as planned, would violate allowable increments of sulfur pollution on the reservation. In the three-year period analyzed, violations would have occurred on at least 19 days. Congressional changes in the Clean Air Act of 1977 allow one such violation. We thus had to deny the permits in the face of overwhelming local support for the plants as well as a strong regional and national interest in generating additional power.

The final outcome of the Colstrip issue is not clear at this time. There is the possibility of further administrative action as well as litigation, but it does serve, again, as an example of the energy vs. environment dilemma Region 8 constantly confronts.

The bottom line in this Region 8 report must, of course, be the competence, courage, and dedication of Region 8 employees in performing tasks of inestimable value for this country in the face of something less than total acceptance of our role by much of the public. And therein probably lies our Region's greatest challenge in the coming months and years: building a broad-based constituency for the values we seek to serve. □

United States
Environmental Protection
Agency
Washington D C 20460

Official Business
Penalty for Private Use $300

Postage and Fees Paid
Environmental Protection Agency
EPA 335

Third Class
Bulk