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**Taking a
Global View**

Taking a Global View

As the recent disaster in Bhopal, India, has illustrated, protecting health and the environment are worldwide concerns. This issue of *EPA Journal* takes a global perspective.

The issue begins with an article by former EPA Administrator Russell E. Train who explains why it is necessary for all countries to take steps to ensure the ecological integrity of the planet. Train is now President of the World Wildlife Fund-U.S.

In the next article, Fitzhugh Green, EPA's Associate Administrator for International Activities, explains how the agency is involved in global environmental protection efforts. In an interview, Jack McGraw explains EPA's concerns in the aftermath of the Bhopal tragedy. He is head of EPA's task force on the subject and Acting Assistant Administrator for Solid Waste and Emergency Response.

An international oilman, Robert O. Anderson, Chairman of Atlantic Richfield Company, discusses the attitudes of multinational corporations toward the environment. Another article presents the conclusions of a report by The Conservation Foundation on whether U.S. pollution controls are forcing companies to locate their plants in countries with less stringent environmental rules.

An industrialist and an environmentalist give their views on whether the U.S. adequately controls the overseas sale of pesticides that are banned in this country. Commenting are Jack D. Early, President of the National Agricultural Chemicals Association, and Edith D. Meacham, International Pesticides Coordinator for the National Audubon Society.

EPA's cooperative environmental ventures with the People's Republic of China are featured in an article by Gary R. Waxmonsky, coordinator of the agency's program with China.

Natural and manmade forces

that affect the earth's climate are explained in an article by Walter O. Roberts of the National Center for Atmospheric Research. The need to preserve the diversity of species that inhabit the planet is discussed by Peter H. Raven, Director of the Missouri Botanical Garden. He headed a special study of the problem.

Shifting to domestic concerns, the *Journal* includes an article by U.S. Senator Lloyd Bentsen about the environmental issues facing this Congress. Bentsen is

the new ranking minority member on the Senate Environment and Public Works Committee.

Courtney M. Price, the agency's Assistant Administrator for Enforcement and Compliance Monitoring, reviews environmental enforcement for Fiscal Year 1984. Susan Tejada of the *Journal* staff profiles a day in the life of an EPA criminal investigator. Jack Lewis, also of the magazine's staff, reports on one state's progress in dealing

with asbestos in schools.

In the fifth article in a series in the *Journal* by EPA's regional offices, Rowena Michaels, public affairs director in Region 7, reports on the start-up of EPA's mobile incinerator in southwest Missouri to help solve the problem of soil contaminated by dioxin.

Concluding the issue are Update, which summarizes recent developments at the agency, and EPA appointments. □



Steve Delaney

Sunset over the Atlantic Ocean: "The environment is global, with one ocean of water and one canopy of air, and therefore must be cared for as one entity." — Fitzhugh Green, EPA

EPA JOURNAL

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EPA is charged by Congress to protect the nation's land, air, and water systems. Under a mandate of national environmental laws, the agency strives 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.

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Front cover: Photograph of the earth, taken from space on the Apollo 10 flight. NASA photo.

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A Perspective on World Environmental Problems

by Russell E. Train

Since cleaning off my desk at EPA in 1977, I have worked to gain an improved understanding of America's role in the biosphere, the thin film of land, air, and water that is home to all life on Earth. Viewing the environment from a global perspective is not easy. We perceive the world through senses—vision, hearing, smell—that can encompass an outfall or stack, perhaps even a wastewater treatment facility or a petrochemicals manufacturing plant. But the Earth is so large that it defies sensation, and therefore comprehension. Similarly, the demands of everyday life cause most people to focus on time-scales of days or, at the most, years. But life on Earth is 3,500 million years old, a period so great that few can see how today's events relate to the vast sweep of time.

Furthermore, the interactions of humans and other living things that determine environmental quality are so complex that we have not yet developed models of global ecological and economic processes adequate for many of the decisions society must make. And the pool of information on which those decisions are based is uneven and incomplete. Many regulators have experienced the frustration of trying to obtain comprehensive data on, say, the discharge or effects of a domestic pollutant. Multiply that by the whole range of environmental issues worldwide, the diversity of languages, the varied systems of government, and the inability of some nations to collect even basic environmental information, and one can appreciate the difficulty of understanding the status and trends of the global environment.

But despite these obstacles, we cannot afford to ignore the ecology of our planet, because available scientific information, theory, and common sense all tell us that the biosphere is undergoing changes at a rapid and accelerating rate. Some of these are

(Train is President of the World Wildlife Fund-U.S. He was EPA Administrator from 1973-77, and Chairman of the President's Council on Environmental Quality from 1970-73.)



Russell E. Train

already serious, others are likely to become profound problems in the next century, and one may not occur at all—but will be devastating if it does.

The acceleration of environmental impacts is not new. The arrival of the first Americans from Asia perhaps 15,000 years ago led to the extinction of many large mammals. The invention of agriculture some 10,000 years ago in Asia Minor and Southeast Asia led to permanent settlements and written records, achievements that further stimulated population and technological growth. Still, progress and its environmental impacts were sufficiently gradual that the Earth could accommodate many of them. Not only was *per capita* impact small; for almost all of history, there have been relatively few *capitae*.

By the year 1 A.D., the world's human population had reached perhaps 300 million, and more than 1,500 years would pass before it doubled. Now the total is 4,800 million, and the doubling time is just 40 years. In the year 2000, the Earth will be home to 20 times as many people as in the year one, and most of them will be doing everything in their power to achieve a standard of living unimaginable in previous times. Accelerating technological innovation will allow some to acquire the material goods they desire. But in the process, by serving their own immediate needs, people in affluent industrialized and poorer developing nations alike will degrade the global environment. Although thousands of people worldwide

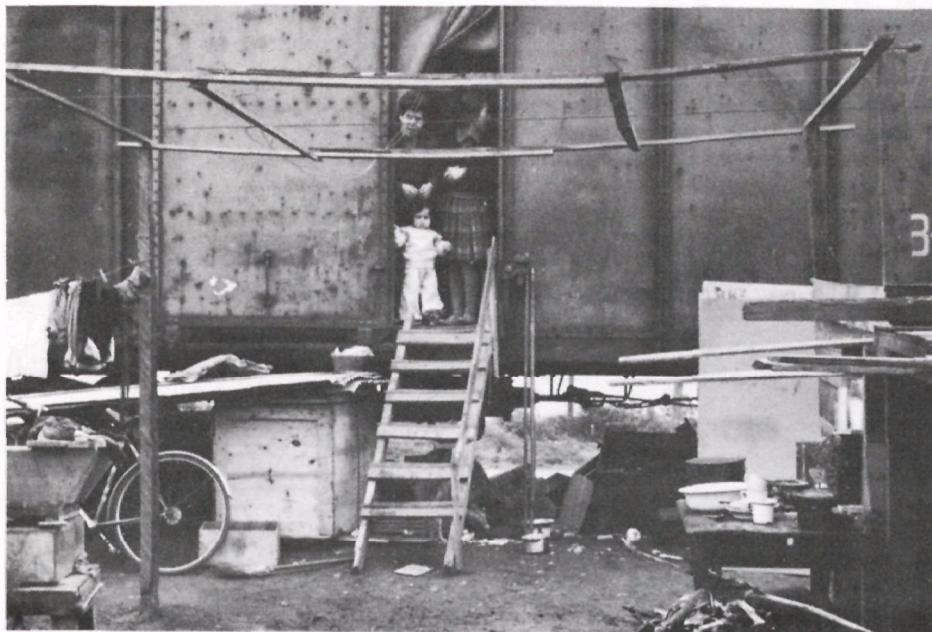
are fighting heroically to maintain environmental quality in the face of growing population, rising aspirations, and proliferating technologies, the task is rapidly growing more difficult.

Fortunately, environmental awareness is changing in our nation and worldwide. When the U.S. was young, most Americans accepted the disappearance of forests and game animals, for there would always be more "further west." Later, we viewed belching smokestacks and polluted rivers as signs of economic vitality. But it became harder to accept environmental strains that have become obvious in recent decades. The new, more productive methods of raising crops led to pesticides in mothers' milk and declines of ecologically and commercially important species in Chesapeake Bay. In the lower 48 states, we even came perilously close to losing the bald eagle, the symbol of our nation.

The American people responded with the National Environmental Policy Act, the Clean Water Act, the Endangered Species Act, and other needed laws. We created new institutions such as EPA and the Council on Environmental Quality to watch over and protect our land, air, water, wildlife, and people. While serious new problems, such as toxic waste dumps and ground-water contamination, are still taking shape, an admirable job has been done in slowing and even reversing environmental degradation in the U.S. Nevertheless, Americans and citizens of other industrialized nations consume a disproportionate share of the Earth's resources and produce a disproportionate fraction of humankind's environmental impact.

In less developed nations, where more than 90 percent of the world's population growth is occurring, people, companies, and governments are striving to repeat our remarkable economic success. Many are unable to build or cannot afford to pay for the environmentally protective institutions that could spare them from the environmental problems we have begun to cure. In many tropical areas, the land cannot support sustained agriculture of the type that makes the U.S. the world's greatest food producer, so attempts to imitate our pattern of economic development will be far more environmentally destructive.

Moreover, the tropics harbor most of the world's biological diversity, the variety of ecosystems, species, and genotypes that has evolved over many millions of years. In coming decades, as people, agriculture, and industry spread throughout the tropics, cutting the forests, damming the rivers, and industrializing the coastlines as they go, the biosphere will lose a major fraction of its wealth of life. No comparable loss of species has happened in 65 million



A windowless railway wagon is home to this Latin American family. Human needs are posing a worldwide challenge to wise environmental management.

years, since dinosaurs last walked the Earth.

As described so well in the "Biological Diversity" chapter of the *1980 Council on Environmental Quality Annual Report*, extinction of these genetic varieties, species, and ecosystems will be a permanent loss of wealth to humankind. Without intending to do so, we will be losing myriad future sources of food, medicines, energy, and industrial raw materials essential to our well-being. We will be increasing soil erosion, drought, and flooding, diminishing the ability of natural ecosystems to break down the increasing load of chemical pollutants, and running the risk of altering climate over large areas.

A growing concern among environmental scientists is the alteration of the Earth's biogeochemical cycles, the ecological processes by which organisms regulate the movement of chemical elements through the land, air, water, and biota. Perhaps the most serious problem on the horizon is the risk of changing global climate by accumulating atmospheric "greenhouse gases," such as carbon dioxide, certain chlorofluorocarbons, and methane. These gases will cause global warming and, almost certainly, changes in the patterns of rainfall.

Although the rate and amount of warming are as yet uncertain, they would be very damaging to agriculture in many nations, including the U.S. Ironically, global warming might well benefit agriculture in those few nations where crop production is currently inhibited by low temperatures. It would also cause some melting of polar ice caps, raising the world's sea level enough to inundate the lowest-lying coastal areas.

Global climatic changes will also be disastrous for biological diversity, because development is rapidly fragmenting once-continuous ecosystems into "islands." Few animals or plants can move among the remaining habitat islands across urban, industrial, or agricultural landscapes. Nor can they possibly evolve quickly enough to adapt to rapidly changing climate. As a result, many of our remaining species in parks, reserves, and other habitat islands will disappear.

Carbon dioxide is increasing because of growing worldwide use of fossil fuels and the destruction of tropical forests, and chlorofluorocarbon levels are rising due to the growth of refrigeration and air conditioning. The source of increasing methane levels is uncertain. Although some greenhouse gases are increasing at more than one percent per year, serious effects of these increases may still be decades away.

While loss of biological diversity and climatic change are the most probable major threats to global environmental quality, there is another so horrendous that many consider it "unthinkable," and choose not to think about it. Nuclear war generally was not considered an environmental issue until the 1983 "World After Nuclear War" conference. Its participating atmospheric scientists and ecologists revealed that dust and soot from nuclear detonations and subsequent fires could envelop the world in a black cloud. The cold, dark "nuclear winter" would be a devastating environmental trauma, interrupting vital "ecosystem services" and causing extinction of great numbers of species, conceivably including *Homo sapiens*.

Yes, from a global perspective,

environmental challenges facing us are very serious. Ignoring them will not make them go away. But nuclear war is not inevitable, nor are global loss of biological diversity or climatic change. We can ensure the ecological integrity of our planet, our survival, and well-being, by improving our understanding of the ecological, economic, social, and political causes and consequences of these problems, and by dealing with them before it is too late.

We must understand that people everywhere seek to better their lives. As noted in a remarkable document called the *World Conservation Strategy*, published by the International Union for Conservation of Nature and Natural Resources, we can maintain environmental quality only by encouraging development that is sustainable and environmentally sound. Individual, corporate, or national behavior appropriate for an uncrowded world may not be acceptable when the ever-increasing numbers of people are dependent on ever-decreasing natural resources, i.e., when our margin of safety is steadily shrinking.

There are two ways that we can help to avoid the environmental problems I mentioned above. First, our nation is still the greatest contributor to global environmental changes. We can provide strong incentives for individuals and corporations that find innovative ways to prevent environmental damage. By protecting our own environment, we can set an example for other nations that look to us for leadership.

Second, we can provide expertise and economic assistance to nations trying to protect the environment while developing their resources. In a world where interconnectedness between industrialized and developing nations is growing steadily, helping them is the soundest way to protect our own vital interests.

Environmental protection is not only the responsibility of government. Although short-term perspectives may differ, individuals, professional societies, public interest organizations, and industries must work with governments if we are to avoid the environmental problems that threaten our survival and well-being. Anyone who has devoted mind and heart to this task knows that it is certainly not an easy one. But I have great faith in our ingenuity, wisdom, and resolve. If we choose to maintain the ecological integrity of the Earth, we will succeed. □

Thinking Globally at EPA

by Fitzhugh Green

People often ask, "Why is EPA, a domestic agency, engaged busily in many parts of the earth?" The short answer is that the environment is global, with one ocean of water and one canopy of air, and therefore must be cared for as one entity.

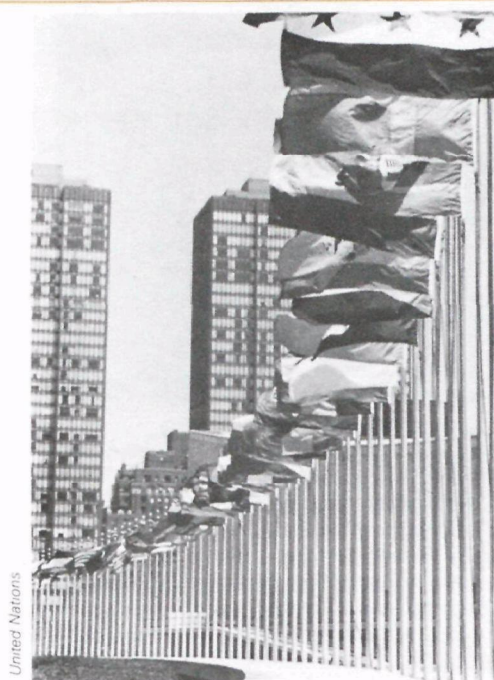
In 1970, EPA's first Administrator, William D. Ruckelshaus, established a program of international activities. The rationale then and now is twofold: enlightened ecological and economic self-interest.

On the first point, Ruckelshaus insisted there is ultimately no sense in cleaning up the air and water unless the rest of the world does so too. Therefore, he directed EPA to keep other nations informed of our regulations, standards, and scientific findings so that the environmental movement could spread far and fast. At the same time, he directed the agency to watch the progress of environmental ministries abroad to be sure EPA could, in turn, profit from their management techniques, control technology, and research.

On the second point, Ruckelshaus wanted to ensure that American manufacturers who complied with the new laws and regulations at home did not suffer unfair commercial competition from foreign-based companies which were unregulated. He was determined, in short, that EPA work with other countries to avoid "pollution havens" where it would be legal to poison the air, water, and land with waste byproducts.

Additionally, Ruckelshaus agreed with Maurice Strong, the great Canadian environmentalist and industrialist, who said: "A country which fouls the air and water of neighboring nations that are downwind, or downstream, is committing ecological aggression."

Congress agreed to some extent with these goals. For example, Article 115 of the Clean Air Act focuses on transboundary air pollution. The Toxic Substances Control Act and the Resource Conservation and Recovery Act require that EPA inform other nations, through the U.S. State Department, before shipments of toxic chemicals or hazardous wastes are made. Then the



Member nation flags fly in front of the United Nations General Assembly building in New York. In cooperation with EPA, U.N. units such as the World Health Organization carry out a variety of environmental programs.

receiving country can decide how to handle the dangerous imports in accordance with its own procedures.

Neither of these goals will be—or can be—totally achieved. But they provide a kind of north star by which the agency's activities in the international community can be kept on course. They encourage EPA to be alert for "bargain-rate" learning experiences. For example, when other countries or organizations stage professional meetings on a topic like acid rain, EPA can piggyback the efforts of others and avoid duplications, or enlist others in bilateral research or consultations on common targets. Or EPA can join with multilateral groups to harmonize approaches to setting of standards on pollutants or protecting some specific vital aspect of the environment, such as the ocean or ozone layer.

EPA's international goals clearly coincide with those of a number of other nation states. Since 1970, when only a handful of EPA-type agencies existed, nearly every country has now set up some sort of governmental mechanism to protect human health and

environment. EPA has entered into cooperative bilateral projects with many of these. With West Germany, the Soviet Union, the People's Republic of China, Japan, the Netherlands, and France there are formal agreements. With our next door neighbors Mexico and Canada there are daily, continuing contacts between environmental agencies. Multiple, complex, and difficult transboundary discussions of the issues run the gamut from acid rain to untreated sewage to at-sea incineration.

Numerous multilateral organizations have embraced the environment as a vital responsibility. They include United Nations units such as the World Health Organization, the U.N. Environment Program (started by Maurice Strong after the Stockholm Conference in 1972), and the Economic Commission for Europe; also, there are the 24 members of the Organization for Economic Cooperation and Development, the European Economic Community or "Common Market," and even NATO, which has an ecologically oriented group called the Committee on the Challenges of Modern Society. EPA pursues active and supportive programs with all of these, as well as with the U.S.-border standing bodies: the U.S.-Canadian International Joint Commission, created in the 1909 Boundary Waters Treaty with Canada, and the International Boundary and Water Commission with Mexico.

Drawing on substantive input from technical experts and top management, EPA offers U.S. policy positions to the State Department in preparation for international negotiations on environmental matters. With the State Department we jointly determine the best strategy for achieving U.S. environmental aims.

EPA suffers no lack of employee interest in the challenging work needed to accomplish the two goals set by former Administrator Ruckelshaus. Indeed, during the 14 years since EPA's inception, not one employee has refused an overseas mission of any sort. With this evident dedication, it is not surprising that EPA operatives are liked and respected in many corners of our planet. It is certainly thanks to their knowledge and drive that America stands today as a leader of the environmental movement throughout the globe. □

(Green is EPA's Associate Administrator for International Activities.)

The Aftermath of Bhopal

An interview with Jack W. McGraw

What are EPA's reactions and plans in the aftermath of the chemical disaster in Bhopal, India? EPA Journal asked Jack McGraw, who heads an agency task force on Bhopal, for answers to these questions. McGraw has recently been named Acting Assistant Administrator for Solid Waste and Emergency Response at EPA. The interview follows:

Q In the wake of the Bhopal tragedy, many people have asked the question—could the same kind of catastrophe happen in the United States?

A Yes, it could happen here, but the probability is low. The real issue is what to do to prevent such an incident from happening, and how to look at the resources that we would need and the systems that it would take to respond to such an incident if one should occur.

Q What has been EPA's official response to the Bhopal situation?

A EPA at this time has not played any direct role in response to the Bhopal tragedy. However, we had continuous inquiries from the news media, from Congress, from private citizens, coming into all parts of the agency—the Office of Public Affairs, the Congressional office, the Office of Research and Development, the Office of Pesticides and Toxic Substances, the Office of Air and Radiation, the Office of Solid Waste and Emergency Response, and the regional offices. As each element of the agency had only a piece of the information, it was essential to consolidate and share the limited amount of data that was available. So, Al Alm (EPA Deputy Administrator at the time) appointed me to organize the agency components that would have a role if and when a Bhopal-type tragedy ever occurred in the United States. My assignment was to pull together a group within the agency to organize and consider the information, to determine what technical support was available, should it be requested by the Indian government, and to develop a course of action. This involved resources from EPA and other federal agencies. A task force has been established to deal with all of these problems. Jim Makris of the Office of Solid Waste and Emergency Response is the Project Leader.

Q What other federal agencies are involved in the official response of the U.S. government to the Bhopal tragedy?

A EPA chairs the twelve-agency National Response Team; the U.S. Coast Guard is the vice-chair. The agencies most concerned with this kind of incident

are the Department of State, the Federal Emergency Management Agency, the Department of Transportation, the Department of Labor (the Occupational Safety and Health Administration), the Department of Defense, the Department of Energy, and the Department of Health and Human Services. Right after the accident, we called a meeting of the National Response Team. We are now reviewing the authorities, regulations, programs, and expertise these other federal agencies might have that would be valuable in the event that we had to respond to a domestic incident or to provide technical assistance to the government of India.

Q Does EPA have authorities to deal with toxic chemicals and their storage?

A Yes. Although we still do not know exactly what caused the Bhopal incident, EPA has a variety of regulations dealing with storage and handling of toxic materials. These authorities are established under TSCA (Toxic Substances Control Act), RCRA (Resource Conservation and Recovery Act), CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), and the Clean Air Act either to prevent or to respond to an incident of this kind.

Q Is our government prepared for accidents like the one in Bhopal?

A Although it would be virtually impossible to assure no loss of life and injury should an accident like that occur suddenly and without warning, local, state, and federal agencies have a variety of response capabilities that would come into play. Beginning with the local police and fire departments and the local Red Cross and expanding rapidly to include county and state emergency services organizations, local health services, and emergency response programs of the Federal Emergency Management Agency, the Department of Health and Human Services, the Public Health Service, the Department of Transportation, the National Weather Service, and EPA, assistance to the injured and evacuees would be rapidly mobilized.

Similar responses have been made to deal with the Texas City chemical explosion in 1947, the chlorine barge sinking on the Mississippi in 1962, the more recent chemical spills following train derailments in Florida and Louisiana, and fires in New Jersey—and of course after the accident at Three Mile Island.

Q What would be EPA's specific role?

A EPA would provide emergency technical support, including monitoring teams to advise public safety authorities on current and potential dangers and effects of the chemical involved, and would work with other agencies to determine the cause of the problem, any violations of regulations, and steps needed to prevent future accidents. Our On-Scene Coordinator and Environmental Response Team would be there as soon as possible. The Regional Response Teams, which include the relevant federal agencies as well as state agencies (and local agencies as required) could be assembled to assist in the coordination.

Q A minor methyl isocyanate leak occurred in Middleport, N.Y., in November 1984. How well did emergency response procedures work in that case?

A It depends on your point of view. The fact that it happened at all would raise concerns. But looking at it in terms of emergency response, our review showed that the company involved was very responsible. It immediately notified the local government, and also assisted in evacuating a school that was in the pathway of the air plume. There were no injuries. Obviously, local and industry officials and the public responded in a very positive manner.

Q What steps has EPA taken with regard to methyl isocyanate (MIC) production at Union Carbide's Institute, W. Va., plant?

A Our Region 3 office, in conjunction with OSHA (Occupational Safety and Health Administration), conducted a full multimedia environmental inspection of the Institute plant. The investigation of the findings is continuing. Other EPA

specialists are also examining the plant and its operation. In addition, the State of West Virginia is also actively reviewing the plant. At this time, MIC is not being produced at the Institute plant.

Q What is a multimedia environmental inspection?

A The agency regularly inspects facilities for compliance with laws, regulations, and requirements. In a multimedia inspection, the various program criteria are consolidated and all relevant elements of the facilities are reviewed. The inspection may be specific or general in nature depending on the overall objective. For example, it may be directed at the potential for air releases only or it may also include water releases, solid and hazardous waste handling practices, ground-water problems, and certain manufacturing practices if they involve hazardous chemicals.

Q We understand that methyl isocyanate is transported to other Union Carbide plants from Institute. Has EPA taken any steps since Bhopal to inspect these other sites?

A There are a number of other places that use methyl isocyanate, particularly the Union Carbide site in Woodbine, Ga. Our Region 4 office conducted a thorough multimedia inspection there. We've also completed environmental inspections at two production facilities that use MIC in Region 6. All other EPA regional offices are now reviewing similar facilities. I would like to note that Institute, W. Va., is the only place in the United States where MIC was actually produced by Union Carbide. At the other locations, it is used in the production of pesticides.

Q Many communities would like more information about hazardous chemicals in their vicinity. Could you tell us something about the recently adopted "Hazard Communication Standard," commonly known as the "Right-to-Know Law"?

A There is a "Right-to-Know Law" for employees covered by OSHA, which will be fully effective in late 1985. Employees are entitled to know what kind of chemicals they are dealing with in their workplace

environment. There are a number of state laws, around 16 I believe, that go beyond the workplace and apply to local communities. These state laws entitle local officials and the general public to know what chemicals are being used or produced and the potential risks from such chemicals. But there is no federal law at this time which deals with the "Right to Know" beyond the workplace. There have been several bills presented. Chairman Anderson of Union Carbide was asked during the hearing in Institute, W. Va, what his position was on such laws, to which the industry as a whole had previously objected. Anderson said that he would take another look at such bills, indicating that Bhopal had changed a lot of people's attitudes about a lot of things.

Q Will EPA representatives be going to India to help in the investigation of the cause of the Bhopal tragedy?

A The Governor of West Virginia and several members of the state's Congressional delegation have asked EPA to send a team to investigate the causes of the Bhopal incident. We're working closely with the State Department in connection with this request. However, at this time India has not requested or agreed to our sending such a team. We have written to the Department of State regarding such negotiations with the Indian Government about an EPA team. We do not yet have an official invitation from the Indian Government to send such a team.

On the other hand, we have worked closely with the Department of Health and Human Services on a request from the Indian Government to send a team from the Centers for Disease Control. CDC did send four medical experts to evaluate the impact on the human health situation, which was India's primary initial concern.

Q What is EPA doing to help prevent tragedies like the one in Bhopal?

A EPA has two basic roles. One is our responsibility for developing and implementing our programs to prevent such tragedies. The RCRA program, for example, has very specific rules for how

Victims of the poisonous gas leak in Bhopal, India, are escorted to a hospital for treatment of eye damage caused by the accident.



Associated Press radiophoto

you can store, dispose, and even transport the highly toxic wastes generated during the production of such chemicals. The other key role, in conjunction with other appropriate agencies, is to continue to assist in the development of contingency plans for state and local communities and to provide training and technical guidance so that, if necessary, proper evacuation and procedures for protection of life could be carried out.

Q What steps has the U.S. taken to cooperate with other countries in emergency response?

A The United States aggressively pursues cooperative agreements with its neighbor countries in the area of emergency response. For example, there are viable joint contingency plans with Canada, Mexico, and the Caribbean area. In addition, the United States participates in emergency planning projects through

several international organizations, such as the United Nations, NATO, and the World Health Organization. These efforts ensure that we have direct access to the most recent developments in emergency response and that we are meeting our responsibilities to provide assistance where we can to help others when environmental emergencies occur.

Q Is there anything that you'd like to add, based on your experience with the Bhopal emergency?

A I think the big question is, where do we go from here? Once we know what caused the tragedy, we can evaluate our own environmental regulations and look at our response programs to see whether or not we could prevent such an incident from happening here and assure the highest capability of response. An

incident such as this certainly raises our consciousness about the importance of EPA's job, and reminds us that we're specialists who deal with real-world situations. Our regulations have a direct impact on the actual lives of people in communities where those regulations apply. What's more, Bhopal underscores the need to lay out a strategy for making certain that we do have the necessary statutory authorities to be able to prevent and deal with such emergencies here in the United States. □

Editor's note: As the Journal went to press, EPA reported that it had learned that there had been a number of releases of methyl isocyanate in the last five years at the Union Carbide Corporation plant in Institute, W. Va. EPA officials said that additional facts are needed to determine whether or not the releases were entirely contained within the facility or reached the environment.

Does Industry Have a Global Environmental Conscience?

by Robert O. Anderson

In 1972, the landmark United Nations Conference on the Human Environment was held in Stockholm, Sweden. Another global environmental conference was held at Versailles, near Paris, last November. Attended by many industrial leaders, the Versailles conference was called the World Industry Conference on Environmental Management. Then-EPA Administrator William D. Ruckelshaus was a keynote speaker at the November conference. Robert O. Anderson, Chairman of Atlantic Richfield Company, attended both the 1972 and the 1984 conferences. In this article, he discusses what has been happening to the environmental attitudes of multinational corporations since the Stockholm conference and reports on principles of environmental protection agreed on at the Versailles conference. The oilman has frequently spoken out on environmental issues.

Progress is usually measured in decades, but for the world environment a 12-year span seems more appropriate. This is the time that elapsed between two conferences that are perhaps among the most significant in the history of the global environmental movement—Stockholm in 1972 and Versailles in 1984.

The United Nations Conference on the Human Environment took place in Stockholm in June 1972. The two-week gathering of 1,200 politicians and officials from 114 nations provided the opportunity for what was really one of the first major discussions of a range of worldwide environmental problems. A remarkable series of plans and agreements was formulated at that time for international cooperation in pollution control. Among the major nations, only the Soviet Union stayed away.

The Versailles meeting, held last November, gave those of us long involved in the environmental movement an opportunity to see how far we had come since Stockholm. In that sense, the convening of the World Industry

Conference on Environmental Management (WICEM) by the International Chamber of Commerce and the United Nations Environment Program was an entirely hopeful event. And this time the Soviets came.

At Stockholm, the two great spiritual leaders of the world environmental movement, Barbara Ward and René Dubos, reminded us that "man must accept responsibility for the stewardship of the earth. The word stewardship implies, of course, management for the sake of someone else."

Barbara added to that very inclusive notion the further important thought that we all serve not one, but two countries—our own and the global community. That was the mood of Stockholm and, as we discovered, the mood of Versailles as well.

For me, a key aspect of Versailles was a strong recognition—far less obvious at Stockholm—that the problems we face in the environment will not be solved by government alone, but require a full and close cooperation between the public and private sectors. For its part, industry appeared to acknowledge and support this notion of a quasi-public role that is incumbent upon it in the environmental area, as in many other social areas, and that transcends its purely economic functions.

In many respects, business today seems far abler to lend a hand in social causes than 12 years ago. Given the chance, the market economy has done reasonably well since Stockholm. The laws of supply and demand still work well, even with oil, as anyone who has watched prices at the gasoline pump lately will have to admit.

In fact, the idea of free competition has not only maintained itself in the traditional capitalist nations, but is also gaining adherents in surprising quarters. The market-oriented reform effort underway in China is the most notable example, but the USSR and other Communist countries are also slowly but surely coming to acknowledge the simple effectiveness of market enterprise.

But as the free market's traditional message spreads, how receptive have its practitioners been to a note of

reciprocity—the idea that business has a social responsibility that goes beyond the obligation to produce a sound product at a fair price? How willing are they to respond to the idea, for example, of private business firms helping to clean up a mess that someone else might have made?

For the most part, the modern multinational company has been understandably loath to accept responsibilities that lie outside the economic purpose for which it was created. I suspect this is as true of industrial enterprises in socialist countries as it is of companies in the Western democracies.

To be fair, there are decided limits to the social efforts we can expect of business. In part this is because in many cases businesses *can't* act. Either the social problem is beyond their competence, or they have no legal right to interfere.

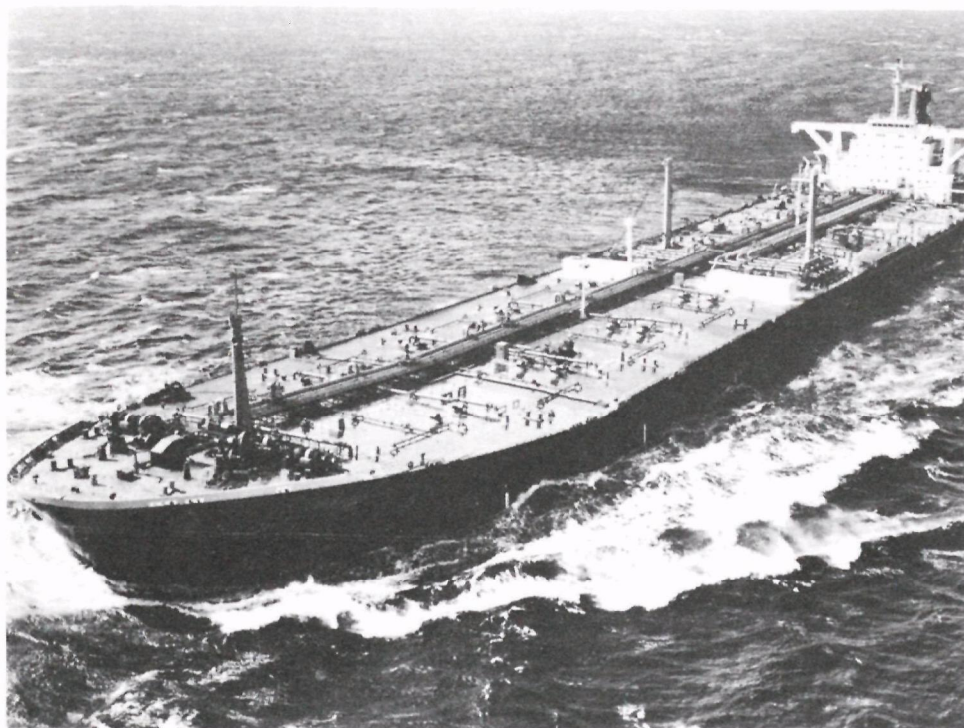
The most critical impediment to a consistent business social involvement is, of course, the unpredictability of the market itself. A down year dampens social enthusiasm in the most activist-minded company. Under such circumstances, no prudent manager can afford to commit time and money heavily to general causes, no matter how worthy. After all, business's power to do good in the world depends first upon its capacity to do well.

The message from Versailles, however, is that despite these obstacles, the business community increasingly recognizes its duty and opportunity to make a major difference in some very difficult social issues, certainly including the environment. A simple line of logic leads many of us to the same conclusion: if we in business don't agree to help voluntarily, our help will be commandeered by government, and, in my opinion, rightly so.

But it's easy to make a virtue of necessity in the case of the environment and in the face of the range of potentially catastrophic social problems that beset the globe. It stands to reason that to be effective, solutions devised must involve the skills, talents, and energies of *all* our institutions, certainly including those of business, or they simply won't work.

Rather than being dragged into it, I think we in business should proffer our help in the spirit of mature cooperation that as much as anything else characterized the entire Versailles gathering.

Certainly we recognize that constructive engagement by the private sector will help us make sound use of the assets we hold in trust. Besides, it offers a clear opportunity for business to do something it likes to do anyway—reduce and limit the need for government action



This supertanker, a symbol of international commerce, carries crude oil from the Middle East to Europe. According to Atlantic Richfield's Robert O. Anderson, the multinational business community increasingly recognizes its environmental responsibilities.

in areas where political action is often the wrong choice. Government energies can then be focused where appropriate, while business can produce new wealth and raise living standards—our fundamental task.

At Versailles we once again took a close look at the world's environmental problems, and found them solvable. The 12 years since Stockholm seem to have produced a rough consensus on the question of who will do what to advance this great task. The answer we arrived at is obvious but momentous: we will all do our part, according to a division of labor that has been taking shape over the last dozen years and now appears firm and credible.

Toward this end, the WICEM conferees unanimously adopted nine broad principles governing this cooperative movement, amounting to a kind of Magna Carta of global environmentalism.

1. Care for the human environment is a common responsibility and must be considered in all activities, including industrial activities. Mankind must continue diligent efforts to understand the natural environment, especially to anticipate the consequences of industrial and other human activities. All elements of society must take action to minimize known adverse impacts on the human environment.

2. Industrial activity should take into consideration related economic and social responsibilities. To survive, industry can ignore neither economic nor social reality. Industry must practice good citizenship as well as any other

sector of society—even in areas of social responsibility not directly linked to its commercial purpose.

3. Sustainable economic development is a desirable international goal. Economic development can improve the quality of life by reducing or eliminating poverty and thereby serving human dignity. In some parts of the world, development is the sole hope for maintaining life itself; other parts of the world can't ignore this. Sustained development will prevent economic and social disappointment as well as damage to the environment.

4. Scientific and technological information is vital to environmental planning. Government and industry must share information about resource use and environmental protection.

5. Governments should expand the adoption of common goals in addressing environmental concerns. Different value systems guide environmental policies affecting industrial development throughout the world. But global environmental protection is a common responsibility. Governments must therefore respect environmental precautions in other states and not attempt to solve their own problems by exporting pollution.

6. Governments should deal evenhandedly with all industrial enterprises. Governments should not establish environmental standards for certain enterprises less rigid or demanding than for others. Standards should be uniform for all enterprises, regardless of ownership or social purpose.

7. Cooperation is more efficient than confrontation in addressing environmental concerns. Government must impose requirements on industry to protect citizens' physical environment. Industry must meet governmental requirements in the most economic manner possible. Hostility between the two sectors usually produces the most expensive and protracted approach to problem-solving. Cooperation will accomplish the most widespread environmental improvements.

8. Governments and developers should address environmental issues as early as possible in the economic planning process. Experience has shown that development requires complex interdependent actions related to public policy and national strategies. Environmental and resource considerations, as well as technological, economic, and marketing concerns, should therefore be factored into development plans at the outset. Tardy recognition of environmental impact can result in costly delays and damage.

9. Industry and government, separately or cooperatively, should promote awareness of environmental issues. Ignorance is the worst enemy of a healthy environment. In many nations, industrialized and undeveloped alike, delayed acknowledgment of negative environmental impacts has caused damage due chiefly to lack of information and understanding. Industry and government can both contribute effective educational and informational programs for the general good.

We believe these principles offer a constructive and hopeful framework for effective international action on the environment, and certainly a most suitable test by which to measure the reality of the new cooperative era that we hope we have entered. All the signs of cooperation are there—initiated at Stockholm in 1972, and brought to a fuller, richer development at Versailles last November. The compromises and adjustments that were implicit at both conferences are difficult but far from impossible, for industry as well as government. Together, I am confident that we can fulfill the Dubos-Ward recipe for stewardship and yet retain the essential self-interest that is at the heart of the effective corporation. We have begun the effort. It only remains to carry it through to a successful conclusion. □

Industrial Flight: Myth or Reality?

by H. Jeffrey Leonard

Some critics of federal environmental laws have argued that these laws impede new domestic industrial development and erode the competitive position of American industry. Others in business and government have contended that the costs of complying with environmental regulations adversely affect the ability of U.S. firms to compete at home with imported products and overseas in foreign markets. These critics have advanced the "industrial flight" argument, namely that U.S. environmental regulations are pushing firms out of the United States and other industrialized countries to developing nations that evidence less environmental concern.

Have environmental regulations caused an exodus of U.S. firms abroad? Must these regulations be rolled back to ease pressures on U.S. companies to relocate industrial facilities overseas? The short answer is "no."

Since 1979, The Conservation Foundation has monitored key U.S. industries to assess whether, in fact, there is any indication that environmental regulations actually have pushed large numbers of U.S.-based industries abroad and have thereby negatively affected the U.S. industrial base. Investigation of recent overseas investment and foreign trade patterns by U.S. manufacturing industries from 1970 to 1982 shows that environmental regulations have not caused a significant exodus of U.S. industries. Indeed, overall investments abroad by U.S. industries have increased faster in manufacturing industries with low pollution-control costs than they have in those industries bearing the major burdens of environmental and workplace-health regulations: mineral-processing, chemical, and pulp and paper companies.

Nevertheless, industry-by-industry studies by The Conservation Foundation do indicate that a few troubled industries producing certain types of chemicals and processed minerals have been more susceptible than most to relocation pressures as a result of environmental regulations. These industries tend to fall into three categories.

1. Manufacturers of some highly toxic, dangerous, or carcinogenic products have not yet been able to develop safer substitutes or to adapt their technologies

to meet environmental, workplace, health, and consumer standards easily. For these few industries, pollution standards and rules on health in the workplace have led to declining production in the United States and increasing production overseas.

In particular, U.S. production of asbestos, arsenic trioxide, benzidine-based dyes, certain pesticides, and a few known carcinogenic chemicals has been disrupted or halted by strict regulations and growing public awareness of the dangers of these substances. In cases where domestic demand for these products has not declined as quickly as has domestic production, some U.S. companies have produced these substances abroad, importing them, or products derived from them, into the United States. Other U.S. companies have purchased these substances from foreign producers.

Often, however, this has proved to be a temporary situation, since consumption, as well as production, of hazardous substances can be restricted or banned. Most benzidine-based dyes and the pesticides lindane, DBCP, and dicofol are examples of products whose U.S. imports first rose after regulations and public concern disrupted U.S. production, only to decline dramatically when the uses of these substances were halted or severely curtailed.

2. In some basic mineral-processing industries (for example, copper, zinc, and lead processing), international dispersion has occurred as a result of environmental problems in combination with other changing locational incentives (raw material availability, other nations' requirements that minerals be processed in the country where they are mined) and economic problems (low prices, high interest rates, recession).

3. Finally, chemical companies may have shifted production of a small number of chemical intermediates—that is, chemicals needed for the manufacture of other products—overseas, in part because of pollution, but more significantly because of regulations on health in the workplace. In effect, environmental regulations may have increased, at least slightly, the trend toward worldwide purchasing of intermediate organic chemicals. Whole industries have not necessarily fled the United States, but large U.S. chemical companies apparently have been going abroad to produce or purchase a few intermediates needed for chemical production within the United States.

This appears to have been the case for butadiene, thiourea, and several dozen low-volume intermediates in the

benzenoid group. However, assessing how influential environmental considerations have become in any given instance is difficult for several reasons: world trade in intermediate organic chemicals would have grown rapidly even without workplace-health and antipollution regulations; many large chemical companies have increasingly sought to build large facilities to supply their regional or even worldwide demand for certain intermediates, and a large percentage of international trade in intermediates takes place as intra-company transfers across borders.

The most significant aspect of these findings is that no examples of industrial flight can be identified among industries where demand is expanding and U.S. producers are enjoying technological superiority. Relocation of an industrial facility abroad has been only one of a number of possible responses for the high-growth firms as they have faced growing regulatory costs and environmental restrictions at home. Technological innovation, use of new raw materials or substitute products, reclamation of waste materials, tighter process and quality controls, and other adaptations generally have proved better responses than flight for many firms.

The industries producing polyvinyl chloride (PVC) and acrylonitrile are two notable examples where intense regulatory pressures and adverse publicity have not prompted significant movements by U.S. producers to other countries. Ultimately, the rapid expansion of domestic demand for these two chemicals and the concomitant incentives to invest in new technological developments have given these industries cushions to weather the onslaught of new regulations and public concern.

Most industries that have responded to environmental regulations by transferring production overseas no longer are dynamic forces within the U.S. economy. More substitutes for harmful dyes, arsenic, highly toxic pesticides, and even asbestos are being, and will continue to be, introduced. In such cases, relief from the standards for pollution cleanup, health in the workplace, and consumer safety that are speeding the obsolescence of hazardous industrial materials would not just increase worker and public health hazards. It would also remove an important incentive for technological progress and would be counterproductive to the long-term goal of strengthening the U.S. industrial base through technological innovation. □

(Leonard is a Senior Associate at the Washington, D.C.-based Conservation Foundation, an environmental research group. He authored a Foundation report, Are Environmental Regulations Driving U.S. Industry Overseas? This article is based on the report.)

Is It Safe to Sell Banned Pesticides Overseas? Two Views

What happens to pesticides that are banned in the United States? Some, although denied registration, continue to be manufactured for export to other countries which often have different environmental standards than those of the United States.

EPA devotes particular attention to assisting developing nations in making informed decisions about the pesticides exported to them. The agency does this in several ways. It notifies the government of the importing country of the first export of an unregistered pesticide in any given year. Whenever EPA takes a major regulatory action, such as a cancellation or suspension of

a pesticide's registration, the agency notifies all countries worldwide. EPA also provides technical assistance through several international organizations to help other countries develop pesticide regulations. In addition, EPA works with the U.S. Agency for International Development to provide EPA expertise to projects in developing countries designed to improve pesticide use and safety.

Some unregistered pesticides which are exported return to the U.S. as residues on imported foods. EPA protects the American consumer by setting tolerance levels, or allowable residues, on all foods and has initiated

a policy of revoking tolerances whenever the agency cancels a pesticide.

Is enough being done to ensure safety in the export of unregistered pesticides? EPA Journal asked two authorities to address this issue. Jack D. Early, President of the National Agricultural Chemicals Association, defends American practices relative to those of other pesticide-exporting nations. Edith D. Meacham, International Pesticide Coordinator for the National Audubon Society, says that more could be done to protect buyers of unregistered pesticides. Their articles follow:

by Jack D. Early

Farmers harvest radishes in Bangladesh. Pesticides are being used in developing countries in efforts to protect health and crops.



When a farmer in Burma sprays an insecticide on his rice, chances are that the product did not come from the United States. In fact, U.S. exports of agrochemicals contribute only 15 percent to the total amount of agrochemicals used outside the U.S., most of which go to countries with established and experienced regulatory systems for managing plant protection products.

What is poorly recognized is that many chemicals used by farmers in less developed countries often come from sources within their own country or could come from indistinct outside sources that reportedly do not meet certain quality standards or health and safety criteria which are accepted by the established industry. Developing countries import mostly the older, commodity pesticides, that is, those products that are no longer protected by patent. Many of these older compounds are manufactured very cheaply by some developing countries for use locally and for export to other less developed countries.

The older compounds include chlorinated hydrocarbons, such as DDT, which are no longer manufactured in the United States. Remember, nearly all uses of DDT are cancelled in this country. However, certain nations value these products even though they are cognizant of the reasons why they are not registered for use here. For instance, in an official statement, the Government of Burma said: "...in many other countries the use of chlorinated hydrocarbons is being restricted because of their persistent nature. The official position here is that these insecticides are effective, cheap, and, if used properly, are no more hazardous than other newer and more expensive insecticides."

We should know that in recent years, field research has shown that insecticides like DDT, aldrin, and dieldrin, etc., do not persist beyond one growing season in tropical agriculture.

All crop protection chemicals are, to some degree, toxic and can be hazardous if not used according to label directions. Knowing this, responsible companies take great effort to alert farmers to product safety via labeling, and most often train farmers to apply them properly and safely.

However, there are many situations where a "bootleg" or counterfeit chemical that has been manufactured or purchased by an exporter strictly for opportunistic sales may be imported into a country. For such products, there are no health and safety data; there is no assurance the product is not contaminated and unsafe or even is efficacious; there is no education program, and there is no follow-up to assure safe and proper application. This creates great concern for the American agrochemical industry.

In the United States, the manufacturer of any product that is not registered for sale in the U.S., but is produced for export, must, by law, notify the government of the importing country of its intent to ship that product to that country. The importing country must then acknowledge to the exporter that it has received the notification and attendant chemical information. The exporting company then notifies EPA that the acknowledgment has been received and the product is shipped. No other country in the world has such a requirement. In Burma, for example, or in any other country, the rice farmer who is using the insecticide must depend upon his government to exercise judgment and

place regulatory constraints on importations of potentially hazardous products. The National Agricultural Chemicals Association supports the institution of appropriate regulatory mechanisms in all countries. Unless governmental discretion, based on correct information, is exercised to guarantee good quality and well-tested products at some point in the registration process, then it is easy to see how poor quality, untested, and potentially dangerous products can find their way down to the rice paddy. The farmer who desperately needs pest control to make a living is not in a position to make such a decision.

But despite proper precautions, there are some misused agricultural chemicals. U.S. agricultural chemical companies are working hard to eliminate or at least significantly reduce misuse in developing countries.

As a case in point, the Inter-American Institute for Cooperation on Agriculture of the Organization of American States invited the pesticide manufacturers' international association to present its position on registration requirements and labeling to government authorities. Four regional registration harmonization consultations encompassing all countries of Latin America and the Caribbean were held. As a result, labeling requirements

will require a uniform format to include additional human and environmental safety and disposal information where it was lacking. An international color coded band, identifying the toxicity category of the product, is added to the label. Users

Pesticides are and will continue to be essential in developing countries if agricultural production is to be maintained and increased...

anywhere can visibly determine, by the color band, the toxicity level which, on a relative scale, indicates the possible severity of effect *should exposure occur*. The initiative in this hemispheric effort demonstrates that leadership is being provided by established industry as well as by the governments of Latin America and the Caribbean. This effort sets an example for the rest of the world to follow.

The industry believes that sovereign governments must make their own decisions according to their local agricultural needs and environmental situations. It further believes that governments should be provided with whatever information they need to make the best decision for their local

conditions and circumstances. Regulatory requirements that insist on making available only high quality, well-tested, and appropriately packaged and labeled products to farmers are a must.

The United States pesticide industry does and will continue to support responsible efforts to assure that its products are used safely. The farmer deserves it.

Pesticides are and will continue to be essential in developing countries if agricultural production is to be maintained and increased in the future. A report of the Food and Agriculture Organization (FAO) predicts that the ranks of the underfed will increase from 435 million in 1980 to 550 million in 2000. "Clearly, there must be greater progress in both food production and distribution than that achieved to date," says Mark Lynch, the Irish official who wrote the FAO report. At the same time, safe, effective chemicals must be made available for agriculture. All countries must mandate that only high quality and safety-tested products be provided to their farmers. Further, any imported product that does not meet these standards should never be taken off the dock. Farmers deserve this protection. Our American industry will do its best to see that its products meet the test of time. □

by Edith D. Meacham

Developed for military purposes during World War II, pesticides became a major factor in world agriculture in the early 1950s. In the United States, chemical control of insects meshed perfectly with post-war economic and technological advances and rapidly became an important part of the U.S. food production system. Farmers began relying more and more on chemical control because it provided a cheaper means of reducing crop losses to pests. Such reductions meant that the farmer could receive more credit, and could greatly expand his operation.

However, as pesticide use increased, problems developed. Insects became resistant to insecticides. Secondary pests became major pests. Pesticides were found to cause health and environmental problems. In response to these and other environmental problems, EPA was created in 1970. In 1972, the Federal Insecticide, Fungicide and Rodenticide Act gave EPA a mandate to regulate pesticides.

To eradicate malaria, a worker sprays pesticides on a stagnant pool near Adana, Turkey. In response to earlier eradication programs, resistant breeds of mosquitoes developed.

Despite this strengthened regulatory authority and increased public awareness, the use of pesticides increased every year until 1981. Now, in response to a slowing of anticipated expansion and growth potential, the chemical industry is seeking alternative markets, one of which is the export market.

Post-war use of chemicals to control pests was hailed as an important breakthrough in the industrial world, but in developing nations the effects were even more profound. These countries rely on their agricultural output to feed their people and to establish a position in world trade. For them, pesticides promised substantially higher yields in export and food crops. Pesticides are also used to control disease-carrying pests, thus promising to free millions of people from the threat of diseases such as malaria, yellow fever, and sleeping sickness.

Pesticides initially controlled pests and increased yields. However, the same problems which developed in industrial countries, such as resistance, secondary pest resurgence, and health and environmental effects, also surfaced in developing nations. Many of these countries lack the scientific, institutional,



D. Henrout World Health Organization

and financial capabilities to regulate the use of chemicals. Proper precautions in use, application, and storage are seldom taken, resulting in poisonings, resistant pests, and resurgent secondary pests. The use of broad spectrum insecticides in the Sudan Gezira demonstrates many of the problems that can result from improper pesticide use.

The Sudan is the largest nation in Africa. Most of its people live in rural areas and practice subsistence agriculture. The only commercial agriculture in the country takes place in the fertile Gezira plain. This area has long been the mainstay of the Sudanese economy because of the huge amounts of cotton produced there yearly: 45 percent of total world production of extra long staple cotton in the early 1970s. The banking system is geared primarily to financing of foreign trade in cotton; and the cotton crop, which is almost the sole contributor to the country's foreign exchange, allows much needed manufactured goods to be imported. A disaster for the cotton industry is a disaster for the government, which suffers from a chronically unfavorable balance of trade and a growing national debt.

In the early 1950s, DDT was used in the Gezira to control a longtime pest, the cotton jassid. Control of this pest and the use of fertilizers substantially increased yields, but by the 1960-61 season neither DDT nor endrin, another pesticide, was effective against the jassid. Even worse, the cotton whitefly, a relatively unimportant pest, suddenly became a major problem. Before the use of broad-spectrum insecticides, the whitefly's only significance was its transmission of leaf curl virus, a disease that was controlled by cultural and sanitary practices. However, resistance to various insecticides and the elimination of natural enemies led to greatly increased whitefly populations. These pests now cause extensive feeding damage and can ruin a cotton cup with honey dew deposits. Since DDT was ineffective against the whitefly as well as the jassid, a new chemical, dimethoate, was adopted widely. The situation was further complicated in 1963 by severe eruptions of the American bollworm which was resistant to dimethoate.

These massive infestations of resistant and resurgent pests brought the number of insecticide sprays from one in 1960-61 to twelve in 1981. Production costs, aggravated by the oil crisis in the early 1970s, rose 600 percent between 1972 and 1981. The culmination of these events came in 1981 when control of the whitefly completely failed. The bill for pesticide imports was the highest ever, yields plummeted, and the cost of controlling pests consumed 85 percent of cotton revenues. For a country that relies

almost totally on one crop for its foreign exchange, as many developing nations do, such situations can spell economic disaster.

But the Gezira was not just in trouble economically. Numerous applications of insecticides had also taken their toll on the environment. High levels of DDT were discovered in fish, birds, and human milk. Mosquitos were becoming increasingly resistant to the insecticides that previously had kept them under control. Biological predators that had fed on some of the pests were decreasing in numbers, if not vanishing entirely. Poisoned fish, birds, and even farm animals became a familiar sight. Finally, in 1981, actions began to reverse the situation and, in effect, to "rescue" the Gezira from its pesticide-caused problems. DDT was banned, and with the help of the Food and Agriculture

Pesticides initially controlled pests and increased yields. However, the same problems which developed in industrial countries.... also surfaced in developing nations.

Organization of the United Nations, the Sudan has begun a long-range program of integrated pest management for the Gezira. A balance will be sought between using natural pest-eating predators and non-harmful pesticides to bring back the area's agricultural economy.

The story of the Gezira is not an isolated incident. Similar problems have occurred, and are occurring, in a number of other countries that do not have the available expertise and the ability to properly regulate the use of imported pesticides.

Attempts to assess and to act on the respective responsibilities of importing and exporting countries and the pesticide industry have progressed fitfully. A successful 1975 lawsuit against the Agency for International Development (AID) marked one of the first efforts to acknowledge government responsibility for hazardous exports. AID, whose pesticide exports were valued at \$17.5 million between 1969 and 1974 and included many banned, restricted, or never-registered products, agreed to develop a generic Environmental Impact Statement for its programs involving pesticide use. Environmental considerations have been a component of AID pest management programs ever since. In addition, the World Bank recently pledged not to finance projects that would severely damage the environment.

In 1978, Congress addressed the hazardous exports issue in amendments to the Federal Insecticide, Fungicide and

Rodenticide Act. The amendments require that the purchasers of such products sign a statement acknowledging their awareness that the product is not registered for use in the United States. EPA then notifies the government of the importing country that unregistered products are being shipped. However, the timing of the notification scheme often does not permit the appropriate official of the importing country to reject the shipment if he wishes, since shipments often arrive long before the information is in his hands. EPA also transmits information about cancellations and suspensions to foreign governments and appropriate international organizations.

The United Nations and the Food and Agriculture Organization have both made considerable efforts to solve the problems of hazardous exports. In 1983, the U.N. General Assembly overwhelmingly passed Resolution 37/137 which calls for stringent restrictions on the export of banned or severely restricted products and for the development of an easily understandable list of these products. The United States was the only nation to oppose the resolution.

The Food and Agriculture Organization has recently issued a draft Code of Conduct on the Distribution and Trade of Pesticides. In its present form, the Code would establish a system of informed consent for countries importing banned or restricted products. The Code also sets up standards for labeling, advertising, safe use, and regulatory activities. In general, it offers the opportunity to set a worldwide minimum standard for importing and exporting countries and for the pesticide industry.

Implementation and enforcement of the FAO Code in the years ahead will be crucial to many countries. It is estimated that pesticide use in developing countries will quadruple in the next two decades. The establishment and maintenance of adequate controls over their use will become increasingly critical as chemical companies search for more and more new markets and developing nations struggling to increase their own export trade and to feed their ever-increasing populations accept the offers of "quick fix" solutions. While such solutions offer the temptation of immediate profits to the exporters and high yields to the importers, they will ultimately sacrifice both long-term economic gains and environmental and human health for the developing countries involved.

To avoid such dire results, all governments must work with each other and the chemical industry to ensure that an increase in pesticide use does not create an explosion of harmful problems.

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EPA and China Seek Environmental Answers Together

by Gary R. Waxmonsky

Halfway around the world from their normal business environment and trappings, an EPA senior management team headed by then-Deputy Administrator Al Alm met in mainland China last year with their counterparts in the People's Republic of China's Environmental Protection Bureau. The Bureau is in the Ministry of Urban and Rural Construction and Environmental Protection (MURCEP for short).

The group went to China last September to review the previous five years of cooperative efforts under the Environmental Protection Protocol between the United States and the People's Republic of China (PRC) and to look at the possibilities of broadening the working relationship between environmental research scientists from both nations. The nine-person U.S. delegation also included EPA Associate Administrator Fitzhugh Green, Assistant Administrators Bernard Goldstein and Milton Russell; Erich Brethauer, director of EPA's Office of Environmental Processes Research; Chieh Wu, a Chinese-American engineer from Brethauer's office; myself; a representative of the National Council for U.S.-China Trade; and a staff counsel to the House Energy and Commerce Committee in the U.S. Congress.

One of 21 cooperative science and technology programs operating between China and the U.S., the Environmental Protection Protocol dates from February 1980. Under its three substantive components, the Protocol provides for scientific exchange in various areas of health effects, control technology, and processes/effects research.

The Alm delegation paved the way for continuation of U.S.-Chinese cooperation in environmental protection in the years to come. In a brief ceremony in the EPA Administrator's office on November 29, 1984, William Ruckelshaus and Chinese Ambassador Zhang Wenjin signed and exchanged documents extending the U.S.-PRC Environmental Protection Protocol for a second five-year term, effective February 1985. Ruckelshaus and Ambassador Zhang spoke highly of the progress the two sides had made in working together and of the prospects for future joint research.

Lung Cancer Study

The first two-year period of EPA's cooperative relationship with China was a time of getting acquainted and defining mutual interests. The first significant joint effort began in September 1982. Former director of the EPA Office of Health Research, Dr. Roger Cortesi, and two scientists from the agency's Health Effects Research Laboratory at Research Triangle Park (RTP), Drs. Robert Chapman and Judy Mumford, visited the Chinese capital city to finalize the scope and design of an interdisciplinary study of the influence of domestic fuel combustion on the development of lung cancer. The study site, a remote county in southwestern China, has one of the highest lung cancer mortality rates in the country. Curiously, the incidence of the disease among women is as high as among men, though very few women in the area (and throughout China) smoke. EPA scientists from RTP returned to China in November 1983 to assist in

A resident of Xuan Wei County, Yunnan Province, sits near the open pit in her house where smoky coal is burned for heating and cooking. Scientists from EPA and China are working together to determine if the indoor coal burning is responsible for the equally high rate of lung cancer in smokers and non-smokers in Xuan Wei.



Bruce Harris

setting up analytical and sampling equipment previously shipped to China and in collecting coal, wood, and particulate samples on-site. Five Chinese specialists spent two months in the U.S. last summer to assist in analyzing the samples and to help plan the epidemiological portion of the study. Their colleagues from RTP will return to China later this year.

The lung cancer study is in many ways a model of mutually beneficial bilateral cooperation. The Chinese are exposed to sophisticated technical know-how, obtain a limited amount of advanced hardware, and can expect to derive a scientifically sound response to an urgent public health problem. EPA's health research effort, in turn, gains access to a large, stable population exposed to a limited range of risk factors of great interest. The Chinese will perform the extended sampling and monitoring work, which is inherently long-term and otherwise quite expensive. Also, this project is expected to generate new, improved bioassay and sampling methods which may prove quite valuable to subsequent research in both countries.

While cooperation on this environmental health problem has proceeded apace, joint progress in the area of pollution control technology has proven elusive. Even in this capital-intensive sector of environmental research and development, however, the potential for meaningful cooperation exists. Accordingly, last September in China, the EPA delegation advanced new proposals, including the full-scale testing of an innovative pollution control device on an uncontrolled facility in China, and a joint field demonstration of deep mine storage of hazardous waste. It remains for the two sides to define a mutually beneficial program by correspondence.

The third area of Sino-American environmental cooperation—processes and effects research—holds perhaps the greatest potential for both sides. Late in 1983, a delegation of eight Chinese scientists and administrators visited several EPA Office of Research and Development labs and developed preliminary cooperative programs in several project areas. Field work in the first of these, a tracer study of medium-range atmospheric transport and dispersion, began in the summer and fall of 1984. Active preparations are proceeding for a joint field and laboratory study of the conversion of sulfur dioxide to sulfate, with special

(Waxmonsky is coordinator of EPA's program with China. He is in the agency's Office of International Activities.)

Chinese technicians learn to operate six high-volume particulate samplers provided by EPA. These samplers are being used for indoor and outdoor air monitoring in the Xuan Wei lung cancer studies.

attention to the influence of aerosols. Both efforts are managed on the U.S. side by Dr. William Wilson of EPA's Atmospheric Sciences Research Laboratory at RTP. The agency's Environmental Research Laboratory in Athens, Ga., recently sent director Dr. Rosemarie Russo and branch chief George Baughman to finalize plans for joint studies on modeling of water pollution fate and transport. Similar planning meetings are scheduled in the near future on topics of aquatic toxicology and pollution mechanisms in soil and ground water, involving the EPA labs in Duluth, Minn., and Ada, Okla., respectively.

U.S.-Chinese cooperation in environmental processes and effects research offers EPA an excellent opportunity to field test and validate models on which some agency standards will be based. At the same time, the Chinese will have an opportunity to develop a modeling capability to meet their own pressing needs.

Acid Rain

Anticipating continued heavy reliance on high-sulfur coal in the coming years of economic growth, environmental researchers in China have become quite concerned with the acid rain problem. A team of Chinese specialists spent three weeks in the U.S. last fall discussing acid deposition research and regulatory issues with specialists in universities and government agencies around the country. These discussions will be continued through correspondence as both sides work toward some mutually viable form of cooperation on this pressing global problem. One promising avenue is the possibility of China joining the U.S.-sponsored Global Trends Network for acid deposition monitoring. EPA and the National Oceanic and Atmospheric Administration would provide the hardware and quality assurance guidelines for one or possibly two monitoring stations; the Chinese would provide vital additional data points on global acid deposition even as they enhance their own monitoring and quality assurance capabilities.

As a developing country embarked on an ambitious program of accelerated economic growth through economic decentralization, China is faced with the problem of obtaining maximum environmental quality at minimum cost. At the September meeting in China, the U.S. delegation proposed an exchange of

Bruce Harris



information and experience in incorporating pollution control considerations into the early planning of major energy, industrial, and municipal construction projects. American engineering firms with experience and expertise in this area would supply the substantive contribution from the U.S. side. Besides enhancing commercial opportunities, this initiative would convey to the Chinese the public/private sector partnership which has proven so important to this country's environmental well-being. The Chinese agreed to the proposal in principle, but also suggested cooperation in more general areas of environmental management such as standard setting, cost-benefit analysis, and compliance incentives. Negotiations are continuing as the two sides work toward a package which will incorporate both site-specific and national environmental management decision-making.

Environmental quality in China is a complex, multi-faceted topic that eludes easy generalization. Through extensive structural reform of the economy, China's leadership aims to quadruple agricultural and industrial production by the year 2000. The implications of such a program for China's environment, already overburdened with decades of neglect, are not lost on the nation's environmental managers. As a matter of national policy, the People's Republic of China has declared its intention to control emissions in the design phase of new construction, rather than clean up pollution after the fact. But the increasing decentralization of economic decision-making, together with the guiding principle that he who pollutes is also responsible for treatment, makes this goal problematic at best. Delegation

member David Klaus, staff counsel for the House Energy and Commerce Committee, observed:

The Chinese are at the beginning of working out whether day-to-day environmental protection decisions will be made at a local or national level....The Chinese are also facing directly the question of how much environmental protection they can afford if that goal conflicts with economic development. Pending a clear resolution of these issues, the Chinese are emphasizing that which can be agreed upon: a commitment to research.

Here, too, China has its work cut out for it. The Cultural Revolution left a gaping demographic hole where the country's middle-aged scientific intelligentsia should be. Replacing this missing generation of environmental scientists and engineers will be a long-term effort. In institutes and universities around the country, China has made a good start. In virtually every location visited last September, the U.S. delegation encountered talented scientists and technicians working with sophisticated equipment. No less striking was the depth of professional commitment in a field which is, for China, relatively new. Assistant Administrator Goldstein noted:

Talking to the Chinese scientists in their laboratories left me with the same impression I get when visiting EPA labs. There's a great consciousness of purpose, a genuine commitment to achieving and maintaining environmental quality.

The challenge to both sides in the years ahead is to turn this shared commitment to mutual advantage in a way which combines good science with good will. □

A Weather Report for the Future

by Walter O. Roberts

"The summer of the year 1783 was an amazing and portentous one, and full of horrible phenomena; for besides the alarming meteors and tremendous thunderstorms that affrighted and distressed the different counties of this kingdom, the peculiar haze, or smoky fog, that prevailed for many weeks in this island, and in every part of Europe, and even beyond its limits, was a most extraordinary appearance, unlike anything known within the memory of man.... The sun, at noon, looked as blank as a clouded moon, and shed a rust-coloured ferruginous light on the ground...."

(Diary of Vicar Gilbert White of Selborne, England)

Benjamin Franklin identified the cause of the strange hazes and dry fog that Vicar White described as ejecta from the huge volcanic eruption of Laki, Iceland, which began on June 8, 1783. The ensuing heat, drought, and famine—plausible consequences of the eruption—killed over half of Iceland's livestock. The pastures withered, and a fourth of the population perished. The following winter was the coldest on record in the eastern United States, and it was also unusually cold in Europe.

Laki was small, however, compared to the Mount Tambora eruption of April 10-11, 1815, on the island of Sumbawa in Indonesia. Over 88,000 people died from the eruption and its ashfall. The explosion was heard 1,500 miles away. Darkness extended for two days to a distance of nearly 400 miles. A ruddy sun, orange sunsets, and dry fogs prevailed for more than a year in London, New York, and throughout the northern hemisphere. The year 1816 became known in Europe and North America as "the year without a

summer," because of the hemispheric cooling that most climatologists attribute to the volcano.

By far the best studied of the great volcanic eruptions is the blast of El Chichon in Mexico on March 28 and April 4, 1982. Modern instruments such as laser scanners, aircraft samplers, and satellite detectors were brought to bear. The National Center for Atmospheric Research made sample-gathering flights from the southern hemisphere to the Arctic Circle. We know that huge amounts of dust and gas were blown into the stratosphere. There, at altitudes near 25 kilometers, sulfur dioxide is converted by the sun's light into light-scattering particles. At an observatory in Hawaii, the direct solar beam was reduced by 25 percent in the months after El Chichon and, even after the diffusely scattered light was added back, the net reduction of incoming sunlight was about five percent.

The El Chichon volcano had far bigger effects than the eruption of Mount Saint Helens in Washington State in March 1980, because the Mexican volcano spewed its debris nearly straight up, well into the stratosphere, while Mount Saint Helens' effects were confined mostly to the lower atmosphere.

The case is strong that volcanoes decrease the world's temperature if they throw enough matter, especially sulfur dioxide gas, into the stratosphere. The biggest ones produce coolings in mid-latitudes of more than one degree Celsius (C), and the light veiling effects last up to three years. A 1°C global cooling means a shortening of the growing season in the U.S. corn belt by about 10 days, and a loss of production of perhaps five percent.

Volcanoes are one of several causes of climate change, but they are not the greatest. Nature's unexplained short-term climate fluctuations are a bigger factor in human affairs. We are still far short of real skill at forecasting these climate anomalies.

Climate and the Causes of Its Changes

Climate, first of all, is usually defined as the expected weather, including its

expected variations, for a particular place and period of time. The expected value is traditionally calculated from the average values of the different weather parameters in the region over some specified number of years. The climatic "normal" is usually defined as the average over the last 20 years for the time and place.

We speak of the warm, dry weather of the winter of 1976-77 in the West by comparison with its preceding averages. The Corn Belt weather in the summers of the 1940s was termed warm, favorable, and steady because the weather was better in these regards than the expected climate at that time. Similarly, December 1983 in North America was colder than the climatic expectation, and October 1984 was a wet month in Colorado, compared to what we normally get.

The most notable fact about weather and climate, to my mind, is the large size of the changes that occur on all scales of time and space. For example, 18,000 years ago we had a severe ice age in the northern hemisphere, with large glaciers extending well down below the Canadian border. In general, the period from 4,000 to 8,000 years ago, known as the "altithermal," had a relatively warm climate, compared to the preceding or following millennia. We are all familiar, of course, with individual cold winters or wet periods.

Changes of climate are clearly the largest single cause of fluctuation in agricultural productivity both in industrialized and developing countries. Energy usage, transportation, fisheries, water power, recreation, public health—all these sectors and more—are also sensitive to climate. The recent disastrous food crisis in Ethiopia and other parts of sub-Saharan Africa is but one of many tragedies triggered by drought.

Perhaps the most drastic U.S. climate anomaly since the American Revolution was the Dust Bowl of 1934-35 in the Great Plains. The area embraced 97 million acres of southeastern Colorado, western Kansas, northern New Mexico, and the Texas and Oklahoma Panhandles. Many farms were engulfed in drifting dust, as the precious soil of their fields blew all the way to the

(Roberts is the founder and former director of the National Center for Atmospheric Research which is primarily funded by the National Science Foundation.)



In 1982, El Chichon volcano in Mexico erupted twice, spewing huge amounts of dust and gas into the stratosphere. In the aftermath, residents of a Mexican town sweep and shovel volcanic ash from the streets.

Atlantic. The out-migration of people from the region was one of the largest in world history. The Dust Bowl was, however, but one of many dry spells the West has suffered.

There is some evidence that the droughts of this region tend to recur approximately every 22 years, even though there are droughts at other times. The recurrence pattern occurred, for example, in the decades of 1890, 1910, 1930, 1950, and 1970. This coincides, for totally unknown reasons, with the alternate minimums of the sunspot cycle. The sun's emissions probably vary with this period, and thus influence the climate.

Fluctuation in the ocean surface temperature is another factor in climate. The most spectacular recent example is the extremely large "El Nino-Southern Oscillation" that occurred in 1982-83. The Western Pacific near the Equator warmed up by 6°C at maximum compared to normal, as a warm coastal current called the El Nino disrupted the food supply for fish. The anchovetta crop, a major source of protein for Peru, was nearly destroyed. Millions of birds died as their food supply disappeared. Climate was disrupted in South America, with rains in normally dry zones, and drought in normally wet regions. Perhaps even the

Australian, North American, and African climate upsets were related. To discover the ultimate cause of this irregularly recurring phenomenon is one of the great challenges now facing atmospheric and oceanic scientists.

Still another source of climate fluctuation is alteration of the amount of sunlight reflected into space by the planet, the "albedo" of the planet. Clouds are a major factor in determining albedo, and their short- and long-term fluctuations are poorly understood. Likewise, changes in snow and ice cover can influence weather and climate. It is even probable that altered land use patterns or urban growth can change weather and climate. On geologic time scales, changes in mountain height or ocean area can also be significant.

Mankind Comes Center Stage

The prodigious growth of energy consumption, most of it provided by fossil fuels, is probably the main manmade climate modifier through action of the now familiar "greenhouse effect." Carbon dioxide is increasing in the atmosphere and is a potent "greenhouse gas." To this must now be added the other greenhouse gases, more than a dozen in number, with freons and

methane high on the list. All the greenhouse gases come from expanding human activity, though there are lots of unsolved questions about exactly how and why they are increasing at their observed rates. The expected climatic effects of the greenhouse effect are large. It is likely that some regions will benefit from the warming, but the overall dislocations, on balance, will probably do more harm than good.

To put things in perspective, very big volcanic eruptions can probably, if their debris reaches the stratosphere in abundance, reduce global temperatures by 1.5°C at the most, with effects lasting up to three years. The greenhouse effect is expected to raise global temperatures 4° to 6°C by the middle of the next century, and the effects are predicted to last for hundreds of years.

The ultimate human insult to climate, however, would be a large scale nuclear war. Though much more research is needed, it appears that its impacts would dwarf not only the effects of natural volcanic eruptions, but even the largest imaginable greenhouse effect. It delivers its jolt in days, and leaves little human capacity to adjust. The vast fires likely from a large nuclear holocaust, if it occurred in the northern hemisphere summer, might trigger a year-long nuclear winter, cool huge regions of the earth below freezing, bring a total end to a large part of agricultural production for a year—and, at the extreme, eradicate a major fraction of humanity.

Barring such catastrophic human intervention, however, the global greenhouse effect is enough, in all likelihood, to bring us a weather regime unlike anything which has prevailed since the origin of mankind. The transition will be slow—scarcely perceptible in a decade—but the changes will last for centuries. It is likely that in the time scale of dozens of millennia the earth will cool. But on the scale of a half century or so, far more important to human societies, the odds are all on the side of warming. It is not a moment too soon for those who will be most affected to begin designing strategies to overcome the adversities of the warming, and to capitalize on the benefits. □

Why Every Species Counts

by Peter H. Raven

With each passing year, irreversible damage is being done to the world's stock of plants, animals, and microorganisms, consequently limiting the range of possibilities available for the betterment of our own condition. Our general failure to recognize the dimensions of this problem, if continued, is likely to make it even more serious in the near future.

Roughly three million kinds of plants, animals, and microorganisms occur in the tropics, at least twice as many as in the much larger temperate regions of the world. Of these, only about 500,000 have yet been given a scientific name. For the small minority that we have catalogued, we have only obtained detailed information on about one in a hundred!

The U.S. National Research Council Committee on Research Priorities in Tropical Biology, which reported its findings in 1980, estimated that there were probably no more than 1,500 trained scientists to deal with the problem of finding the remaining organisms. If all of these scientists were fully supported and could devote their entire lives to the process, they would be able to add only a small percentage to the total that is known. Even if time were not a limiting factor, most tropical organisms still would remain completely unknown for decades or centuries with the existing level of effort.

Unfortunately, we do not have decades or centuries to complete the process. The present human population of some 4.8 billion people is well over twice what it was at the end of World War II, and is climbing rapidly. The Population Reference Bureau has estimated that 15 years from now, at the end of the century, there will be more than six billion people. More than 80 percent of this

growth will occur in the tropics, where roughly half of the people in the world live at present. Anywhere from 40 to 50 percent of the people who live in tropical countries are 15 years of age or less, and have not yet reached childbearing age. For this reason, the level of population in these countries cannot attain stability for two or three generations, even if present policies that attempt to limit population growth are pursued successfully for that whole period.

By World Bank estimates, well over a third of the people in the tropics are living in absolute poverty, at least half of them malnourished. It is these rapidly growing numbers of rural poor, who have no other options available to them, that constitute the principal force in devastating the environment of their countries. For example, the Food and Agriculture Organization of the United Nations (FAO) has estimated that tropical evergreen forests are being cut at a rate that would lead to their complete removal in 90 years. This estimate, however, is unrealistically optimistic, because it does not take into account the greatly increased effects of a rapidly growing population in the future. Most of the lands that are being cleared are practically useless, at our present level of knowledge and economic strength, for sustained cultivation.

With the destruction of the tropical forests will come the extinction of many of the kinds of organisms that live in them, most of which will never have been discovered before they are lost. We can estimate the magnitude of this loss indirectly by considering in detail what is happening in a few selected regions. In Madagascar, an island in the western Indian Ocean about twice the size of Arizona, scarcely five percent of the vegetation remains in a natural condition. Even smaller amounts of natural vegetation remain in western Ecuador, a region that was completely forested a few decades ago, or in the Atlantic forests of Brazil. By extrapolation, one may estimate that something on the order of 200,000 species of organisms originally occurred in each of these

areas, and that from a third (western Ecuador) to two-thirds (Madagascar) of these organisms occur nowhere else. Taken together, these three tropical regions alone are estimated to contain anywhere from 300,000 to 500,000 species of organisms that don't occur elsewhere. All of these species, approximately 10 percent of the total found on earth, are surviving in from one to five percent of the original forest, and only about a sixth of them have yet been discovered!

When natural forest is reduced to remnant patches, the surviving species exist only in small numbers, and they are especially susceptible to loss for that reason alone. For example, on Barro Colorado Island—an island of six square miles formed by the flooding of the Panama Canal from 1911 to 1914, separated from source areas on the mainland by a gap of about 640 feet, and protected continuously as a sanctuary—over a quarter of the 208 species of land birds present initially have disappeared over the last 60 years.

Furthermore, most kinds of tropical organisms have extremely narrow ecological requirements, and these requirements obviously are much less likely to be met in small forest patches than in larger ones. For all of these reasons, one can expect the loss of species to be rapid over the next few decades in Madagascar, western Ecuador, the Atlantic forests of Brazil, and in all other parts of the tropics outside of the main forest blocks of the western Amazon and the Zaire Basin, forested areas that might persist well into the twenty-first century.

Because of our limited knowledge, it has not been possible to arrive at accurate estimates of the rate of extinction, but at least several hundred thousand species are likely to be lost during the next few decades, during our lives and those of our children. Such a rate of extinction has not occurred since the end of the Cretaceous Period, 65 million years ago, when the dinosaurs and many of the other kinds of organisms associated with them

(Raven is Director of the Missouri Botanical Garden in St. Louis, which houses an extensive field-oriented program concerned with tropical plants. He headed the U.S. National Research Council Committee on Research Priorities in Tropical Biology, whose report "Research Priorities in Tropical Biology" was published in 1980.)

Tropical forests contain thousands of unique biological species.



disappeared forever. We are, therefore, facing an event of global importance, and must be wary of ill-advised efforts to minimize its importance by those who are ignorant of the facts and wish to believe in a happier, if fanciful, scenario.

The importance of this loss in limiting human possibilities can only be outlined briefly here. Of the estimated 240,000 kinds of plants, for example, only a few thousand have ever been grown commercially; a few hundred are cultivated now; and only a handful contribute more than 80 percent of the world's food supply. Even for these, the genetic diversity is being eroded seriously, and their wild relatives are being lost rapidly. Most plants have never been studied in any detail, and we have no idea whether they would provide anything of use to a modern industrial society. Despite this neglect, many useful products have been discovered recently.

As examples, the periwinkle, native only to Madagascar, has yielded drugs that are highly effective in the treatment of Hodgkin's disease; Cyclosporine, developed during the last few years from a soil fungus that was tested by chance, has greatly enhanced the possible range of organ transplants; and the oil palm has been developed into a multibillion-dollar tropical crop during the present century.

These are just examples, but they surely indicate, on economic grounds alone, why we should not passively tolerate the loss of several hundred thousand kinds of plants, animals, and microorganisms over the next few decades without even attempting to find them. We should be working cooperatively to develop biological surveys of all tropical regions and computerizing the data obtained as a base for our subsequent action. We should be training additional biologists,

both in the tropical countries themselves and in the developed countries, and devoting significant sums annually to the exploration of tropical regions. We should be screening the plants, animals, and microorganisms of the tropics actively for possible usefulness to us, and bringing them into domestication when such uses are found. We should also be setting aside reserves of various sizes in connection with our development projects, reserves carefully designed to preserve a maximum number of kinds of organisms.

Only by taking these steps, and others related to them, can we avert the extinction of a significant percentage of the plants, animals, and microorganisms that now exist on earth, contribute to the stability of the rapidly growing human populations of the tropics, and preserve our human options for the future in a responsible way. □

Environmental Issues Facing the 99th Congress

by Lloyd Bentsen

The EPA Journal asked U.S. Senator Lloyd Bentsen, D-Tex., for his views on the environmental policy issues facing the 99th Congress. Senator Bentsen recently became the new ranking minority member of the Senate Committee on Environment and Public Works, a key environmental position on Capitol Hill.

Senator Bentsen first came to the Senate in 1971 after 16 years in business in Houston. He was re-elected to a third term in 1982. In addition to the Environment and Public Works Committee, he serves on the Senate Finance Committee, the Senate Intelligence Committee, and the Joint Committees on Economics and Taxation.

In private life, Bentsen and his wife B.A. have three children. The Senator was born in 1921 in Mission, Tex., and holds a J.D. from the University of Texas Law School. He served during World War II as a much-decorated bomber pilot, flying 50 missions over Europe. He served three terms in the House of Representatives between 1948 and 1954, declining to seek re-election after the third term.

Senator Bentsen explains his views in the following article:

A fair and sound environmental policy is a critical national goal that can only be achieved by correcting the mistakes of the past and adopting a new, dedicated outlook for the future.

Over the past few years, environmental policy has unfortunately—for all of us—lost the public trust that is the basis of any effective public effort.

When the public loses faith in its government, in its protective agencies, it will resist with great intensity any action that appears based on inadequate review or faulty, confusing regulations. It will seek whatever recourse is available—including the courts and Congress—and the atmosphere for the recovery of this public trust becomes even more clouded.

This is where we find ourselves at the beginning of the 99th Congress—environmental policy has stagnated, environmental protection is questioned, and industrial development has been severely hampered by conflicting and uncertain signals from Washington.

At the forefront of this dilemma is EPA. Although questions and complaints over EPA's management and intent have in fact resulted in changes at the agency, these came only after public trust in EPA had been depleted. In the highly polarized arena of environmental policy, no decision or regulation proposed by EPA will go unchallenged until the agency has regained its reputation for fairness and efficiency. EPA is making efforts to recover, but this will take time, and there is little of that precious commodity to waste.

Meanwhile, there is a clear risk that environmental policy will be immobilized. Over the past several years most of the major environmental funding authorizations have expired. While this has not limited the ability of laws to be enforced or regulations to be developed or modified, it certainly reflects the difficulties facing Congress in attempting to reach decisions on how to improve environmental policy.

Much of this is due to the fact that questions regarding the effectiveness of EPA to carry out the mandates of environmental law have limited the ability of Congress to enact needed revisions. The extent of the delegation of authority to the judgment of the EPA Administrator has become a



Sen. Lloyd Bentsen

time-consuming issue, and all too often the attention of Congress must be directed to oversight of EPA activities.

Quite frankly, whenever Congress is devoting its time and energies to rewriting regulations, it is a sure sign that the regulatory process is failing. This type of serious problem normally stems from the misuse of delegated authority, either the extension of authority beyond Congressional intent, or an obvious failure of public support for the regulatory effort. In this important case, the issue is the loss of public trust.

Compounding this problem is the open and expanding polarization of interest groups. From a national standpoint, the environment has been, and largely continues to be, a bipartisan issue with broad public support, but this uniformity of opinion is not the case among the interest groups who lobby on environmental issues.

In the 1970s these groups would differ but ultimately move toward the agreement that is essential to legislation. This is how great progress was made. Now, under this often bitter polarization, any attempt to find the middle ground may be viewed as outright betrayal by one or more advocacy positions.

Sound policy cannot be easily crafted in such an atmosphere. Environmental policy, because it must address the sensitive questions of a balance between aspects of public health and economic considerations, demands careful thought, dedicated work, and the full cooperation of all involved. One of the most debilitating effects of the current polarization is that we cannot effectively define new policy approaches because we cannot enact new legislation. Even

rational debate on the course to be followed is inhibited.

It is in this context that EPA's stature becomes particularly important. As the issues become increasingly complex, as the sciences become more uncertain, as the economic implications of any policy decision become larger and often international in scope, we as a nation must have a stable and professional EPA to provide that "neutral ground" necessary to assess the complex issues. EPA must be willing and able to provide the type of professional analysis that the public and the Congress can rely on as unbiased and unaltered by advocates of a particular position.

EPA has as its primary function the protection of the environment, and it is expected to carry out this role with a full realization of the impact of its decisions on the national economy. If EPA cannot do this, or if it appears that environmental policy is being manipulated by other forces, it cannot fulfill its critical role as an unbiased analyst. The result, again, is a loss of public trust and continued stagnation of environmental policy.

We simply cannot afford this situation. Environmental issues, as all others, change with time and must be properly monitored. Today's environmental problems differ from those of a decade ago, in part because our current laws have been effective in many areas and in part because our perception of public health threats has changed with new evidence. Many of our current laws were passed at a time when environmental threats were viewed as risks to be handled by threshold levels. If we reduced exposure to a level below the threshold, the risk would be eliminated. Today, for many pollutants, particularly carcinogens, the operative theory is that no effective threshold can be established—that any exposure represents some risk. The issue thus becomes a matter of risk management, and it requires policy-makers to develop complex new courses of action. To perform this critical task, we must work together, and we must begin now.

These and other pressing environmental issues have been neglected far too long. For example, the effect of toxic pollutants in all environmental media demands policy guidance, and may highlight the need to

respond to all multimedia environmental problems.

Most immediately, Congress must reauthorize the Superfund trust fund. There is no question that a larger fund is necessary, just as there is no doubt there will be considerable debate and controversy over the nature of the fund. The current feedstock tax is too small, but it cannot be significantly increased without unacceptable economic consequences to an element of the national economy. Other revenue alternatives must be found. A waste end tax should be included, but this too can provide only limited funds. Additional revenues will have to be generated from a much broader revenue base, such as general revenues. Whatever is decided, Congress must act quickly and fairly to assure that the Superfund program can continue at an accelerated pace.

We will also return to the important issues of the Clean Water and Clean Air Acts. While progress was made on developing legislation on the non-construction grants portion of the Clean Water Act, the law was not reauthorized in the last Congress—leaving this Congress to review those issues as well as consider the future of the construction grants program.

An effort that deserves special consideration is the development of a non-point source pollution program. This increasingly important area of environmental concern received considerable attention in the last Congress, but substantial progress can come only through cooperation of the land owners who will be most affected by any control program. The Committee on Environment and Public Works has made considerable progress toward developing an approach which emphasizes such positive cooperation.

The controversial environmental issue of acid rain appears to be the pivotal point in determining success or failure for Clean Air legislation. Because it is a regional economic issue as well as an environmental issue, economic welfare is expected to play a significant role in any resolution. This nation must and will confront this contentious issue, and it should be addressed with a maximum of cooperation.

There are, of course, other important issues to be considered in Clean Air legislation, including the problem of developing a sound air toxics program.

Ultimately, although probably not in this Congress, certain fundamental questions must be answered. Specifically, the Act relies on the premise that areas which exceed national ambient air quality standards are subject to deadlines for meeting these standards. While this philosophy may be applied in general, it is becoming evident that it likely will not work in some areas.

Most notably, there are cities such as Los Angeles and Houston where no realistic attainment date can be projected for meeting the oxidant ambient standard. If this is the case, as it appears, it seems that a different approach might be considered which would press increasingly rigorous controls on these areas while recognizing that attainment dates are not yet definable. The bipartisan National Commission on Air Quality suggested some alternatives that may be appropriate. This difficult problem deserves a full and clear evaluation, and it underscores the type of policy issues on the horizon.

If we are serious about seeking a successful review and the needed modification of environmental policy for the remainder of this decade, we must recognize that the delicate key to success is the ability of all interested parties to compromise for the sake of progress. The alternative is the status quo. Without a general willingness to help improve the environmental laws, little will be done at a time when standing still means being left perilously behind.

The citizens of this country deserve a safe environment, our industries deserve a consistent guideline for long-term planning, and all interest groups deserve to be heard on the issues. Congress plays an important role in forging the difficult decisions from a variety of viewpoints. So does a stable and professional EPA. But the work cannot go forward without the assistance and cooperation of concerned individuals and advocacy groups, just as there can be no successful program without the support of the American public.

If we cannot work together, if we cannot move ahead through compromise, if we cannot form our plans and fund them, the loser will be the nation's environment. We must not, and I believe we will not, risk this possibility. □

An Enforcement Status Report

by Courtney M. Price

"Unless they [the states] have a gorilla in the closet, they can't do the job. And the gorilla is EPA. If they open the door and find nobody there, or somebody who won't come out, that doesn't do them any good. They can't enforce these laws by themselves."

—Former EPA Administrator William D. Ruckelshaus at National Compliance and Enforcement Conference, January 1984

The "gorilla" had an especially good year in Fiscal Year 1984, the Office of Enforcement and Compliance Monitoring's first full year since its establishment. Working with the Department of Justice and the various states, EPA's legal enforcement activities gave new credibility to the agency's efforts to enforce the laws.

Increasing the level of enforcement activities was one of the agency's highest priorities in FY 84. Our accomplishments have been outstanding. In every program, EPA and the states used a variety of actions to address a majority of the significant violators targeted at the year's onset. The air program dealt with 99 percent and, based on only 11 months of data, the Resource Conservation and Recovery Act (RCRA) program addressed 100 percent of the hazardous waste handlers targeted from its top violator list. Our regional offices issued over 3,000 administrative orders and referred 263 civil and 35 criminal actions to headquarters. In turn, 240 civil cases and 31 criminal cases were referred by EPA to the Department of Justice for further action.

Other accomplishments included several very important judicial decisions and some significant out-of-court settlements. Also, a number of important policy and management initiatives provided new, improved tools for use by federal and state environmental enforcement efforts.

(Price is EPA's Assistant Administrator for Enforcement and Compliance Monitoring.)

Significant Cases

Because the hazardous waste enforcement program under RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also referred to as "Superfund") is relatively new, compared to the air and water programs, it is in this area where much new law is being made by judicial interpretation of the statutes. In most instances, the courts have read the statutes to cover the broadest possible range of parties and practices. Some of the most important cases that have been decided this year are:

● **U.S. v. Northeastern Pharmaceutical and Chemical Co.:** In this case, involving dioxin-contaminated waste, the court held that under CERCLA, EPA can require a company that generates hazardous waste, which was disposed of on someone else's property, to reimburse the government for its costs of cleaning up the waste, even if the waste was disposed of before CERCLA was enacted, and even if the company was not negligent when it disposed of the waste. The court also held that CERCLA authorizes EPA to recover the costs of litigating enforcement cases, the cost of cleanup work, and the interest on these amounts.

● **U.S. v. Conservation Chemical Co.:** As in the *Northeastern Pharmaceutical* case, the court ruled that individuals or companies which generated waste before the passage of CERCLA are liable for cleaning up those wastes if the waste presents a hazard to health or the environment. The court also held that CERCLA imposes "joint and several liability." This means that where a given site involves two or more defendants, the courts can decide that the harm imposed by the site cannot be divided among the defendants, and that any one of them can be held responsible for paying the entire cost of cleanup. If any one defendant believes that his share of the harm is somehow divisible from the others (and therefore he should pay only a proportional share of the cleanup costs) the burden is on that defendant to convince the court of this.

Before it was demolished by state order in 1980, the Metate Asbestos Co. mill in Globe, Ariz., occupied the site in the right foreground. Mobile homes were subsequently built on soil permeated with asbestos tailings. The court decision regarding Superfund applicability to mining wastes has permitted EPA to initiate remedial action at the site. All residents have been relocated, and the mobile homes will be destroyed and buried on-site.

● **U.S. v. Metate Asbestos Company:** This case involved an asbestos mining company in Globe, Ariz., where a subdivision of approximately 55 families had to be evacuated because of asbestos pollution. The court decided that mining wastes are included within CERCLA's definition of hazardous waste.

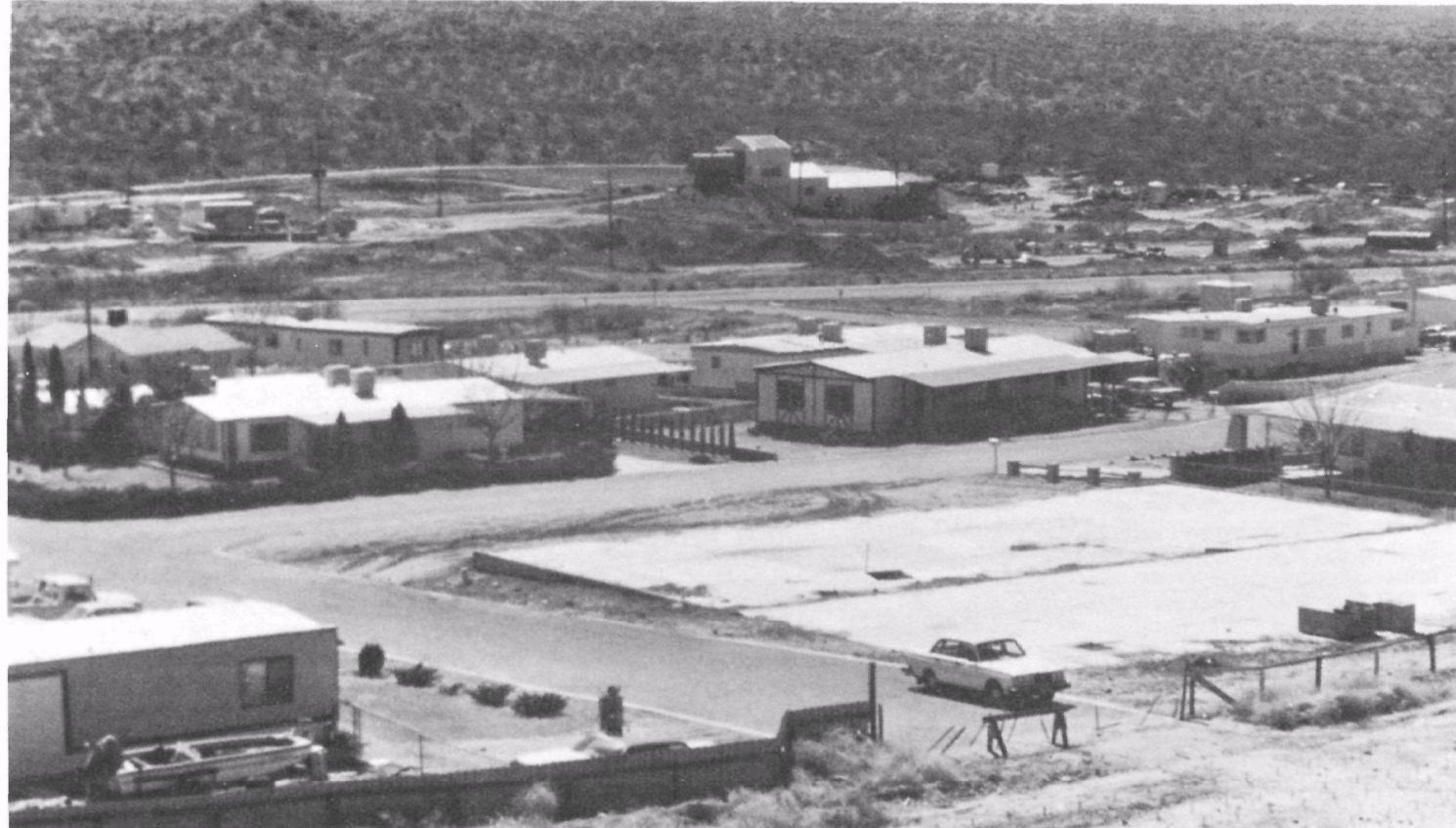
● **U.S. v. South Carolina Recycling and Disposal, Inc.:** Like *Conservation Chemical*, this case held that CERCLA imposes "joint and several liability." Further, the issue was raised as to whether CERCLA is unconstitutional. Specifically, one question was whether the Act violates the due process clause by regulating past conduct. The court preferred not to rule on this issue directly, but did say that the statute was not unconstitutional as applied to the facts of this case. The court also said that defendants are responsible for all costs actually incurred by the government, including attorneys' fees and prejudgment interest.

● **U.S. v. Waste Industries:** The Fourth Circuit Court of Appeals held that under RCRA Section 7003, where the past activities of hazardous waste handlers may present an "imminent and substantial" endangerment to health or the environment, EPA has the authority to compel such waste handlers to take corrective action even though their improper activities occurred in the past and may have ceased prior to EPA's action.

We also won some important cases under the Clean Air Act (CAA) and Clean Water Act (CWA):

● **U.S. v. City of Kansas City, Kansas:** In this CWA case, the judge ordered the municipal sewage treatment system to comply with its National Pollutant Discharge Elimination System (NPDES) requirements regardless of the availability of funds. The case thus gave support to the agency's National Municipal Policy, which requires publicly owned treatment works to construct the necessary pollution controls even if federal funding is not available.

● **U.S. v. City of Providence:** In this action to enforce an existing CAA consent decree, the judge initially



said he would not impose a penalty as high as the amount which the parties had previously agreed to pay if the decree was violated. The government persuaded the court, however, that it did not have the authority to reduce these stipulated penalties.

- **U.S. v. Kaiser Steel:** In this case, the government won a large civil penalty—\$850,000—and forced the shutdown of a significant source of pollution in an area where the air quality does not meet the standard set by EPA as necessary to protect human health.

- **U.S. v. Borden, Inc., U.S. v. Conoco, Inc., and U.S. v. B. F. Goodrich Co.:** In these actions to enforce the vinyl chloride emission standard, the defendants challenged the validity of part of the standard. Because one district court had previously accepted this argument, it was important that these three other courts reject it, as they did.

In addition to the court cases we won this year, we have accomplished a great deal by negotiated settlement of enforcement actions. Some of the most important of these settlements are:

- **U.S. v. Petro Processors:** This landmark settlement involved what is believed to be one of the largest hazardous waste sites, and a possible threat to the Baton Rouge, La., water supply. The defendants will conduct a comprehensive cleanup of the site, and maintain the remedy in perpetuity, at an estimated cost of over \$50 million. Also under the decree, the government can compel the defendants to remedy any future problems at the site.

- **U.S. v. A & F Materials:** In addition to requiring the defendants to perform a full-scale study of this Illinois waste site and perform the necessary remedial work, this consent decree, like the one in *Petro Processors*, contains language which will allow the government to require the defendants to remedy any future threats to health or the environment posed by the site.

- **U.S. v. Hooker Chemical and Plastics (S Area Landfill):** This settlement (which is awaiting court approval as this article goes to press) covers one of four major enforcement actions involving chemical dumpsites in the vicinity of Niagara Falls, N.Y. The company is required to clean up the site with advanced, state-of-the-art technology, to take stringent measures to protect the drinking water supply for the City of Niagara Falls, and to undertake surveys and long-term monitoring to assure that chemicals do not contaminate the ground water. The settlement allows EPA to seek further remedial action if the surveys or monitoring programs show ground-water contamination.

- **U.S. v. General Motors Corp.:** This case was the first major CWA action taken to enforce the categorical pretreatment standards for integrated electroplaters. The standards involved here define what must be done to wastewater from the electroplating process before the wastewater is sent to publicly owned treatment works. Eight separate consent decrees were negotiated concurrently. The agency held firm on the June 30, 1984, deadline set by the standards, and will collect

substantial civil penalties from GM for violations occurring after that date.

- **U.S. v. District of Columbia:** This CWA consent decree requires the District of Columbia to remedy NPDES permit violations at its Blue Plains Sewage Treatment Plant by hiring additional staff and repairing, operating, and maintaining the pollution control equipment. The District must also undertake a \$200,000 environmental project, and pay a \$50,000 penalty. The case was particularly important because EPA had made a large investment of construction funds in the facility, and because failure to properly operate and maintain the plant built with those funds had created significant pollution problems.

- **U.S. v. Dow Chemical Corporation:** This settlement resolved a three-year dispute over EPA's authority to obtain information on water pollution control processes and internal waste streams. Under the decree, Dow must provide EPA the data it needs to draft discharge permits; allow EPA access to its Midland, Mich., facility to conduct sampling and analytical studies; perform studies requested by EPA for use in drafting the permit; and give EPA broad access to information concerning the presence, sources, and control of dioxins and furans at the Midland facility.

Policies and Guidance

Outside the courtroom and consent decree negotiations, the Office of Enforcement and Compliance Monitoring (OECM) has other, critically significant functions. One of these is to develop—or

A fire at the Petro Processors abandoned hazardous waste site near Baton Rouge, La. As a result of a court decision that preceded the fire, responsible parties will conduct a comprehensive cleanup of the site.

help the media program offices develop—policy and guidance documents either for the enforcement program as a whole, or on media-specific issues. These documents help assure uniform enforcement efforts nationwide so that violators know that as far as EPA is concerned, they will be treated the same wherever they are in the United States. Such policies and guidance become an important tool for enforcement efforts.

OECM produced several important documents this year, many jointly with the media program enforcement offices. Some of these are: compliance and enforcement manuals for the Toxic Substances Control Act (TSCA), RCRA, and CAA; compendia of the enforcement policies now in effect for CERCLA, TSCA, CAA, CWA, and FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) programs; a compendium of all the general enforcement policies now in effect; a revised general penalty policy from which program-specific policies have been drawn for the air and RCRA programs, and are under development in other programs; guidance on pursuing enforcement actions against insolvent parties in the hazardous waste area; guidance on enforcing information requests in the hazardous waste area; general guidance on model consent decrees; and guidance on enforcing the new municipal policy. Other important policies, issued jointly with the EPA Office of Solid Waste and Emergency Response, covered the issuance of certain RCRA orders and the participation of potentially responsible parties in the development of remedial investigations and feasibility studies under CERCLA.

Management Initiatives

Last but not least among OECM's accomplishments for FY 1984 are several management initiatives aimed at making better use of our available tools and resources, and focusing on results.

For example, FY 84 saw the first concerted effort to put a long under-utilized tool of the Clean Air Act to use. Section 120 of the Act provides an administrative remedy designed to recoup the economic benefit a facility has gained by violating CAA standards. From 1980 to 1983, EPA had initiated only 20 Section 120 actions, but in FY 84, 22 such actions were initiated.

Another tool which has long been available but has not been used is the contractor listing provisions of the Clean



Air and Water Acts. Under these provisions, certain civil and criminal violators can be suspended from receiving any federal grants, loans, or contracts. Our Office of Legal and Enforcement Policy took steps to put this tool to use by publishing proposed revised regulations, issuing guidance on the use of this mechanism until final rules are in place, and encouraging the regions to propose candidates for "listing."

Similarly, FY 84 saw far more extensive use of the criminal enforcement provisions of our statutes. We increased the number of criminal investigators—we had 23 at the beginning of FY 84, and we had 35 by the end of calendar year 84. One very important accomplishment in the program was the deputation of the investigators as Special United States Marshals. This means they now have full law enforcement powers, such as authority to carry firearms, make arrests, and execute warrants. The additional resources devoted to the criminal program showed significant results: in comparison to FY 82, the number of cases referred for prosecution increased from 20 to 31, the number of defendants charged increased from 14 to 36, and the number of defendants convicted increased from 11 to 26.

Another type of initiative we have taken in the past year may be characterized as "super-coordination" of cases. This refers to selected cases which are large and complex, involving multiple facilities, and/or multiple companies, and/or multiple media violations. The GM pretreatment case, discussed above, was one of these, involving eight separate facilities and eight separate decrees. Another type of a coordinated, comprehensive, well-planned approach to a large-scale problem is OECM's Chesapeake Bay initiative. We will work

closely with Region 3 and the surrounding states to define the specific noncompliance problems in and around the Bay, and determine where enforcement action would help solve the problem. This of course will be a long-term project, but one well worth a substantial effort.

Also in FY 84, OECM took the lead in two other major projects, again aimed at improved coordination and planning of the enforcement effort, but on an even broader scale. First was the Steering Committee on the State/Federal Enforcement Relationship. Responding to the 1983 State/Federal Task Force Report to the Administrator, the Steering Committee developed a policy framework for State/EPA enforcement agreements. Headquarters enforcement program offices then developed more specific guidance for the regions on negotiating these agreements and on oversight of state programs. In particular, the guidance provides criteria and procedures for direct enforcement action by EPA. Through extraordinary effort by headquarters, the regions, and the states, these agreements now have been negotiated in each program in almost all states. This project has greatly improved our working relationships with the states, and this will be a key factor in maintaining our momentum.

The second OECM-led, agencywide initiative was to put in place by the end of FY 84 a strategic planning process for compliance and enforcement matters. The process, which has been integrated with the agency's existing management systems, involves discussion between OECM and the media program offices, and then between the agency and the Department of Justice.

In short, I am very proud of the accomplishments our "gorillas" have made this year, and I am looking forward to another very successful year. □

A Day in the Life of a Criminal Investigator

by Susan Tejada

(First in a series of occasional reports on how some EPA employees spend their working days.)

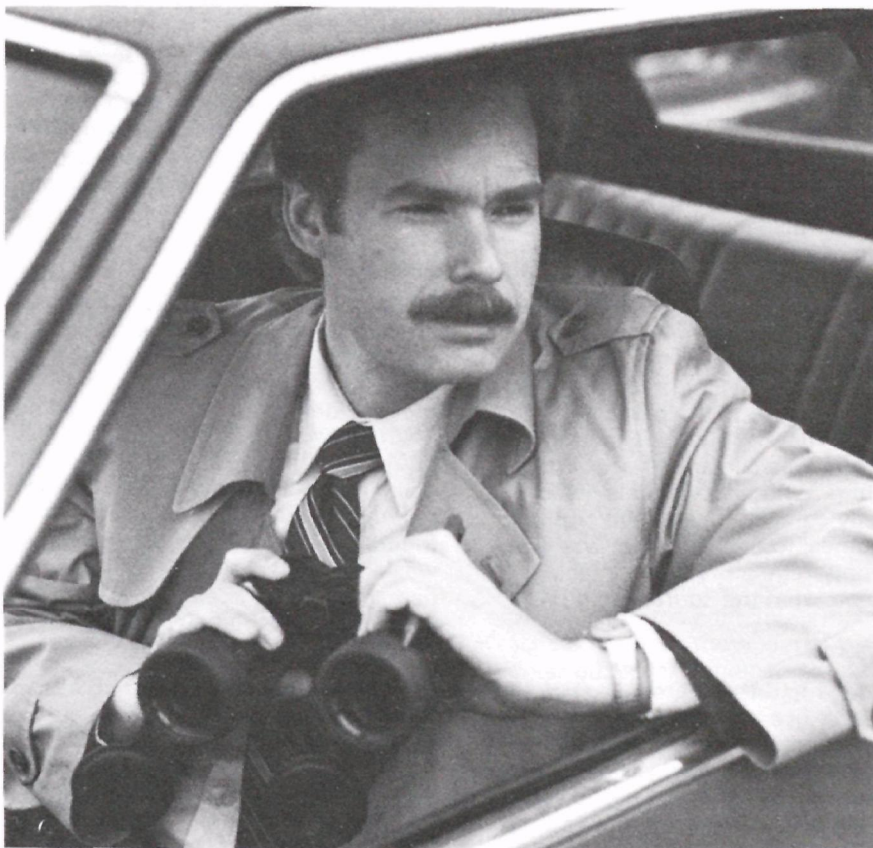
In May 1982, for the first time in its history, EPA began recruiting special agents: criminal investigators to help enforce environmental laws. In July 1984, authority was given to deputize the agents as U.S. Marshals, empowered to carry guns on the job. By January 1985, EPA had hired 35 criminal investigators, with a minimum of two stationed in each regional office.

David Wilma, former Seattle cop and special agent for the Drug Enforcement Administration, came to EPA in January 1983. Based in Chicago, he investigated environmental law violations in a 10-state area.

Last September, Wilma transferred to EPA's Region 9 office in San Francisco. He was the first special agent in the region, developing cases and working to incorporate the criminal investigation function into ongoing operations.

Soon after arriving in Region 9, Wilma began an investigation of an electrical equipment manufacturing company suspected of illegally using and disposing of polychlorinated biphenyls, or PCBs. The situation had first come to EPA's attention two months earlier, when the agency had carried out a Superfund emergency action at the company site to look for PCB-contaminated materials.

EPA's criminal investigators do spend some of their time in cloak-and-dagger activities: surveillance and reconnaissance, for example, or clandestine interviews with confidential sources. But they also spend a lot of time just waiting: waiting for airplanes, waiting for people, even waiting for typewriters and copying machines. This article describes a day in the life of one EPA criminal investigator: October 30, 1984, the day special agent David Wilma prepared to enter the electrical equipment manufacturing company with a search warrant to look for evidence of criminal wrongdoing.



EPA special agent David Wilma on a stakeout.

5:30 a.m.

Camped out in what he called the "Casa de Flop," waiting for his family to sell their house in Chicago and join him in San Francisco, David Wilma woke up.

Yesterday had been a long day. Wilma had been at the EPA office until after nine, working with the Assistant Regional Counsel on a search warrant request. They had filled a 10-page affidavit with the site history, technical information, and the results to date of the criminal investigation. Today would be another long day, and so would tomorrow.

Wilma got dressed and then did something he does at least twice a week: drove to the airport to catch a plane to another city. With the ratio of criminal cases to investigators as high as it is, EPA's special agents more often than not find themselves on the road or in the air, working to cover a lot of territory.

Wilma had to allow time before departure for a weapons check. EPA special agents can carry guns, but they have to go through inspections each time they board a plane. "You can't just show up 10 minutes before flight time," says Wilma, "and expect to make it."

At the airport, Wilma met the two

regional officials who were going with him to obtain the search warrant. At 7:00 a.m., they flew out of San Francisco.

8:30 a.m.

After yet another forgettable in-flight breakfast of danish and coffee, Wilma and his partners arrived at their destination, rented a car, and drove to the office of the U.S. Attorney.

Criminal investigators "always make contact with the federal prosecutor when beginning an investigation," Wilma says. "When the U.S. Attorneys get involved in a case early on, they become familiar with the details, and can give direction on how to proceed." Besides, the investigator can determine the chances of a prosecution. "Each district has a different approach," Wilma explains. "Some prosecute you if you throw a cigarette out the window. Others prosecute an environmental case only if it's a sure thing."

The U.S. Attorney involved in Wilma's case had already been briefed on the particulars, and met now with Wilma's group to go over the affidavit. When the documents were in order, he advised Wilma how to obtain the warrant.

(Tejada is Associate Editor of EPA Journal.)

10:15 a.m.

Wilma brought the affidavit to the chambers of the U.S. Magistrate. The judge read the document, Wilma swore that it was truthful and signed it, and the judge approved the search warrant.

"I've never had a warrant turned down," says Wilma. "By the time we get to that stage, enough work has been done so that there is an excellent chance the warrant will be signed."

In this particular case, "enough work" had meant locating and interviewing confidential sources over a one-month period prior to preparing the affidavit. "We interviewed state and local inspectors familiar with the facility," Wilma explains. "We cashed in on one inspector's sense that a particular individual knew about the situation in the facility and was concerned about it. We asked him 'Who else will help?' We discreetly contacted people at night, in their homes, to find out what was going on. County regulatory agency files confirmed what the sources told us."

11:00 a.m.

Wilma now had the search warrant, but he couldn't use it until the following day. For one thing, he needed a full day for the search, and this day was almost half over. For another, the rest of the search team wouldn't arrive from San Francisco until later in the day. Wilma decided to run a little reconnaissance mission.

"I drove by the facility," he recounts, "to be sure everything was still there. I had to be discreet about it—I couldn't just stand at the fence and peer in—because in this case, the element of surprise was very important. The search warrant was a deep secret. We didn't want records spirited away or drums disappearing before we could serve the warrant."

Satisfied that the facility, from the outside at least, appeared unchanged, Wilma paid a courtesy visit to the local police to inform them of the operation planned for the following day. Then he selected a rendezvous point for the team members: a donut store in a shopping center. "If we wanted to keep the element of surprise, we couldn't very well collect, one by one, in the parking lot of the company."

1:00 p.m.

Wilma headed back to the airport to meet an incoming flight. There it was a case of hurry up and wait: the flight was late.

Wilma went over a mental checklist for the next day. Two teams were enroute to join him. One group of people would collect physical samples at the facility. They would need respirators and protective clothing for four, plus an

adequate supply of glass jars, tubes, and ice chests. Another group would seize documents. Those people would need containers to hold the records they collected. Had all the equipment been ordered? A local EPA contractor had some of the equipment already in the area. More was enroute from the regional office via an express delivery service. Members of the sampling team would be bringing 10 ice chests with them.

3:00 p.m.

The plane he had come to meet finally arrived. Wilma found his passenger, an engineer from the sampling team, and drove directly to a home where two of the confidential sources were waiting.

"In an ordinary EPA inspection," explains Wilma, "the company president goes over his operations and makes records available. It's all nice and friendly. But an inspection under a search warrant is different. You can assume the people won't be cooperative because they've done something wrong. That's why it was important for the engineer to talk to insiders *before* entering the premises."

The engineer's team would be collecting samples from soil, drums of oil, and electrical items. The sources told him what processes were used at the plant and what safety risks he would encounter. This pre-search interview was "a damn good idea," Wilma emphasizes. "The engineer found out how to take the most important samples in the most efficient way, how to handle them safely, and how to transport them."

The confab lasted until 6:00. Then Wilma and the engineer headed back to the hotel.

9:00 p.m.

In a meeting room that had already been reserved, members of the search teams gathered for a final briefing before zero hour the next day. Besides the Assistant Regional Counsel who had accompanied Wilma from San Francisco that morning, there were eight others from the regional office, plus four local contractors, and someone from the county health department.

The involvement of other agencies in an EPA criminal investigation is "real typical," according to Wilma. One reason is because "EPA is so desperately short of criminal investigators and equipment." Another is that violations of environmental statutes often involve more than one agency, and "joint investigations are more efficient than separate ones." In this particular case, the county had loaned one van for handling samples, and the U.S. Treasury

Department loaned another for a mobile office.

The search teams were enthusiastic. "Over the past 10 years," explains Wilma, "people at EPA have seen some truly egregious environmental harm take place. And they have seen companies get off the hook by writing a check. That grates. Now they had an opportunity to make a violator pay. There was tremendous esprit."

Wilma began the briefing with an overview of the investigation and described how the warrant would be executed. It would be important to show up early in order to secure the office area and deny entry to employees as they arrived. It would be important to move fast, so there would be no time for company personnel to remove or tamper with evidence. And it would be important to be polite. "There will be understandable resentment at your entry," Wilma told the group, "and you have to expect it. Some employees may try to make it difficult for you to gather samples. You have to be diplomatic. There's nothing more powerful than a search warrant, so you can be just as nice as you want."

The heads of the document collection and sampling teams described what they would be doing, and the group clarified any remaining questions about the operation.

11:00 p.m.

The glass jars and other equipment that had been shipped via express delivery finally arrived. Their late delivery had provoked "some tension," and the arrival brought a sense of relief.

Midnight

Wilma and the other members of the search teams turned in for the night.

At 7:00 a.m. the next morning—October 31, 1984—Wilma served the search warrant. Execution of the warrant went completely according to plan.

At the present time, this case is still under investigation and has not yet been brought to trial. Because of this, additional details are not available for publication. Nevertheless, says Wilma, "The evidence we expected to find, was found. There was contamination, and it was worse than we thought. It should result in a successful prosecution."

Nationwide, EPA's criminal enforcement program showed significant results in fiscal year 1984 (see related story, page 22). Thirty-six individuals were charged with criminal violations of environmental statutes, more than twice as many as in fiscal year 1982; and 26 were convicted, compared to only 11 two years earlier. □

Asbestos in Schools: One State's Answer

by Jack Lewis

Abating asbestos hazards in America's schools is still primarily a state and local responsibility, although EPA's role has been growing steadily in recent years, and continues to grow. The following article explains how one state took the initiative in handling the problem.

At a time when some states are just becoming aware of asbestos contamination problems, Oklahoma has already compiled an admirable record of achievement. The "Sooner State" has lived up to its nickname by launching an ambitious asbestos abatement program, originally confined to schools but now embracing all buildings Oklahoma owns or leases.

Oklahoma has also implemented a certification program for training and licensing asbestos contractors. And the state has an 85 percent rate of compliance with EPA's Inspection and Notification Rule at a time when the national average for compliance with this school inspection rule is only 34 percent.

This is not meant to suggest that Oklahoma's asbestos record is without flaws. There has been an element of trial and error in the state's asbestos abatement efforts. However, it is difficult to fault the initiative Oklahoma's officials have shown in tackling the problem of asbestos—or their willingness to learn from their mistakes.

In the late 1970s, Oklahoma's Department of Health began addressing inquiries about asbestos to officials at EPA and the National Institute for Occupational Safety and Health (NIOSH). Federal officials advised Oklahoma of scientific evidence that links the breathing of asbestos fibers with several types of cancer and with a scarring of lung tissue called asbestosis. Asbestos fibers most often escape into the air when surfaces coated with "friable" asbestos begin to deteriorate. Asbestos is called "friable" if it crumbles easily when subjected to hand pressure. Even "nonfriable" asbestos can, however, release fibers if it is damaged, disturbed, or improperly maintained.

In 1973 EPA prohibited the spraying of friable asbestos for purposes of

soundproofing or insulation. Five years later, the agency banned the spray application of friable asbestos for decorative purposes. Prior to these bans, the American construction industry had made widespread use of the substance.

During the years of rapid growth following World War II, Oklahoma contractors followed the national pattern by making frequent use of asbestos-containing materials, both friable and nonfriable. The state's health officials were concerned about the ramifications of the problem, and they did not hesitate to address it.

Even before the passage of federal legislation requiring asbestos inspections, Oklahoma had taken giant strides in that direction. Between June 1979 and April 1981, the state surveyed almost all of its 6,691 school buildings for possible asbestos contamination.

Every county in Oklahoma has a "sanitarian," and it was these local health officials who first inspected public

school buildings for deteriorating friable asbestos. Oklahoma's sanitarians conducted their inspections according to specifications set forth in EPA's March 1979 guidance document, "Asbestos-Containing Materials in School Buildings." Officials from the Oklahoma Departments of Education and Health provided on-site technical assistance, whenever possible.

Suspicious samples were analyzed free of charge by the Oklahoma Department of Health, which used a technique known as polarized light microscopy in its tests. These tests confirmed that 70 out of Oklahoma's 617 school districts—over 10 percent—had at least one building with friable asbestos-containing material. In 47 school districts, the material was deteriorated or damaged to such an extent that the Department of Health recommended abatement action.

During the summer of 1980, Oklahoma's Education and Health Departments sponsored Asbestos Abatement Workshops at locations throughout the state. NIOSH funded the workshops, which were planned with help from EPA Region 6. No federal funds were, however, available at that time for actual asbestos abatement.

As a result, state and local authorities were thrown back on their own resources to fund any abatement actions. By

Workers in a Washington, D.C., elementary school remove asbestos from a radiator pipe. They have collected the asbestos in a specially designed plastic bag and are about to wet it with solvent to control airborne fibers. Similar procedures were used in Oklahoma's asbestos abatement program.



Steve Delaney

(Lewis is Assistant Editor of EPA Journal.)

December 1980, a few schools in the state had already taken corrective action on their own initiative, even though they were under no legal obligation to do so. Others, because of budgetary constraints, were waiting for the state to offer them assistance.

When confronted with evidence that some eight percent of Oklahoma's public school districts needed asbestos abatement, the state's legislators did not take long to act. In June 1981, Governor George Nigh signed into law an appropriation bill setting up a \$2 million Asbestos Removal Fund.

School districts had to meet two requirements to qualify for grants under this revolving fund: (1) Grants had to be used strictly to reimburse a school district for abatement work already completed, and (2) the school district in question had to have an annual budget carry-over of less than 10 percent at the end of its most recent fiscal year.

Twenty-nine of the 47 problem school districts met these two requirements and received financial help from the state in tackling their asbestos problem. Between June 1981 and September 1982, all of the state's asbestos removal fund of \$2 million and an additional \$1 million of local funds were expended to complete abatement actions in all 47 school districts. A total of 1,116,948 square feet of friable asbestos was handled. In most cases, removal was the abatement option used. However, encapsulation was used in several instances to avoid the undue disturbance of asbestos fibers that full-scale removal actions might have generated.

The level of state reimbursement varied from 100 percent in the case of poorer school districts, such as Pauls Valley, on down to 35 percent for more affluent districts such as Tulsa. One factor working in favor of rural school districts was the availability in those areas of contractors willing to perform abatement work for fees close to the official reimbursement rate of \$2 per square foot. That flat rate worked against urban areas such as Tulsa where contractor fees as high as \$7 or \$8 per square foot were not uncommon.

The quality of available contractors became a source of concern by 1982. Instances of shoddy, unprofessional, and even potentially harmful abatement work were reported. These lapses occurred despite early state issuance of federal safety guidelines for asbestos contractors and regular on-site monitoring by the Department of Health. According to Bill Giles of Oklahoma's Department of Labor, "Sometimes we ended up with more of a problem than we had to begin

with" as a result of incompetent contractors. Ideally, Oklahoma should have had asbestos contractors trained and licensed before any abatement work was done. In actuality, there was a time lag of over a year before the state developed a certification program.

The state's licensing program, which was approved in April 1982, did not become effective until October 1982, when the last of the state's Asbestos Removal Fund money had already been spent. Fortunately, however, more than 60 percent of all asbestos abatement completed in Oklahoma prior to the start of the state's licensing program was performed by a contractor voluntarily committed to the most exacting safety standards. The company in question—Utility Savers, Inc.—has in all cases required its asbestos workers to wear protective masks, coveralls, and boots that did not become mandatory in the state until 1982.

Only formally trained and certified contractors have been allowed to handle the 103,000 square feet of asbestos abatement completed since 1982. Fifty contractors have been trained and licensed since the certification program began. Even though certified, their work is subject to on-site inspections by the state Labor and Health Departments, which have shut down several projects until proper standards could be met.

Dale McHard and Bill Kemp—two officials at the Oklahoma Department of Health—have been the motivating forces behind most of the state's asbestos initiatives since the late 1970s. McHard is the Chief of the Department of Health's Special Hazards/Radiation Division, and Kemp is his Special Hazards deputy. Since the completion of public school inspections in 1981, they have expanded their inspection network to include religious and non-sectarian private schools as well as day-care centers and pre-schools.

As a result, three parochial schools have conducted major removal actions, and several religious academies have moved from their leased facilities to new ones without asbestos contamination. These steps have been taken without state subsidy because of Oklahoma's rigid tradition of church-state separation. However, the Department of Health did make available to all private and parochial schools such services as surveillance, sampling, bulk sample analysis, and assistance in developing corrective action plans.

In the spring of 1983, the Department of Health conducted a survey of Oklahoma's 2,100 day-care centers and pre-schools. After visual inspection pinpointed possible problem areas, state

health officials stepped in to help with formal sampling and laboratory analysis. Thus far, ten centers have either moved or launched abatement actions as a result of this initiative.

Largely as a precautionary measure, Oklahoma's Governor George Nigh recently ordered the Department of Health to re-inspect all of the state's public school buildings after 16,000 square feet of deteriorating friable asbestos was discovered in a previously inspected Oklahoma City high school. The mistake at this school has prompted concern about the quality and thoroughness of previous inspections, as well as the records kept to document them.

The new inspections will be more rigorous and thorough than those conducted between 1979 and 1981. They will cover not only public access areas but also pipes and boilers, and both state and local officials will be subject to more stringent recordkeeping requirements. Also, for the first time, Department of Health officials will inspect 1,000 other buildings that Oklahoma owns or leases for possible asbestos contamination.

Governor Nigh has increased the state's emergency fund from \$2.5 million to \$5 million to cover the cost of all these new inspections and any abatement actions that may result from them.

It is too early to tell whether the re-inspection of Oklahoma's schools will raise serious doubts about the results of previous inspections. However, at least one other aspect of Oklahoma's asbestos record is already open to criticism, and that is the state's failure to have a contractor certification program in place before abatement actions were undertaken. This step would have prevented unnecessary hazards resulting from improper asbestos removal procedures.

But the positive aspects of Oklahoma's approach to the asbestos problem clearly outweigh the negative. The state is widely admired for its prompt asbestos inspections, careful adherence to federal guidelines, and generous funding of inspections and abatement actions. Few other states have compiled a comparable record of achievement in dealing with asbestos contamination. □

Destroying Dioxin with EPA's Mobile Incinerator

by Rowena Michaels

This is the fifth article in a series by EPA's regional offices on major environmental problems they are addressing. Articles thus far have been from EPA regions 1, 4, 9, and 10. Rowena Michaels is the Director of the Office of Public Affairs in EPA Region 7.

The most promising state-of-the-art technology for the destruction of hazardous waste—high temperature incineration—is being used to burn dioxin-contaminated wastes in southwest Missouri.

EPA's Kansas City regional office finalized a permit for the mobile incinerator on November 19, 1984. The incinerator, which had been designed, constructed, and tested by the EPA Office of Research and Development, was then moved from the Office of Environmental Engineering and Technology's field station at Edison, N.J., to a farm site near Verona, Mo. The incinerator will be at the farm location for several months while it is being used to destroy dioxin. The trial burn began in early January.

Millions of words have been written in the past few years about dioxin; many of those stories concerned the 42 dioxin sites in the State of Missouri. Pictures of "moon suited" field workers stared out from the pages of newspapers around the world. "Times Beach" became a synonym for environmental disaster. But why so much attention focused on Missouri? The now-defunct chemical company, North Eastern Pharmaceutical and Chemical Company (NEPACCO) in Verona, Mo., produced hexachlorophene in the early 1970s. The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) present in the contaminated waste at nearly all of the Missouri sites was an unwanted byproduct from the manufacture of trichlorophenol, produced as an intermediate in hexachlorophene production. (Hexachlorophene, a compound once sold as a germicide, now has restricted uses.)

A salvage oil company owner hauled the dioxin-contaminated waste from the plant in Verona to eastern Missouri where, after being mixed with waste oil, it was used as a dust suppressant on roads, parking lots, and horse arenas.

Some waste was disposed of on farms in southwestern Missouri and on property now owned by the City of Neosho. Some waste still remains at the former NEPACCO plant now owned by Syntex Agribusiness, Inc.

An anonymous phone call late in 1979 to the EPA Region 7 offices led to an intensive investigation that has, to date, revealed more than 40 locations where the dioxin was spread.

Up until now, little relief could be offered to those citizens whose lives were marred by the presence of dioxin on their property. Temporary measures have been taken to ensure that: (1) people are removed from the dioxin contamination; (2) the dioxin is removed from the people (gathered and contained); or (3) barriers are put in place to prevent contact with or subsequent migration of the chemical.

But these are temporary measures that do not solve the monumental

environmental problem of destroying dioxin and restoring the communities.

The agency announced early last year an accelerated research program to find a solution to this dilemma. Researchers from EPA, other federal agencies, state officials, representatives from the private sector, and officials from foreign countries have met together repeatedly to share the limited information available on dioxin destruction. An international literature search was carefully conducted in an effort to find clues to a possible answer.

The trail kept leading back to the "Blue Goose," the EPA's mobile incinerator. Incineration is a proven technology; hazardous waste materials had already been destroyed successfully in the unit and so the project was launched.

The commitment made for this project has been a major one. Overall costs are estimated at \$4 million involving the Office of Research and Development, Office of Solid Waste and Emergency Response (Superfund), Region 7, and Syntex Agribusiness, Inc.

A tremendous amount of planning and preparation for the project has been done and is continuing. Weekly conference



In Verona, Mo., EPA Region 7 Administrator Morris Kay (right) shows observers the mobile incinerator being used to destroy dioxin.

Hylar Cooper/Springfield

AIR

New Stack Height Rules

EPA has proposed new regulations to set certain limitations on the use of tall smokestacks to disperse air pollution from industrial sources.

The proposed regulations are designed to help meet the national ambient air quality standards for sulfur dioxide and other pollutants in cases where dispersion by tall smokestacks would be deemed inappropriate. The national ambient air quality standards are designed to protect public health and welfare. States would be required to determine what methods other than tall stacks should be part of their clean air plans (State Implementation Plans) for given cases.

Interstate Pollution Petitions Ruling

EPA has denied petitions filed by the states of Pennsylvania, New York, and Maine. These states had claimed that violations of ambient air quality standards within their boundaries had been caused by emissions of pollutants from sources in the Midwest.

The petitioning states claimed that such emissions hindered their ability to meet federal air quality standards, interfered with visibility, and caused acid rain.

The petitions requested relief under Section 126 of the Clean Air Act. That section gives the Administrator the authority to control interstate transport of air pollutants that may cause violations of another state's ambient air quality standards.

EPA said that it could only provide relief under Section 126 of the Clean Air Act for those transboundary pollutants to which the act is specifically addressed: that is, only when transboundary or interstate air pollution causes a state to violate national ambient air quality standards, to exceed its prevention of significant deterioration increments, or to violate its visibility requirements.

HAZARDOUS WASTE

Emelle PCBs Removal

EPA has announced a wide-ranging agreement with Chemical Waste Management concerning its Emelle, Ala., disposal site. The Emelle site is the largest of its kind in the United States.

calls between all of the participants have kept the project on track.

Permit applications for the incinerator were submitted to both EPA-Region 7 and the Missouri Department of Natural Resources. The permits were issued to the Office of Research and Development and its operating contractor, IT Corp. of Knoxville, Tenn. The EPA permit was reviewed by responsible EPA offices and issued by Region 7 in about 90 days. The permit assures the public of compliance with all of the rules and regulations that would be required for any commercial incinerator under the Resource Conservation and Recovery Act.

Logistical planning and site preparation at the Denney Farm site in northern Barry County, Mo., where the incinerator will be operating, has been accomplished by Syntex Agribusiness, Inc., Springfield, Mo. The company is also providing much of the dioxin-contaminated material to be used in the trial burns and field test of the incinerator.

The incineration process is an application of modern technology to the ancient art of purification by fire.

The extremely high temperatures of up to 2,200°F literally break apart the dioxin molecules into atoms of carbon, oxygen, chlorine, and hydrogen, which then form small basic molecules, predominantly carbon dioxide, water, and hydrochloric acid. The acid is then neutralized through contact with an alkaline solution and rendered harmless.

To assure that the public health and environment are protected, the field demonstration of this incineration system will be conducted under the strictest surveillance by local, state, and federal authorities. All Toxic Substances Control Act and Resource Conservation and Recovery Act requirements will be met as well as the stringent state environmental standards and all applicable local regulations.

Upon successful completion of the project we will have demonstrated that no harmful contaminants entered the environment by any route from the process. Ash and water produced by this destruction process will be shown harmless and the stack emissions will be thoroughly monitored. We will have successfully, safely destroyed dioxin.

When the agency decided to move the mobile incinerator to southwest Missouri, Region 7 undertook a comprehensive effort to ensure that the citizens were informed; that they received consistent, accurate technical information; and that they were listened to.

A brochure and a slide show were developed to explain the incinerator project. A briefing for neighbors of the Denney Farm, local citizens, and elected officials was held before the official

announcement of the decision. Followup visits to elected officials and citizens in the area were made the day after the announcement. Brochures, fact sheets, and photographs were provided for these individuals to share with constituents and neighbors. An intensive speaking tour of major civic organizations in the area was arranged for the scientist in charge of the project in the region. His presentation was always the same: the slide show, prepared script, and brochure. This ensured that the very technical information we were sharing was, in each case, consistent and factual.

A joint public hearing on the permits was held with the state, followed by a 15-day public comment period.

When the final permits were issued for the mobile incineration operation, both the state and EPA were able to respond to the wishes of the citizens by limiting the duration of the permit to one year and limiting the materials to be destroyed to Missouri wastes only.

An on-site demonstration day for visitors has elicited a great deal of interest, locally and nationally. The quality-assured data from the trial burn will be shared with the public as quickly as possible. An on-site liaison from the regional office will be present during the burn to answer any questions the public may have.

The overall goal of this research project is to safely destroy dioxin. The project will provide valuable technical and economic research information. EPA Region 7 remains sensitive to the concerns of those residents whose homes and communities have been contaminated with dioxin. We are committed to finding answers and remedies to the dioxin problem. The field demonstration of a proven technology for the destruction of hazardous wastes as described here will make a significant contribution to solving the challenge of dioxin destruction. □

Chemical Waste Management has agreed to pay a \$600,000 penalty for violations pertaining to storage and handling of polychlorinated biphenyls (PCBs).

Part of the agreement is the first environmental auditing requirement ever incorporated into a settlement. The audit will include all plant management and operations, systems, practices, and policies, and will evaluate them in relation to existing legal requirements to ensure safety.

109 Chemicals To Be Regulated

EPA has added 109 more commercial chemicals to its list of hazardous wastes. The agency is proposing to regulate the disposal of these chemicals.

Of the chemicals EPA is proposing to add to the list, 81 would be classified as "toxic hazardous wastes," and 28 would be classified as "acutely hazardous wastes." Acutely hazardous wastes are subject to more stringent standards than toxic hazardous wastes.

EDB Production Wastes Disposal

EPA is proposing to regulate the handling and disposal of wastes from the production of ethylene dibromide (EDB). The agency has begun this process by adding EDB production wastes to its list of hazardous wastes subject to regulation under the Resource Conservation and Recovery Act (RCRA).

Wastes from EDB production—if improperly stored, transported, or disposed of—could leach into ground water or evaporate into the air, posing a threat to human health and the environment. EPA's Carcinogen Assessment Group has found a significant cancer risk to humans in certain lifetime levels of EDB exposure.

Almost 90 percent of all EDB still being produced is for use as a gasoline additive. It is also produced as an intermediate in the production of other chemicals and as a solvent for resins, gums, and waxes. EPA has suspended its use as a soil and grain fumigant and as a quarantine fumigant on citrus and other fruits. Use of EDB as a gasoline additive is expected to decline as EPA's lead phase-down regulations take effect.

Superfund Report to Congress

On December 12, EPA sent to Congress a series of Congressionally mandated

studies on the agency's experience with the nation's hazardous waste cleanup law.

The studies, which EPA is required to submit to Congress under Section 301 of the Superfund law (the Comprehensive Environmental Response, Compensation, and Liability Act of 1980), report on EPA's experience with the nation's hazardous waste cleanup law so far. Based on these findings, EPA will submit a list of recommended changes to Congress this year, when Congress begins considering reauthorization of the Superfund Act.

PESTICIDES

Pentachlorophenol Restrictions

EPA has proposed cancelling most of the non-wood preservative uses of the pesticide pentachlorophenol after determining that continued use may cause unreasonable risk to public health.

The agency's decision is based on data which show that pentachlorophenol causes birth defects in offspring of laboratory animals and that its contaminants, hexachloro-dibenzo-p-dioxin (HxCDD) and hexachlorobenzene (HCB), cause cancer in laboratory animals.

The non-wood preservative uses of pentachlorophenol are as a herbicide, disinfectant, defoliant, moss control agent, and anti-microbial agent.

Linuron Restrictions Lifted

EPA has lifted its requirements that linuron pesticide products be used only by certified applicators and bear a tumor warning statement.

EPA has taken this action because of new studies submitted by E. I. duPont de Nemours & Co., Inc., one of the linuron registrants. DuPont's studies show that the potential health risks to workers applying this pesticide with ground equipment were much less than originally estimated. These studies included a skin penetration study and a workplace exposure study.

However, the agency is requiring the registrants of linuron products to modify labeling to provide more protection for workers. Specifically, the new label will require workers to wear forearm-to-elbow length chemical resistant gloves. Recent

evidence has shown that such gloves provide more protection than the heavy fabric work gloves that EPA originally required.

Because of agency concerns about high exposure to applicators, DuPont has voluntarily cancelled all aerial applications of linuron. EPA will require other registrants to do so as well.

Voluntary Dinocap Suspension

As the result of a reregistration initiative by EPA, Rohm & Haas Company, the manufacturer of the pesticide dinocap, has notified EPA that it will voluntarily suspend the sale and distribution of this product pending the outcome of additional testing to determine its safety.

The suspension action was taken after recent laboratory tests showed that dinocap (trade name Karathane) caused birth defects in rabbits. Tests confirming birth defects were conducted by Rohm & Haas in response to routine EPA requests to pesticide registrants for toxicology data necessary to reregister all older pesticides as required under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

TOXICS

School Asbestos Compliance Survey

EPA has released the results of a survey on compliance with its 1982 Asbestos-In-Schools Rule. The field survey was completed in January 1984 and included 1,800 public school districts and 800 private schools throughout the U.S.

The survey indicates that 93 percent of America's school buildings have been inspected for asbestos and that 35 percent of those inspected have friable materials containing asbestos. The survey also revealed that 67 percent of the schools have voluntarily taken action to control the asbestos in their buildings.

While 93 percent of the country's schools have been inspected, the survey reports that only 34 percent of the school districts have complied with major requirements of the 1982 Asbestos-In-Schools Rule.

Small Manufacturer Exemption Standards

EPA has issued a final regulation that exempts small chemical manufacturers and importers from most of the reporting and

recordkeeping that is required by Section 8(a) of the Toxic Substances Control Act (TSCA).

The Act requires EPA to exempt small manufacturers, importers, and processors from Section 8(a) regulations except in certain limited statutory cases. Instead of doing this on a case-by-case basis, EPA has established a general set of exemption standards.

Shortened Polymer Review Time

EPA has issued a final rule shortening the time that certain new polymers must undergo agency review for health and environmental risks before production of the substances can begin.

Polymers, which have a wide variety of industrial applications, are the basic molecular ingredients in plastics.

This action, authorized by the Toxic Substances Control Act (TSCA), is expected to result in lower information reporting costs and a shorter preproduction waiting period for private industry, without compromising public health protection.

WATER

Nonpoint Source Task Force

A special task force has presented EPA with a proposed national policy document on nonpoint source water pollution.

The task force, whose chairman is Jack E. Ravan, EPA Assistant Administrator for Water, was created in January 1984 by former EPA Deputy Administrator, Alvin L. Alm.

Nonpoint source pollution is caused by runoff from agriculture, urban areas, construction sites, mining activities, silviculture (forestry), and similar operations.

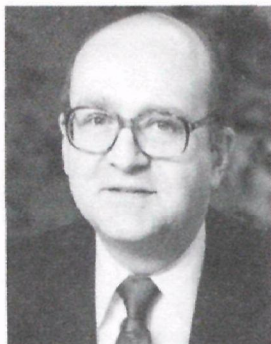
The policy declares that with federal leadership, all levels of government as well as the private sector must cooperate to carry out nonpoint source management programs.

As directed by the Clean Water Act, EPA will serve as lead agency to coordinate interagency and state actions. The policy said that states will lead in developing and carrying out nonpoint source strategies on state and private lands. For other activities, the policy said success would depend on cooperation and efforts by the private sector. □

Appointments at EPA



Lee M. Thomas



A. James Barnes



Jack W. McGraw



Gerald H. Yamada

Senate confirmation hearings for **Lee M. Thomas**, Administrator Designate of EPA, were scheduled for February 6. President Reagan named Thomas Administrator Designate in late November.

Also appointed in acting status were **A. James Barnes** as Acting Deputy Administrator of EPA, **Jack W. McGraw** as Acting Assistant Administrator for the Office of Solid Waste and Emergency Response, and **Gerald H. Yamada** as Acting General Counsel.

Barnes has served as EPA's General Counsel since 1983. Before he joined EPA, he was General Counsel for the U.S. Department of Agriculture from 1981 to 1983. Between 1975 and 1981, Barnes practiced law in Washington, D.C. He first served with EPA as Assistant to the Administrator from 1970 to 1973.

McGraw has served as EPA's Deputy Assistant Administrator for Solid Waste since July 1983. Before he joined EPA, he served as the Deputy Director for Emergency Operations and Assistant Associate Director for Response Planning Coordination at the Federal Emergency Management Agency (FEMA).

Yamada, who has served as EPA's Deputy General Counsel for the past year, joined EPA in 1977. Between 1974 and 1977, he was an attorney with the U.S. Department of Justice.

John Quarles will head the newly created Ground Water Research Review Committee of EPA's Science Advisory Board. Quarles is a partner in the law offices of Morgan Lewis & Bockius, where his practice is primarily in the field of environmental law.

Quarles has played a prominent role in the development of EPA. He joined the agency when it was created in December 1970 as EPA's first Assistant Administrator for Enforcement and General Counsel. He served as the agency's chief legal officer for nearly two and a half years. In April 1973, Quarles was appointed Deputy Administrator of EPA. He held that position until March 1977.

For the past five years, Quarles has served as Chairman of NEDA/CAAP, a



John Quarles



Glenn L. Unterberger



Thomas A. Speicher

business-labor coalition seeking amendments to the Clean Air Act.

From 1962 to 1969, Quarles was engaged in the practice of general corporate law in Boston, Massachusetts. In 1969-1970 he served as chief staff assistant to the Secretary of the Interior.

Quarles received his college education at Yale University, where he graduated Phi Beta Kappa in 1957. In 1961 he graduated magna cum laude from Harvard Law School.

Glenn L. Unterberger has been appointed Associate Enforcement Counsel for Water in EPA's Office of Enforcement and Compliance Monitoring. This position, which Unterberger has held on an acting basis since June 1984, gives him responsibility for overseeing EPA's national enforcement judicial litigation program under the Clean Water Act and the Safe Drinking Water Act.

Unterberger joined EPA in September 1977, shortly after he received his J.D. from the Georgetown Law Center. He served two years as a staff attorney-advisor in EPA's Mobile Source Enforcement Division before his 1979 appointment to be Chief of the Division's Waivers Section. Unterberger held that position until 1981. In 1981 he also served for six months as Chief of a Special Task Force responsible for proposing and evaluating alternative strategies for enforcing federal automobile pollution control requirements.

In November, 1981 Unterberger became a branch chief in EPA's Office of Legal

and Enforcement Policy. He held that position until February 1983 when he became Director of the Office of Legal and Enforcement Policy. Unterberger served in that position until June 1984.

Unterberger completed his undergraduate education at the University of Pennsylvania, where he received his B.A. in Physics in 1974.

Thomas A. Speicher has been appointed Regional Counsel of EPA's Region 8 office in Denver. As Regional Counsel, Speicher will be responsible for legal enforcement matters as well as legal and policy advice to the Regional Administrator and other senior managers. He has held that position on an acting basis since November 1983.

Speicher joined the Region 8 Office of General Counsel in October 1978 as a general attorney. In 1980 he became lead regional attorney for underground injection control programs. In November 1982 Speicher was appointed Deputy Regional Counsel.

From 1971 to 1978 Speicher worked as an attorney-advisor for environmental law problems at the U.S. Army Materiel Command in Alexandria, Va.

Speicher became a member of the Maryland Bar in 1970, shortly after he received his J.D. from the University of Maryland School of Law in Baltimore, Md. Between 1970 and 1971, he completed an LL.M. at the Southern Methodist University School of Law in Dallas, Tex. Speicher did his undergraduate studies at the University of Maryland in College Park, where he received his B.A. in 1967.



James P. Blair, ©

A lumberman cuts down a tree in a tropical rain forest in Papua, New Guinea. Logging operations threaten to diminish the biological diversity that flourishes in the tropics. (See story on p. 18.)

Back cover: Chinese-style canopies add a decorative touch to a wastewater treatment facility at the Nanjing Oil Refinery in China. Treated water from this facility is discharged into the lower Yangtze River (see related story on p. 14). Photo by Gary Waxmonsky, EPA.



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