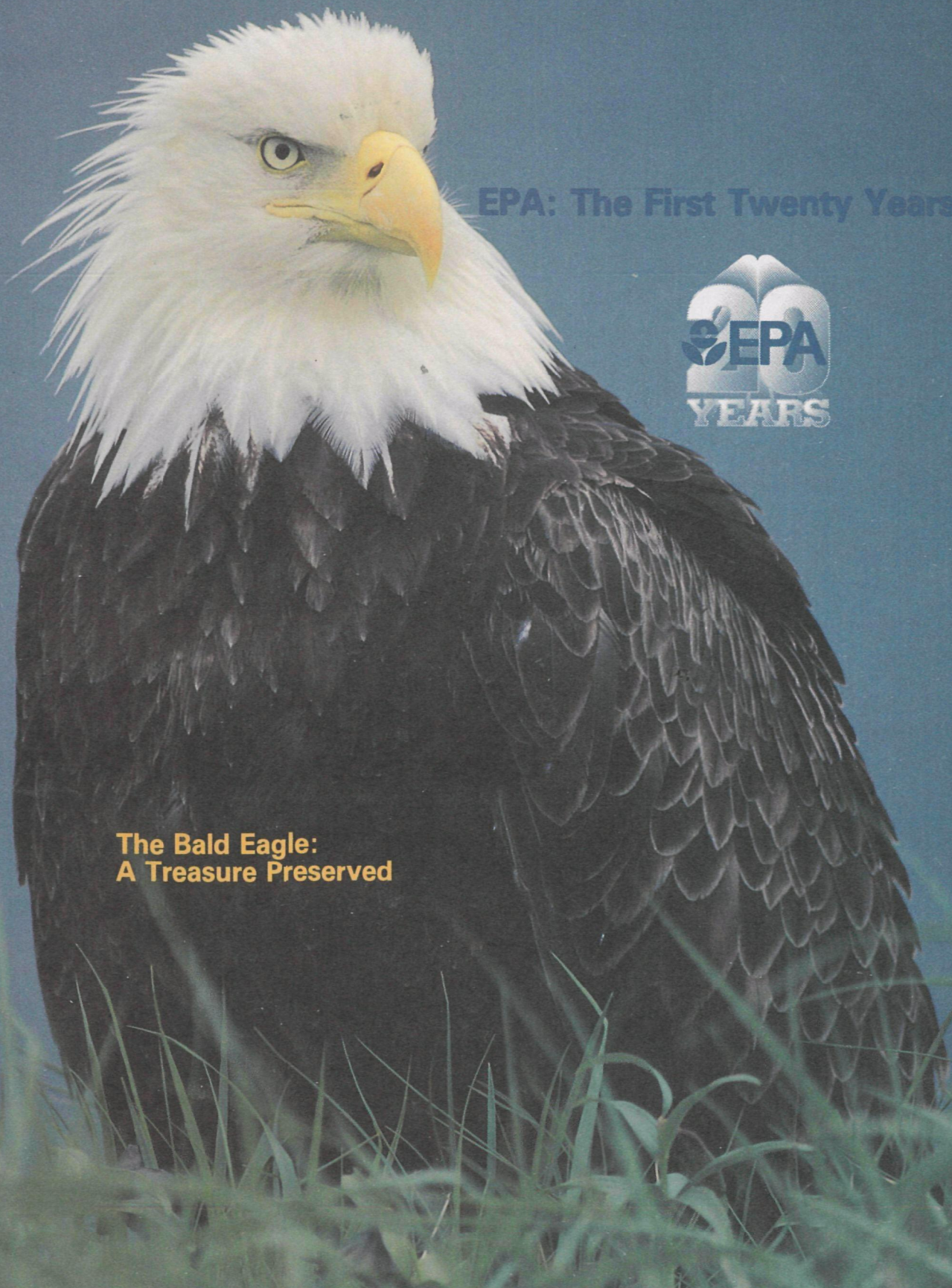


EPA JOURNAL



EPA: The First Twenty Years



**The Bald Eagle:
A Treasure Preserved**

EPA: The First Twenty Years

On December 2, 1970, EPA came into existence, created by an executive reorganization plan signed by President Richard Nixon. This issue of *EPA Journal* notes the Agency's 20th birthday with features reminiscing about the past, reviewing the present, and addressing the challenge of the future.

President George Bush, the first chief executive personally to visit EPA, introduces the issue with an article and a happy-birthday wish. Next is an interview with William K. Reilly, the Agency's sixth Administrator, exploring his vision for EPA as it positions itself for the next decade and beyond.

Then F. Henry Habicht, Deputy Administrator, offers strategies for reaching EPA's emerging new goals. Next, a former Agency official and long-time observer, Alvin L. Alm, explains the nature of the Agency as first conceived and how it actually is today.

A 14-page special section follows, reporting on the progress and delineating the challenges in major aspects of EPA's mission: protection of air, water, and land, and regulation of chemicals. This section, which also summarizes the dollar costs and benefits of EPA programs, is adapted from two new EPA reports, *Meeting the Environmental Challenge* and *The Cost of a Clean Environment*.

Then, in a format borrowed from *Harper's* magazine, some telling facts about EPA and the environment are presented.

Five articles follow, each looking at some key aspect of the modern environmental situation from a new perspective--through a new "looking glass":

- Frederic Krupp, Executive Director of the Environmental Defense Fund, finds growing areas of consensus on the environmental front.

- U.S. Senator Quentin Burdick (D-North Dakota), Chairman of the Environment and Public Works Committee, explains the fresh start that is under way for environmental education.

- Douglas P. Wheeler, Vice President of World Wildlife Fund and The Conservation Foundation, and writer Douglass Lea describe the resurgence of interest in ecology--in respecting nature for its own sake.

- Howard Gruenspecht, Senior Staff Economist with the President's Council of

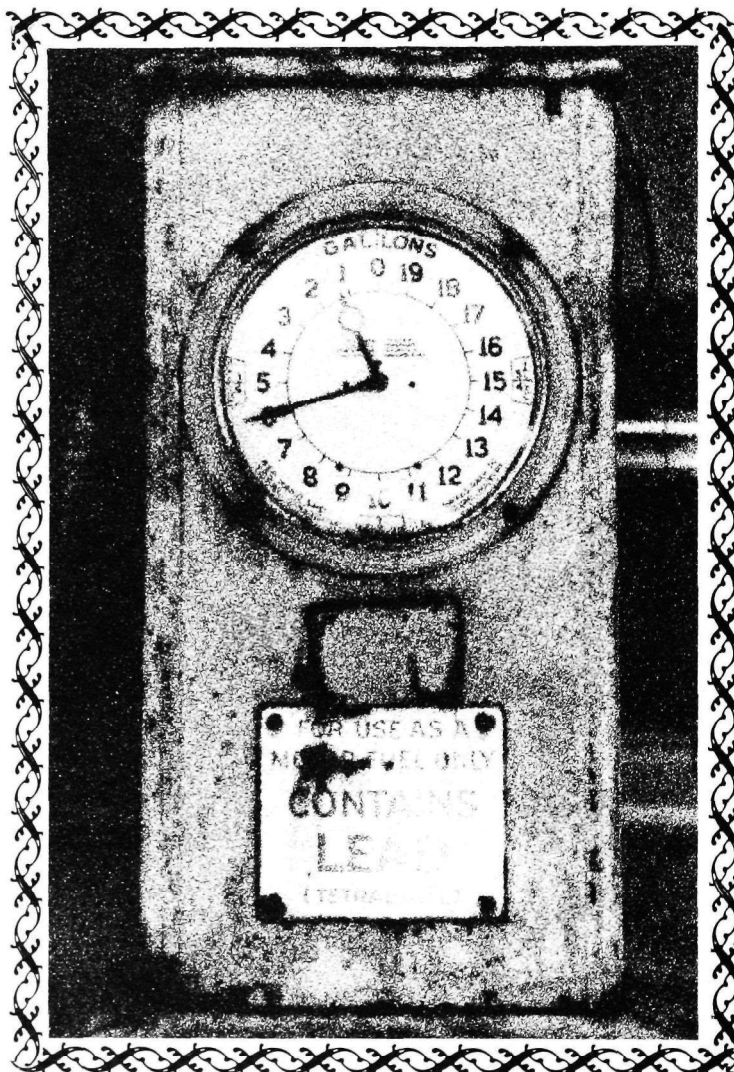
Economic Advisers, explains an emerging new relationship between economic policy and environmental concerns.

- Erich Bretthauer, the Agency's Assistant Administrator for Research and Development, discusses the goal of a strong science, out front, helping establish the agenda for environmental protection.

The next segment of this *Journal* issue includes several features in which outside observers comment. Included are a forum in which five U.S. Senators and Congressmen offer their views on the major challenge a Cabinet-level EPA would face; a feature in which eight environmental journalists from around the country comment from their daily perspective on EPA's relations with the public; and articles by three outside leaders, each answering the question: What do you expect of EPA? The writers are Chris Gregoire, Director of Washington state's Department of Ecology; Michael McCloskey, Chairman of the Sierra Club; and Frank Popoff, President and Chief Executive Officer of The Dow Chemical Company.

Then writer Phyllis Myers reviews EPA's first 20 years, based on extensive interviews with past and present EPA'ers. And 18 of today's EPA employees tell staff writer Roy Popkin what working for the Agency means to them.

The issue concludes with a regular feature, *Appointments*. □



A leaded gasoline pump, reminder of an era ended by EPA action on behalf of public health. Twenty years ago, over 200 billion grams of lead per year were used in U.S. gasoline. Today the amount is less than one-half billion grams per year. This picture by Vera A. Ashworth was among the top three winners of the EPA employee photo contest recently sponsored by the Agency's 20th Anniversary Office.

What Some Of Our Readers Are Saying...

"EPA Journal is a respected source on all sorts of environmental and ecological issues, and very widely read in the firm..."

"EPA Journal is an information-packed overview of environmental affairs that we have found quite useful in our department. I make sure to circulate it among the various faculty members in case they need answers about EPA policies and programs. I wouldn't change a thing; it's a very good magazine as is."

"The ***Journal*** is an informative and interesting round-up, and above all nontechnical, which means it's a fast read..."

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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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A New Era of Environmental Stewardship

by President George Bush 2

A Vision for EPA's Future:
An Interview with
William K. Reilly 4

Strategies for Meeting Our Goals
by F. Henry Habicht 8

A Dream that Hasn't Come True
by Al Alm 12

Progress and Challenges:
Looking at EPA Today 15

Facts to Reflect On
by Ross Ettlin 29

Changing Perspectives:

-Win/Win on the Environmental Front
by Frederic Krupp 30

-Starting Fresh with Environmental Education
by Quentin Burdick 32

-Rediscovering Ecology
by Douglas P. Wheeler
and Douglass Lea 34

-Forging New Links with Economic Policy
by Howard K. Gruenspecht 36

-Environmental Science:
Helping Shape EPA's Agenda
by Erich W. Bretthauer 39

Reflections on the Role of a Cabinet-Level EPA 42

The Agency and the Public:
Journalists Comment 46

What Do You Expect of EPA?

-A State Official
by Chris Gregoire 50

-An Environmentalist
by Michael McCloskey 52

-An Industrialist
by Frank Popoff 55

The Road We've Travelled
by Phyllis Myers 57

What Does EPA Mean to You?
Employees Comment
by Roy Popkin 61

Appointments 64

Front Cover: A bald eagle, cherished American symbol. The species was rescued from the brink of extinction by EPA's ban against DDT in 1972. See article on page 57. Photo by Johnny Johnson for AllStock, Inc.

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A New Era of Environmental Stewardship

by President George Bush

On New Year's Day 1970, President Nixon launched the "Year of the Environment" by signing into law the National Environmental Policy Act. This pioneering law reflected the growing determination of the American people to protect and preserve our nation's environment. In the spring and summer of that year, while Americans observed the first Earth Day and organized to fight pollution, government officials set out to fashion a new Environmental Protection Agency by stitching together bits and pieces of federal agencies from all over the government. EPA opened for business in December, two months after Congress passed a ground-breaking Clean Air Act. Ever since, EPA has been at the forefront of our country's significant environmental accomplishments.

Now, 20 years later, it's common to hear people refer to the 1990s as the "Decade of the Environment." Concern for environmental protection and stewardship has grown, solidified, and deepened over the last two decades. It is in keeping with this continued commitment of the American people to a clean, healthy environment that I've made the vigorous enforcement and strengthening of our nation's environmental laws one of my Administration's top domestic priorities. And it is in keeping with this continued commitment that I have recommended that EPA be elevated to Cabinet status.

EPA has come a long way and accomplished a great deal in 20 years. The issues that dominated the early years of the Agency were fairly obvious and straightforward: DDT and the bald eagle, flames on the Cuyahoga River in Ohio, pollution so thick you could almost touch it in Pittsburgh and Los Angeles. Today's issues are much more subtle, more complex, and harder to deal with. Toxic chemicals show up in food and water, but often in doses so small only experts can detect

them. Just how dangerous are these "trace" amounts? No one knows for sure. Yet the health of the public and the environment must be protected, and this must be done without unnecessarily hampering the nation's economic growth.

So it is clear that EPA has its work cut out for it in the 1990s. And I am very pleased that under Bill Reilly's leadership, EPA has been developing a variety of creative and innovative new approaches to environmental protection that will enable us to build on the environmental progress the nation made in the 1970s and 1980s.

Congress has just passed, for example, my proposed strengthening of the Clean Air Act. Our goals are to protect the American people from urban smog and toxic air pollution and to protect vulnerable ecosystems from the adverse effects of acid rain. Many of these clean air proposals are based on new, market-based concepts—such as emissions trading in our plan to curb acid rain—that will substantially reduce the cost and increase the flexibility of pollution controls and thus will make a greater amount of environmental protection possible in the long run.

The Clean Air Act is just the most visible element of the environmental agenda we've set out. We have stepped up Superfund enforcement; expanded our national parks, forests, and wildlife refuges; funded a much more aggressive effort to clean up pollution at federal facilities; agreed to a complete phaseout of CFCs; and proposed a healthy increase for EPA's operating budget—the heart and soul of the Agency.

As we turn to the future, an important thrust must be pollution prevention. Preventing pollution is everybody's job, from the biggest industrial complex to families and individuals. Environmental programs that focus on the end of the pipe or the top of the stack, on cleaning up after the damage is done, are no longer adequate. We need new policies, technologies, and

processes that prevent or minimize pollution—that stop it from being created in the first place.

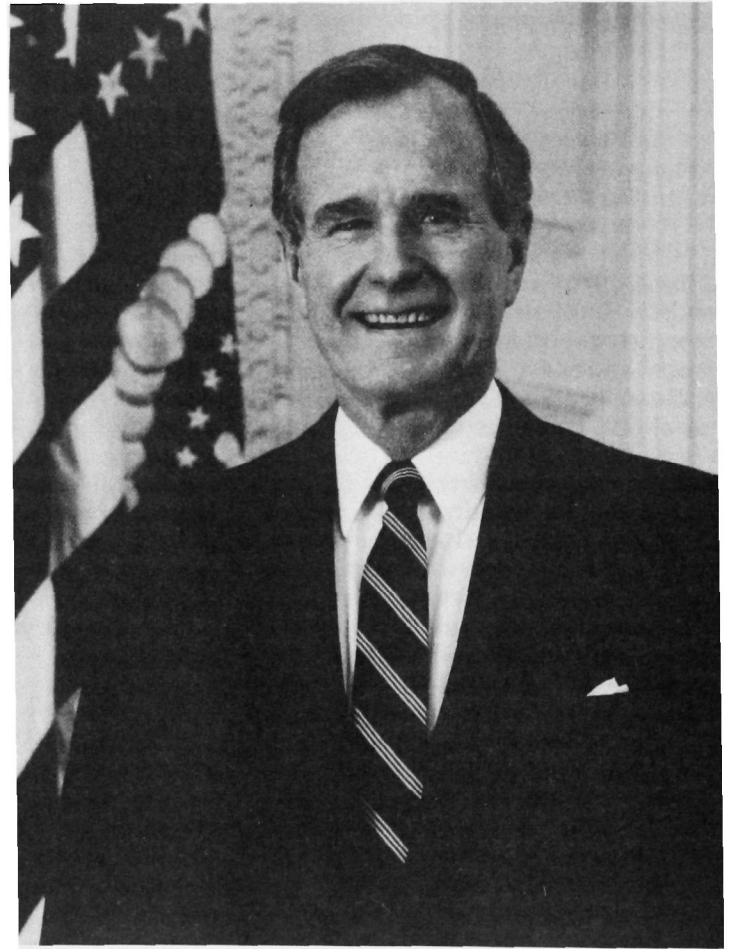
To do this, everyone must pitch in. Business leaders, workers, environmental groups, consumers: Everyone needs to work together as partners instead of adversaries. Governments at all levels have a role to play, and at the family level, we all can learn to shop more carefully, to waste less, and to recycle more.

Another step every American can take to help protect the environment is to plant a tree—plant lots of trees! Our "America the Beautiful" initiative calls for planting one billion trees a year for the next 10 to 15 years. Not only will planting trees help beautify America, it will improve air and soil quality, provide wildlife habitat, and aid in shading our homes, offices, and public buildings.

In 1908, President Theodore Roosevelt called the nation's governors together to discuss, for the first time as a group, the conservation and development—the wise use—of the nation's threatened natural resources. "One distinguishing characteristic of really civilized men is foresight," President Roosevelt told the governors. "We should exercise foresight in conserving and wisely using the property which contains the assurance of well-being for [us and our] children."

I find it encouraging that so many people today are starting to recognize the wisdom of Teddy Roosevelt's advice, to acknowledge that economic well-being and environmental prudence go hand in hand. In a modern industrial society like ours, we can't have one without the other.

I hope that 20 or 30 years from now, we'll be able to look back on EPA's 20th birthday and conclude that it was around 1990 when the Agency, and the country, began to chart a new course: when we began to exercise foresight in a



truly meaningful way. The 1990s must be the decade when we focus our attention on finding the most cost-effective, most efficient ways to prevent pollution, to reduce risks to human health and the environment, and to achieve environmentally sound, sustainable economic growth.

It can be a new era of environmental stewardship, creating a safer, cleaner, more productive world for ourselves and our children. I know EPA will be there to help bring us into that new era, adding another proud chapter to its already proud history. □

A Vision for EPA's Future: An Interview with William K. Reilly

On this occasion of EPA's 20th anniversary, EPA Journal asked Administrator Reilly for his assessment of the challenges facing EPA and about his goals and vision for the Agency. The questions and Mr. Reilly's answers follow:

If you had to say what the most crucial environmental issues facing the world in the 1990s are, what would they be?

I think the most serious and potentially most destructive environmental problems have to do with planetary systems and the possibility of their destabilization. The depletion of stratospheric ozone is certainly high on this list.

The loss of forests, particularly in the tropics—and more broadly, the degradation of biological systems and their productivity—is also very important. Forest losses in the tropics are proceeding so fast that within the next 10 to 15 years, the number of mature forest systems will be very significantly impaired. Some will be virtually gone at the present rates of loss.

That loss will diminish the species on the planet very significantly. It will alter the rainfall and local climate for a number of developing countries. It may well exacerbate the climatic problems throughout the world.

Poverty and the stresses that very poor people place on the environment are also critical. In so many large cities, we see accumulations of toxics in the air, in the ground water, and in the soils that are very difficult to address. It takes resources to improve the environment. Unless poor countries can generate wealth and growth, they're unlikely to be able to devote any resources to the environment.

Those, I think, are the most significant problems. In addition, there are places in Eastern Europe where people are dying prematurely due to environmental problems. Rivers in some cases are almost half chemicals. Pesticide residues on food are grossly excessive. Vast areas are contaminated with cadmium and other heavy metals. Water supplies are shrinking as river water cannot be purified for drinking. In many cases, it cannot even be used to cool machinery.

More fundamentally, the problem in our own country, as well as in many



Steve Delaney photo. EPA.

countries that are more grossly affected by environmental contamination, is to develop systems of economic growth and activity that ensure sustainability. We have not yet done that even here.

There are many systems that are continuing to deteriorate in the United States. With all of the efforts we've made in the Chesapeake Bay, we still see a steady loss and project a continuing loss of oxygen. Fish still accumulate toxins in the Great Lakes. On the other hand, there are fish in the Great Lakes. That's a great achievement over the past 20 years, but it's an incomplete one.

Our next question focuses on EPA and EPA's mission. It is sometimes said that EPA has taken care of the most obvious environmental problems. Now, the Agency faces tougher challenges, needing basic new approaches. Do you agree?

I think the accomplishments of EPA over the past 20 years have been extraordinary. I believe there is no more significant success story in the realm of public policy during this period.

Consider all of the other commitments society made during that time—whether

to eliminate poverty or provide adequate housing, or to control crime or eliminate illegal drugs. We have made more progress on the environment than in all of those other areas.

Nevertheless, we still have persistent environmental problems involving soil run-off containing pesticides and nutrients from farms and other lands and cities. We have a continuing air-pollution problem that leaves half our population breathing unhealthy air. We have a rate of wetlands loss that is really shocking in view of our understanding of wetland functions and the long-time commitment on the part of the federal government and the states to wetlands protection. There are contaminated wells from one coast to the other. And this problem appears to be becoming more serious.

Many of these problems are the result of diffuse, difficult-to-control sources of pollution. They are not obvious or visible or corrected by simple enforcement actions against a spewing smokestack or a recalcitrant industry. They really involve all of us. And what they involve most fundamentally, I think, is a pattern of use of resources and resulting waste that is out of control. We waste far more than many other successful, competitive modern industrialized countries do. And that waste is bedeviling us in all media: air, water, and land.

Addressing problems of this sort is going to mean a change in attitude, a somewhat different ethic with respect to resource use and disposal—and a much more individual commitment. To attain that, EPA has to speak to the public with a clearer voice, and we have to be more successful at winning their adherence for changes in behavior.

That's a somewhat different mission than the Agency began with. But it's necessary, I think, to address the remaining problems we have.



National Park Service photo.

EPA's mission--protecting the environment and public health--is inspired by a concerned nation and carried out, in the words of the Administrator, by "a young, aggressive, and vigorous agency." Pictured is a feature of the natural world, snow-capped mountains in California.

Q What is your primary goal for the Agency as it positions itself to deal with the kind of problems that you are talking about--contemporary environmental problems?

A My principal goal is to ensure that EPA organizes its own agenda and communicates to the society a message based on careful science and systematic assessment of the seriousness of problems. I want us to pay attention to the things that matter. I want us to be clear about the threats to health. I want us to avoid being transported by popular enthusiasms, as Senator Moynihan warned on my first meeting with him, and to base our work consistently on good, sound science.

We need the coherence and integrity that scientific research can provide us. And we need scientific information to defend what will often be difficult, controversial, or expensive decisions. I look to science and to risk assessment to help the Agency put together a much more coherent agenda than has characterized the past 20 years, given the accumulation of separate statutes EPA has received.

I see all of this as a means of reducing the risk to health and the destruction of ecology that continue even into the 1990s.

Q You've already touched on the theme of pollution prevention as a strategy for the future. Could you talk a little bit more about that?

A EPA has been very effective, I think, at developing standards and promulgating regulations and enforcing the law. We have been less successful at causing people to ask questions, before they become polluters, about the possibilities for avoiding pollution in the first place.

As we look to the future, especially in areas where much progress has been made against a problem, making a further dent is going to require certain fundamental changes. For a lot of people, it's going to mean asking different kinds of questions. How will a product be used? How will it be manufactured? What kinds of byproducts will be created in its manufacture? And how will it be disposed of? Is it possible to create an alternative product which entails significantly fewer environmental problems--a product which can be recycled, which is biodegradable, which minimizes or prevents altogether the resulting assaults on the environment?

That's a subtle problem. People will not change their habits without incentives to do so. We're going to have

to become more adept at communicating, at providing information and education, and at leading by constant exhortation. We must also become more expert at interrelating environmental proposals with economic incentives and finding ways to use incentives and taxes of one sort or another to deter the creation of products that have a high cost in terms of environmental impact and funds that will have to be invested in cleanup later on.

I think people at EPA have learned these principles through experience, but we have not yet fully applied them. The lesson of pollution prevention is one that will ultimately make sense both economically and environmentally, but it's not widely understood as I speak.

Q You have spelled out a pretty daunting list of problems and strategies. Yet historically, the Agency's budget has been relatively level. How are you going to realize your vision for EPA in view of that reality?

A Well, we have begun to bring the operating budget up in the last couple of years. But it is certainly correct that we do not ourselves have the resources

sufficient to solve all of the nation's environmental problems.

We are, however, the cockpit of great influence on the expenditure of much larger sums of money. The percentage of money spent on the environment that actually goes to EPA is less than 10 percent. That's less than 10 percent of the funds being expended by the society generally—by federal, state, and local governments and by private industry and individuals.

EPA influences and often determines the expenditure of the other 90-plus percent of funds. There is a steeply rising curve of expenditure on the environment in this country, and by the time this issue of *EPA Journal* comes out, we will have issued a report entitled *The Cost of a Clean Environment* (see writeup on page 28). As this report shows, the United States is committing more money, as a percentage of gross national product, to environmental protection than many of our economic competitors.

I think the kinds of tools that we have and the increasing personnel resources that we now deploy—almost 2,000 more than a couple of years ago—give us not really adequate staff support, but an encouraging level of support that will allow us to carry out our mission.

Q In your testimony at your confirmation hearing in Congress, you said enforcement is the key to an effective EPA. How are we doing in that respect?

A Enforcement is one of those activities where if you are vigorous and are seen to be so, you will gain a great leverage, a great boost in productivity in all of your programs. It will be less necessary to police a system that gets the message that it had better self-police.

I am very pleased with the enforcement record in my time here. The measures we have are either record highs or second-bests ever. We have been working well with the Justice Department. Some milestone cases in the last couple of years have significantly strengthened our hand for future enforcement actions.

One example worth citing is the record number of Superfund settlements concerning potentially responsible parties. I think this record suggests that lawyers are now giving clients a different kind of advice. The Agency obviously is serious. It's going to go after potentially responsible parties. Before that happens, they would do well to come forward and

acknowledge their responsibilities. That's the kind of message I hope will become broadly understood in other areas as well.

EPA has also begun to use enforcement in a more creative way. We have entered into settlements that require pollution-prevention commitments from companies that sometimes go quite beyond the immediate circumstances of enforcement. That is a less well-understood possibility, but one that I think Jim Strock (EPA's Assistant Administrator for Enforcement) and I very much believe in. It's possible to break new ground in crafting settlements with companies that set the companies on a new course.

Q EPA has evolved as primarily a public health agency. Do you favor an increased emphasis on ecological concerns?

A I think EPA was conceived as an organization that would pay significant attention to ecology, meaning that a high proportion of its attention and resources would go to ecological stabilization and protection. Obviously we have enormously significant public-health responsibilities reflected in the statutes we administer.

I would like to reestablish the priority that I think belongs to national resources. Fundamentally, we all depend on sound, healthy, natural systems. All human activity—all economic activity—depends upon them.

One sees from the experience of Eastern Europe today what happens when that's forgotten. You cannot manage a successful economy for very long if you allow your ground water to become contaminated, your soils to accumulate heavy metals, your rivers to run with chemicals, and so forth. These affect public health, but they also affect the lasting capacity of nature to sustain life in all of its diversity and richness.

Ecology and ecological systems also function to warn us about the consequences of the way we're living. The fact that we see a high accumulation of toxic substances in fish in many of our surface waters, and particularly in the Great Lakes, should make clear to us the size of the clean-up job still to be done. The Great Lakes is not a healthy system. It will ultimately be unsustainable if it remains so contaminated, and we've got to clean it up. The loss of basic resources like wetlands will translate, I think, into many other consequences that we probably half understand.

Q If you look 20 years into the future, what do you think EPA might be like? What's the chief difference you'd like to see? Will environmental quality be better?

A First of all, I would hope that EPA would be understood as an agency with sufficient scientific capacity, consistency, and integrity that it is not subject to transitory seizures of public opinion. I would hope that our mission is broadly embraced by the society and that we are seen as having the key role in reconciling industrial and economic activity with nature and environmental protection.

Looking outside the Agency, I would expect the air in our cities to be significantly cleaner. The promise of the Clean Air Act is very great. We have identified the goals and we've settled on the means that will, in fact, move us toward that objective. So that's not merely wishful thinking. Each generation will have to revisit the clean air issue as there are more cars and factories and other sources, but the new emphasis on clean fuels and economic incentives will serve us well as future priorities are decided.

I would hope that we can be equally successful in other areas of the environment and public policy and bring back the Chesapeake Bay and Long Island Sound, the Great Lakes, and other great water bodies to a level of health and productivity that they have not yet achieved in recent years.

Internationally, I would hope that we will have found a means to help many of the most impoverished countries and areas with the most degraded environments to stabilize their environments, protect public health, and do for their countries what we have done and are doing for our own. In my experience, the stature of EPA seems to rise with distance from Washington, DC. Our standards, our epidemiological resources, our information, and our example are esteemed and emulated the world over.

To an extraordinary degree, the world looks to EPA to chart the course of environmental protection. What we do here is watched closely and borrowed almost immediately. That's a high responsibility and one that, with our increasing international capacities, I think we are better equipped to carry. We are

Many of the nation's rivers were once foamy from detergents. Widespread state and local action with EPA assistance has dramatically reduced this problem. Less visible problems now remain.

going to be saving lives and restoring ecological systems on a large scale outside the country as well as in this nation in the next 20 years. The simple fact is there's no one else; there's no other agency capable of playing that role.

I do believe that environmental quality in our own country will be better, perhaps significantly so. I'm reasonably confident that in some of the new pre-market economies of Eastern Europe and Southeast Asia, the next two decades will see better environmental stewardship.

As the Latin American countries begin to cope with their debt and—thanks to President Bush's "Enterprise for the Americas" initiative—to apply some of that debt to natural resource and environmental protection, they also should be able to bring down the grotesque levels of air pollution affecting many of their citizens and get a grip on toxic substances.

Whether they will succeed in managing their forests is a larger question and a more daunting problem. The President's commitment to an agreement on world forestry reflects our sense of urgency about that problem that will cause us to give it a very high priority. But the

reasons for forest losses are so fundamentally connected to patterns of land tenure and settlement and poverty that it's going to take a great deal of imagination, and a fair amount of money, to solve the deforestation problem.

On a more positive note, the world should have ceased production of ozone-depleting chemicals within the next 20 years, the developing world having fully phased them out by then. And within the not-too-distant future thereafter, we should begin to see a decrease in the ultraviolet radiation reaching the Earth as a consequence of ozone depletion.

Ultimately, I think the prospects for environmental improvement both in the United States and throughout the world will depend on public expectations and demands. Happily, public consciousness of the environment is higher today than I've ever seen it. That is true even in the developing world. It's true in Mexico, Brazil, and Chile, and it's certainly true in Eastern and Western Europe, the United States, Australia, and Canada.

In a fundamental way, public consciousness is something we have to rely upon and also inform. The relationship is reciprocal. EPA informs

public expectations, and public expectations drive us to do better. More than anything else, public trust enables us to lead and to be effective.

One last question: Here we are at EPA's 20th anniversary, some 17,000 employees strong. Sometimes environmentalists say that EPA is not doing enough, and sometimes industry says that EPA is doing too much. Do you have particular closing thoughts on how we are doing really?

EPA seems always to sit astride the controversial nexus between concerns about health and anxieties about costs, and between science and economics. We do have our critics, as any agency operating with such power in areas of such importance is going to have. There have always been concerns on the part of the regulated community that we are excessively zealous, insensitive to economics, or sometimes not informed about science or sufficiently attuned to risk. There are also concerns among environmentalists, as you mentioned, that we are sometimes slow to act in the absence of a court suit or a statutory directive.

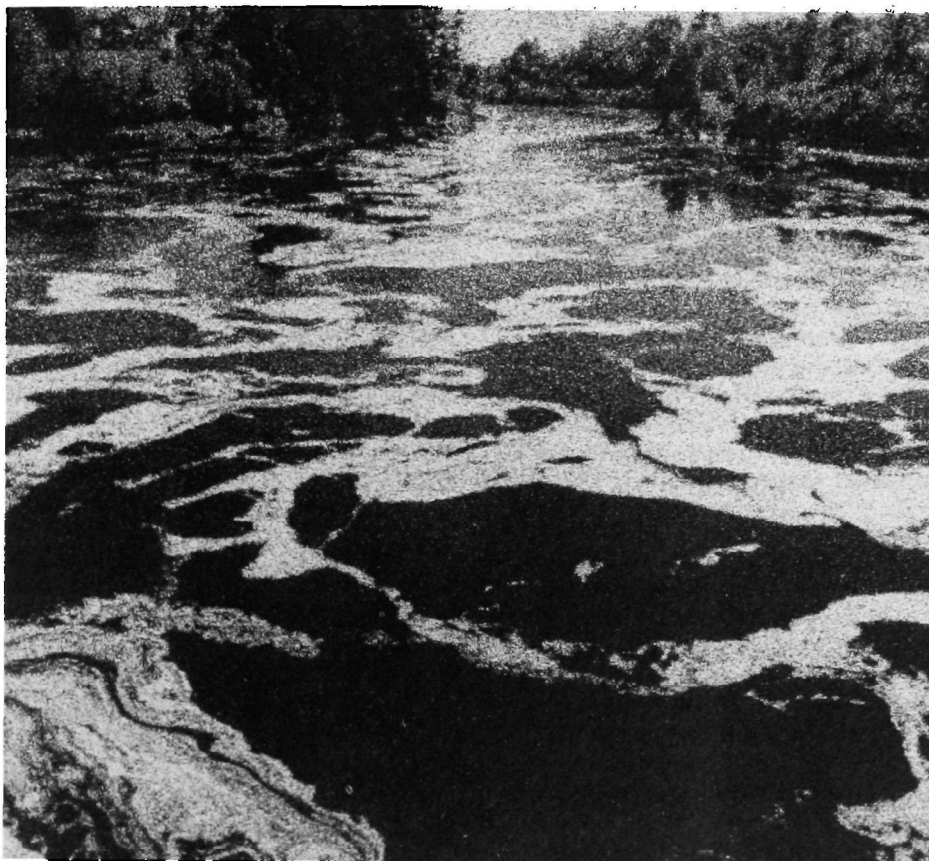
I think the quality of people here at EPA is such that we can maintain the vigor that we have, and certainly with the support we have from President Bush, do a far better job of carrying out our mission.

We can never fully satisfy the various critics of the Agency, but we can win their respect. It seems to me that we are increasingly doing that.

We can also recapture the agenda. One of the distressing aspects of the past several years is the loss of our capacity to shape initiatives and influence the Congressional agenda: These are things I believe EPA is qualified to do.

I feel very strongly about winning back the kind of trust from Congress and the country that EPA needs to function effectively. And the best case we can ever make on this point turns on the professional skill, training, integrity, and sheer vigor of our employees. There are some government agencies where you walk through the halls and adrenalin just flows out your shoes onto the floor. EPA is not one of those agencies: This is still a young, aggressive, and vigorous agency.

Overall, EPA people have wonderful qualities, and I cannot say enough how proud I am to be leading them at this time. □



EPA photo.

Strategies for Meeting Our Goals

by F. Henry Habicht

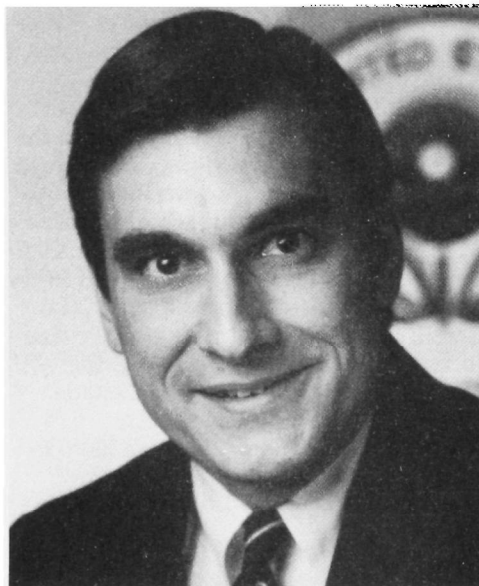
Some of the best environmental actions may be outside EPA's direct jurisdiction. Example: As a travel alternative, the Washington, DC, metropolitan area's recently constructed subway system is kinder to the environment than heavy commuter traffic.

As EPA celebrates its 20th birthday this December, those two decades may seem like a lifetime to EPA employees who have spent their entire professional careers here. Yet EPA still is a very young agency, especially compared to federal agencies like the Department of the Treasury, which measures its lifespan in centuries.

Despite its relative youth, EPA has accomplished a great deal. From a few thousand people linked together by a Presidential Reorganization Plan in 1970, we have grown to an agency of more than 17,000 people working at headquarters, 10 regional offices, and several laboratories. As our numbers have grown, so have our responsibilities: We now implement and enforce a dozen major environmental laws and nearly 100 additional ones, all enacted since 1970.

Without doubt, in its 20 years of existence EPA has played a major role in causing substantial changes in the world around us. Because of EPA's efforts to implement national laws, air emissions from cars, power plants, and large industrial facilities have been curtailed sharply; hundreds of primary and secondary wastewater-treatment facilities have been constructed; ocean-dumping of wastes has been virtually eliminated; land disposal of untreated hazardous wastes has largely stopped; hundreds of hazardous waste sites have been identified and 52 have been cleaned up; and the production and use of substances like asbestos, DDT, PCBs, and leaded gasoline have been banned. In the aggregate, actions like these have had a measurable, positive effect on environmental quality in this country, and they have set an example for other countries around the world.

Everyone at EPA should be proud of the difference the Agency has made over the last 20 years. Attacking pollution with mandated, media-specific controls—



EPA photo.

usually at the end of the pipe—has been EPA's main operating paradigm since 1970, and this approach indeed has improved the quality of the environment.

Right now, however, EPA is looking ahead 20 years to ensure that we are prepared to sustain environmental quality in the face of rapidly changing economics, demographics, and technology. We should not simply abandon our traditional tools, but in the future we must look beyond command-and-control; we must end compartmentalization at EPA, take a more systematic view of environmental risks, and develop more targeted strategies to reduce them.

In short, the Agency and the country manifestly need a new paradigm, one that goes beyond the end of the pipe, beyond any type of control or remediation technology, beyond EPA itself. This new paradigm already is beginning to emerge, and it promises to have a profound impact on EPA as the Agency embarks on its third decade.

The Science Advisory Board Report

EPA's Science Advisory Board recently produced a report that suggests some of

the ways that EPA should evolve in the years ahead. Although the report was not written as a part of EPA's birthday activities, its timing was fortunate. For after looking at EPA's past approaches to environmental protection in the context of existing and emerging risks to human health, welfare, and the ecology, the SAB made several findings and recommendations that suggest what EPA could look like in the decades ahead.

In late September, the SAB presented EPA Administrator William Reilly with *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*. That report reviewed EPA's groundbreaking study, *Unfinished Business: A Comparative Assessment of Environmental Problems* (1987), in light of the latest scientific information and then recommended ways for the Agency to improve its ability to assess, compare, and reduce environmental risks.

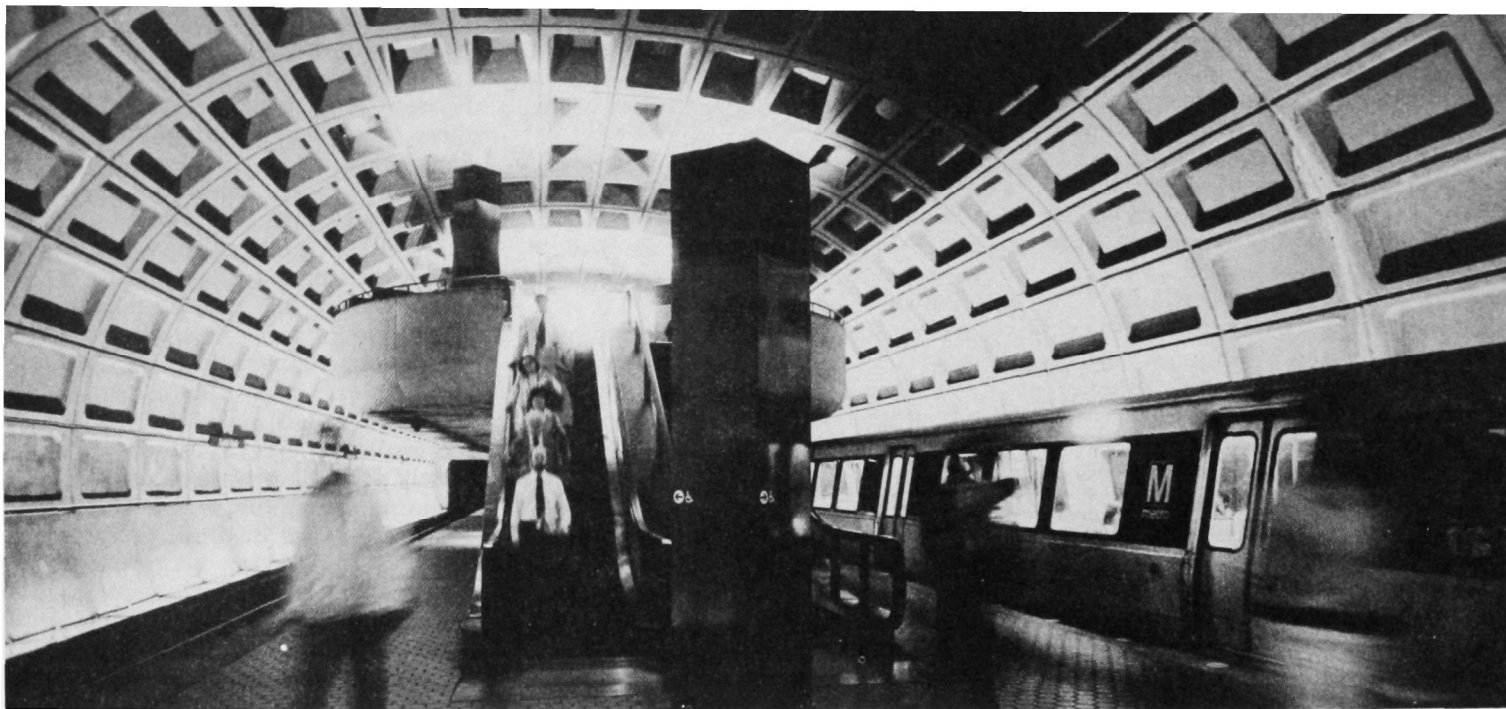
Reducing Risk made 10 specific recommendations (see box) that can be summarized in two simple points. First, EPA must *target* its environmental protection efforts much more than it has in the past, and, second, EPA must *integrate* its environmental protection efforts much more than it has in the past. I believe that our success at targeting and integrating our efforts over the next few years will shape, to a large extent, the EPA of the 21st century.

Targeting EPA's Efforts

EPA came into existence 20 years ago at a time when the people of the United States felt threatened by several serious, and readily observable, environmental problems. Air quality in many American cities was deteriorating, and the deterioration was all too visible. The flammability of the Cuyahoga River, thick urban smog, fish kills in different stream segments across the country, and piles of rusting drums of chemicals were unambiguous signs that industrial pollution was imposing very high environmental costs.

In response, Congress passed a series of specific laws aimed at specific

(Habicht is Deputy Administrator of EPA.)



Mike Brisson photo.

environmental problems. Each of those laws prescribed clean-up standards, control technologies, regulatory deadlines, or some combination of all three. Each of those laws was intended to reduce the risk posed by the environmental problem in question to an acceptable level.

But the laws were written without consideration of other laws, or other problems. No attempt was made to prioritize actions across the environmental policy spectrum; because all environmental problems were considered equally serious, all environmental regulations were equally urgent. Citing this history, the SAB stated in its report, "at EPA there has been little correlation between the relative resources dedicated to different environmental problems and the relative risks posed by those problems."

At EPA, environmental professionals are finding that this traditional approach, by itself, will not be as successful over the next 20 years as it has been in the past. And the Agency is beginning to put emerging environmental challenges, and the strategies for attacking them, into perspective. For example, the number of environmental problems that EPA is asked to address continues to proliferate. Many of those problems—pesticide residues on food, indoor air pollution, stratospheric ozone depletion—are far less visible than the problems of the 1970s, and their effects are much more difficult to measure. To make matters worse, while new problems multiply, none of the old ones completely go away.

Yet we continue to blast away at all environmental targets separately, as if environmental policy were a kind of "Space Invaders" video game, as Administrator Reilly noted in his speech to the National Press Club last September. In reality, our fiscal ammunition during any given time period is limited. Consequently, in the future we have to do a better job focusing EPA's activities where they will do the most good.

In short, we have to target our efforts on the basis of risk. We have to use the discretion available to us under present law to better inform the public about risks and how those risks interrelate, and to focus agency resources—to the extent we can—on problem areas that, in our best judgment, pose the greatest risks to human health, welfare, and ecology.

This recommendation by the SAB is sometimes interpreted to mean that EPA's different program offices should compete for funding on the basis of the risks they would reduce. This kind of "riskier-than-thou" interpretation reinforces the artificial walls that have grown up between EPA's program offices and belies the more important message. That is, each program office should reevaluate its own *internal* responsibilities and set priorities on the basis of risk. Moreover, in the face of a particularly serious environmental problem—lead, for example—the Agency's different program offices must work together to define the set of cross-program actions, or even external actions, that would reduce the most risk.

In other words, targeting risk within EPA should mean *less* turf consciousness and *more* cross-program and cross-media cooperation. Such team approaches will be key to the new paradigm.

The SAB made one other important "targeting" recommendation: EPA should better assess and target ecological risks than it has in the past. In fact, the SAB recommended that EPA attach as much importance to reducing ecological risk as it does to reducing human health risk.

Concern for ecosystems is a central part of EPA's heritage. By drawing attention to the links between chemical use and declining populations of birds, Rachel Carson's *Silent Spring* helped galvanize public support for strong environmental laws, and for a strong federal environmental agency, in this country. Early environmental laws like the Clean Air Act and the Clean Water Act included important ecological components. Yet, for whatever reasons, ecological concerns have been a secondary preoccupation at EPA for the last decade or more.

The links between ecosystem and human health are many and obvious: the value of wetlands in filtering pollutants out of ground-water aquifers; the potential future medical use of different plants' genetic material; the human health effects of heavy metal accumulation in fish and shellfish. It is clear that healthy ecosystems provide the underpinnings for the long-term health of economies and societies. In addition, as

the SAB report pointed out, "natural ecosystems have an intrinsic, moral value...." Over the next 20 years, EPA must reestablish ecological protection as a vitally important part of its mission.

Integrating EPA's Efforts

During EPA's first 10 years of existence, Congress passed a series of laws intended to control emissions of pollutants into the different environmental media, or—in some cases—to clean up pollutants already in the environment. Because EPA was given the responsibility for implementing those laws, it is not surprising that they tended to shape the way the new agency conducted its business. In particular, they shaped the Agency's evolving organizational structure, its emphasis on command-and-control, end-of-pipe technologies, and its predominant concerns about protecting human health.

As the SAB noted in *Reducing Risk*, that kind of *ad hoc* approach tended to compartmentalize the Agency. Each program office saw its set of environmental responsibilities as most important, its problems as most serious, its regulations as most urgent. There were few linkages among the different program offices, because there were few linkages among the different environmental laws. Because problems in the environment were artificially separated from each other in the law, EPA's programs were artificially separated from each other in organizational structure. EPA's multifarious efforts to protect the environment proceeded on different and often unconnected tracks.

After 20 years of experience, we know now that this compartmentalization of agency activities is inefficient at best, and counterproductive at worst. Water quality in the Great Lakes is affected to a great extent by toxic air pollutants emitted hundreds, if not thousands, of miles away, and by pesticides washed off farms, lawns, and gardens in a huge watershed. Thus cleaning up the Great Lakes is not simply the responsibility of EPA's water-quality experts. It demands the coordinated, integrated efforts of several EPA program offices with complementary responsibilities. In fact, as our past experience in the Great Lakes has shown, real long-term progress demands the integrated efforts of the federal governments of both the United

States and Canada, several provincial and state governments, a host of local governments, and the private sector and concerned citizens on both sides of the border.

The value of this kind of broad policy integration is implicit in several of the recommendations made by the SAB in *Reducing Risk*. For example, the SAB pointed out that we have a range of tools at our disposal for reducing environmental risk. We are not limited to the federally mandated command-and-control regulations that have played so prominent a role in our environmental protection efforts of the past two decades.

The private sector can be given economic incentives to reduce pollutant emissions in the most cost-effective ways, as the new clean air legislation shows. And look at the power of information. Emissions data supplied to local communities, like the information required in the Toxics Release Inventory data base, can give businesses economic and public-relations incentives to cut back on emissions voluntarily. Finding the right mix of tools, regulatory and non-regulatory, and applying them in a coordinated and integrated way is one of the major challenges facing EPA employees in the years ahead.

Some of the best tools for reducing environmental risk may lie outside the Agency itself. The SAB noted that the policies implemented by other federal agencies can have direct—and substantial—effects on environmental quality. National agricultural policy, for example, influences the quality of wetlands and riparian (related to land on edge of natural waters) and ground-water resources. National transportation policy clearly is one of the factors that affect air quality in urban areas. Programs undertaken at the Department of Housing and Urban Development may have a far greater potential for reducing the health risks posed by lead than anything EPA's program offices could do.

In such cases, EPA has a responsibility to work cooperatively with other federal agencies to ensure that the environmental ramifications of their evolving policies are not overlooked. EPA is not the only agency whose actions affect the environment. But EPA is the only agency with an environment-wide perspective, and it thus has an important leadership opportunity in helping fashion federal efforts to reduce environmental risk. Consequently, as we evaluate all the tools that can be used to address a

particular problem, we should reach out to other federal agencies more confidently than we ever have before. Because, more than ever before, I think those other agencies are willing to listen and to help.

The SAB report made several other recommendations that pointed out the value of EPA's integrating its efforts with people outside the Agency. It recommended that EPA do much more to educate the general public and train the professional workforce in ways that will help *them* make choices, and take actions, to reduce risk. The report recommended that EPA work more closely with the private sector to foster pollution prevention, which the SAB believes is by far the most promising approach to reducing environmental risk over the long term. But, at root, all those recommendations make the same simple point: All of us at EPA have to challenge our traditional, narrowly defined notions of programmatic responsibilities and, using all the tools at our disposal, engage all elements of society in the business of reducing environmental risk.

The Future Of EPA

Institutions, like people, have a life cycle. They are born, they grow, they learn from their experience. As Administrator Reilly said in his speech to EPA's Senior Executive Service last September, EPA has passed through its youth and adolescence. It now stands on the threshold of a long and potentially productive maturity.

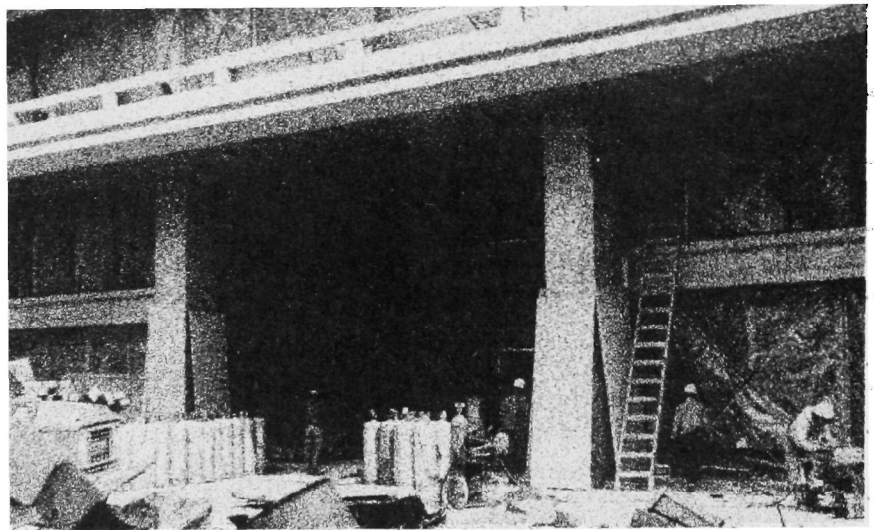
Our collective experience here at EPA has taught us that it is indeed possible for a society to be technologically advanced and economically robust while it takes conscious actions to protect the quality of the environment. In fact, it is increasingly clear that these characteristics go hand in hand. That fact was not universally accepted two decades ago.

But our collective experience has also taught us that there are better ways to achieve our goals than we once believed. Over the next two decades we at EPA need to apply the wisdom of past experience to the challenges of a new decade and a new century.

We have already begun doing that. Indeed, we already have under way several of the steps recommended by the SAB. The vision of a unified EPA team with a shared mission is taking hold. Our emphasis on Total Quality Management, the new strategic planning process, the pollution-prevention program, clustered rules, and

cross-media enforcement efforts: All these demonstrate our commitment to target and to integrate our efforts much more effectively.

But we have to do one thing more: We have to remain receptive to those new ideas that will spring up from tomorrow's experiences, ideas that will make today's wisdom seem old-fashioned and ineffective. People at EPA represent a superb cross-section of expertise, and each one has to find ways to improve continuously the way we do business. If we constantly challenge our own ideas, we will constantly regenerate our spirit.□



The 10 Recommendations*

1. EPA should target its environmental protection efforts on the basis of opportunities for the greatest risk reduction. Since this country already has taken the most obvious actions to address the most obvious environmental problems, EPA needs to set priorities for future actions so the Agency takes advantage of the best opportunities for reducing the most serious remaining risks.

2. EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk. Because productive natural ecosystems are essential to human health and to sustainable, long-term economic growth, and because they are intrinsically valuable in their own right, EPA should be as concerned about protecting ecosystems as it is about protecting human health.

3. EPA should improve the data and analytical methodologies that support the assessment, comparison, and reduction of different environmental risks. Although setting priorities for national environmental protection efforts always will involve subjective judgments and uncertainty, EPA should work continually to improve the scientific data and analytical methodologies that underpin those judgments and help reduce their uncertainty.

4. EPA should reflect risk-based priorities in its strategic planning

processes. The Agency's long-range plans should be driven not so much by past risk-reduction efforts or by existing programmatic structures, but by ongoing assessments of remaining environmental risks, the explicit comparison of those risks, and the analysis of opportunities available for reducing risks.

5. EPA should reflect risk-based priorities in its budget process. Although EPA's budget priorities are determined to a large extent by the different environmental laws that the Agency implements, it should use whatever discretion it has to focus budget resources on those environmental problems that pose the most serious risks.

6. EPA—and the nation as a whole—should make greater use of all the tools available to reduce risk. Although the nation has had substantial success in reducing environmental risks through the use of government-mandated, end-of-pipe controls, the extent and complexity of future risks will necessitate the use of a much broader array of tools, including market incentives and information.

7. EPA should emphasize pollution prevention as the preferred option for reducing risk. By encouraging actions that prevent pollution from being generated in the first place, EPA will help reduce the costs, intermedia transfers of pollution, and residual risks so often associated with end-of-pipe controls.

8. EPA should increase its efforts to integrate environmental considerations into broader aspects of public policy in as fundamental a manner as are economic concerns. Other federal agencies often affect the quality of the environment—e.g., through the implementation of tax, energy, agricultural, and international policy—and EPA should work to ensure that environmental considerations are integrated, where appropriate, into the policy deliberations of such agencies.

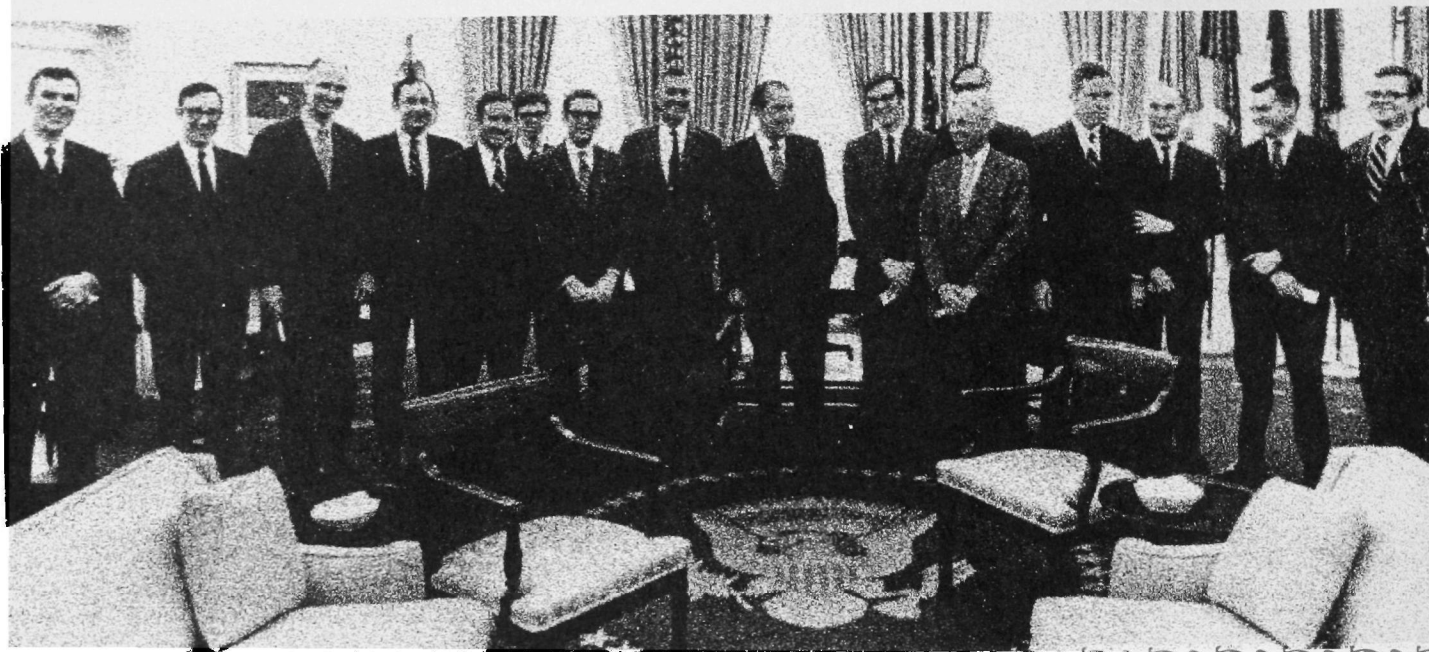
9. EPA should work to improve public understanding of environmental risks and train a professional workforce to help reduce them. The improved environmental literacy of the general public, together with an expanded and better-trained technical workforce, will be essential to the nation's success at reducing environmental risks in the future.

10. EPA should develop improved analytical methods to value natural resources and to account for long-term environmental effects in its economic analyses. Because traditional methods of economic analysis tend to undervalue ecological resources and fail to treat adequately questions of intergenerational equity, EPA should develop and implement innovative approaches to economic analysis that will address these shortcomings.

*Source: *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* (EPA Science Advisory Board, 1990).

A Dream That Hasn't Come True

by Al Alm



EPA's creation some 20 years ago was premised on a new vision of environmental management. As theorized by the Ash Council, which recommended creation of the new agency, pollutants would no longer be dealt with in media-specific straitjackets. Rather, an integrated approach to environmental management would prevail, reducing pollution in a comprehensive manner throughout all media: land, air, and water. Traditional media-specific organization and approaches would wither away—an anachronism of a less sophisticated understanding of environment and its holistic nature.

In fact, EPA has never shaken the media-specific approach to environmental management. If anything, the media programs have become even stronger over the years. No generic legislation or organizational structure has emerged or is likely to emerge.

Nevertheless, although the original vision for EPA was practically flawed, the Agency has tremendous opportunities to expand its vision. By developing intermedia priorities, integrating environmental concerns into

other national policies and programs, developing new environmental management tools, pursuing pollution prevention, and expanding the knowledge of its staff, EPA can make real strides toward a more integrated environmental management system.

EPA's creation in 1970 was precipitated by the confluence of widespread rising concern over environmental problems with President Nixon's desire for fundamental government reorganization. At that time, the President's Advisory Council on Executive Reorganization, the so-called Ash Council, unanimously recommended creation of an "Environmental Protection Administration." That recommendation edged out the alternative of creating a much larger Department of Environment and Natural Resources.

In transmitting Reorganization Plan #3 to create a new Environmental Protection Agency, President Nixon spelled out certain environmental principles: "The environment must be perceived as a single, interrelated system A single source may pollute the air with smoke and chemicals, the land with solid wastes, and a river or lake with chemical and other wastes Similarly, some pollutants—chemicals, radiation, pesticides—appear in all media." Nixon suggested that an effective approach to pollution control would include identifying pollutants, tracing them through the entire ecological chain,

observing and recording changes in form as they occur, determining the total exposure of man and his environment, examining interactions among forms of pollution, and identifying where in the ecological chain interdiction would be most appropriate.

This Presidential message, taken almost verbatim from the Ash Council report, suggested a sharp departure from traditional approaches to pollution control. Under the Ash Council approach, EPA would need to amass a large data base, initiate new environmental monitoring programs, develop "end-use" monitoring schemes to determine exposure, and understand interactions among pollutants. Presumably, armed with this data, the Agency could establish standards for individual chemicals or constituents to minimize exposure to humans and ecosystems.

To implement this integrated approach, the Ash Council suggested that EPA should be organized around its major functions: monitoring, research, standard-setting, enforcement, and assistance. Presumably, programs transferred to the new EPA would be divided among these functions, losing their media identity entirely.

Despite the President's endorsement, the principles developed by the Ash Council were not carried out in practice. The first visible manifestation of the gap between the Ash Council theory and the

(Alm, a former Deputy Administrator of EPA, is now Director and Senior Vice President of the Science Applications International Corporation.)

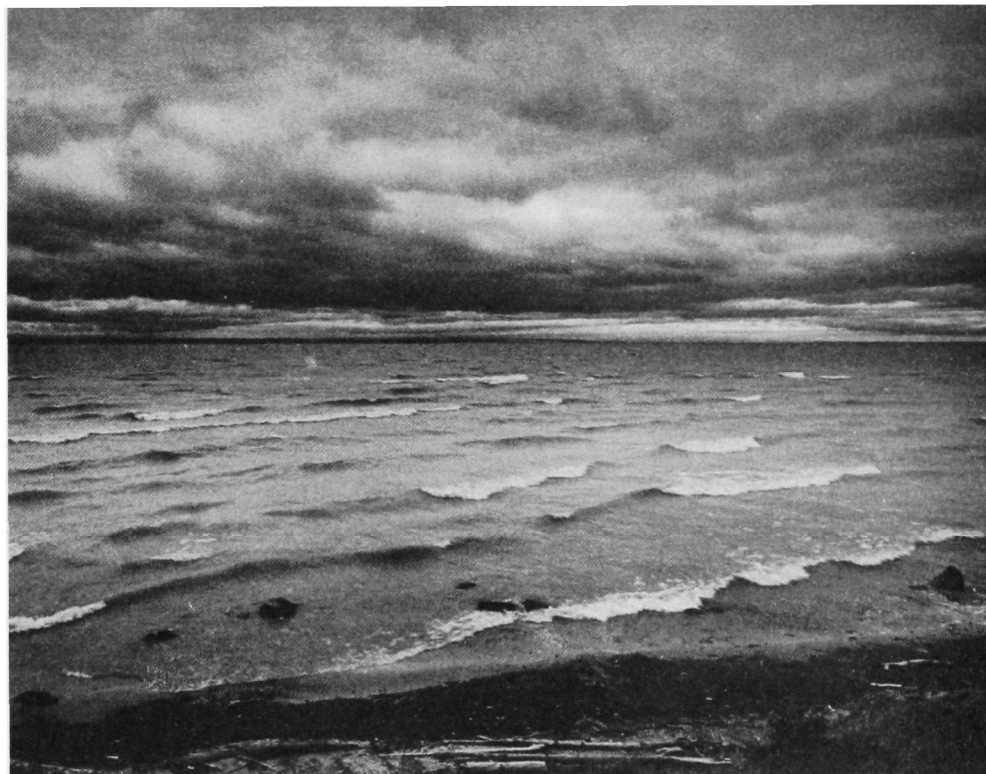
Cross-media pollution is a problem in Lake Superior. One study suggests that atmospheric deposits account for 90 percent of PCB residues in the lake. EPA's original organization combined air and water clean-up efforts in a single program; subsequently, air and water programs became separate entities.

An early meeting at which President Nixon announced the forthcoming creation of EPA. Some people pictured here subsequently became EPA officials. Original plans called for a fully integrated approach to environmental management, but this early vision proved elusive.

traditional form of pollution-control management appeared in EPA's original organization. This initial organization was a compromise between the traditional media-specific form of environmental management and the recommendations of the Ash Council. Two functional offices were created: one for Research and Monitoring and one for Enforcement and General Counsel. Two media offices were also created: one for air and water programs and one for pesticides, radiation, and solid wastes--inelegantly named Categorical Programs. A fifth entity, the Office of Planning and Management, provided administrative, budget, and program-analysis functions. The 10 EPA regional offices were organized in a similar fashion.

Over the years, the functional components lost power at the expense of media programs. Monitoring programs increasingly became the province of program offices. In 1981, essential authority for enforcement was transferred to the program offices. Although research was conducted Agency-wide by the Office of Research and Development, program office budgets for technical studies increased over time. Throughout its history, EPA's organization gravitated toward the media programs.

EPA's implementation of environmental laws also followed traditional media boundaries. From the beginning, the air and water programs followed fundamentally different strategies, accentuated by the geographical separateness of the air-pollution office in Durham, North Carolina. As new legislation was



Mike Brisson photo.

enacted, new program offices were created, namely the Office of Pesticides and Toxic Substances and the Office of Solid Waste and Emergency Response. Each developed its own approach and culture.

From time to time, more comprehensive experiments were tried. During the Costle era, an integrated permit initiative for air and water discharges was started, but ultimately abandoned due to implementation problems. Experiments in regulating chemicals or other constituents across media lines were tried--only to be jettisoned later. Regions attempted various initiatives to cope with state and regional problems on a multi-media basis, but rigid allocations of headquarters resources acted as a barrier to substantial success.

Despite top EPA managers' recognition that environmental problems are all interrelated, EPA has continued to organize and manage its programs along media lines.

During the early years, the problems of such a limited focus seemed less important. But during the 1980s these limitations became more obvious. For example, acidified lakes can be considered a water-pollution problem caused by air pollution. Initial monitoring data suggest that atmospheric deposits can be a significant source of total loadings of toxics in water bodies. One study suggests that atmospheric deposits actually contribute up to 90

percent of PCB inputs to Lake Superior and up to 78 percent to Lake Huron. The Philadelphia sewage treatment plant is a substantial source of air pollution. Tough land disposal restrictions result in pollution being transferred from the land to the air and water.

Hence, the underlying principles laid out in the Ash Council Report are more cogent today than when they were presented 20 years ago.

Considering the clear desirability of treating environmental problems in a more integrated fashion, why have we been so unsuccessful in this approach? Is the failure related to the stubbornness of EPA's career staff or the lack of vision of its leadership? In fact, the reasons are more fundamental; indeed, the obstacles--outlined below--are so formidable that, in my opinion, the original vision was unattainable.

- EPA's piecemeal legislative mandates virtually force piecemeal approaches to environmental problems. EPA's legislative structure can be likened to an archeological dig. Each layer of legislation represents a set of political and technical judgments that often do not bear any relationship to other layers. For example, EPA has a number of mandated tests for establishing standards under its several major statutes. Some take only public health into account; others call for balancing risks with benefits. An array

of technological standards has been set. The different laws have different due dates for compliance. If EPA's laws really represented an archeological exploration, one would conclude that profound changes occurred within the culture or, perhaps, that more than one culture existed.

Congress has never seriously considered enacting, much less attempted to enact, generic legislation mandating a more integrated program. The reasons are numerous. First, as I will discuss below, the technical and management challenges are daunting, if not insuperable. Second, no political pressure exists to tackle this problem. Because of the complexity of environmental issues, specialists in the Agency, in Congress, and among interest groups all have a stake in their piece of the turf. The participants in this three-way iron triangle have little interest in a comprehensive approach which would disrupt their handiwork.

Finally, at least in the House of Representatives, an integrated statute would raise serious jurisdictional issues—enough to scare off committee leaders and staff. For these reasons, leadership toward integrating environmental legislation will not likely come from Congress.

• **The technical and management issues posed by integrated environmental management are beyond the capability of EPA.** EPA's ability to identify contaminants and their toxicity is limited. Methodological problems with animal testing, lack of decent exposure data, and the paucity of good epidemiological and clinical data restrict the government's capacity to characterize contaminants accurately. The sheer volume of potential contaminants taxes the government's systems for testing them.

EPA has succeeded in tracing only a few pollutants through the entire ecological chain. The entire scientific community is in its infancy in determining interactions among forms of pollution. Knowledge about the current state of the environment, exposure levels, and future trends is primitive at best.

The management challenge is equally formidable. Although most observers agree that managing along media lines has its limitations, the alternatives are

infinitely more complex. Regulating individual chemicals throughout all media is a herculean task. The sheer volume of chemicals, coupled with the need to understand integrated technologies to cope not only with individual chemicals, but other constituents as well, makes this approach close to impossible. While certain visible and large-volume constituents, such as lead and PCBs, are appropriately regulated in this fashion, regulation of a large number of constituents is not very appealing.

Regulating industrial facilities on the basis of total residuals to air, water, and land is somewhat more appealing. This approach could conceivably work, although the government would need to understand industrial processes to a much greater extent than it does at present. Moreover, not only do different laws have different compliance dates and standards, but these periodically change, making it difficult to keep comprehensive permits up to date. Comprehensive regulation of sources would require substantial rewriting of environmental law and much more technical information than currently exists.

Finally, geographical regulation has great intellectual appeal. States or subparts of states could develop comprehensive environmental plans, targeting resources on the highest priorities and dealing with intermedia conflicts. Such geographic approaches

have been demonstrated in some cities, regions, states, estuarine systems, and the Great Lakes.

While geographic approaches are attractive, the data and analytical costs are high. For example, over \$25 million per year is spent on geographic programs for the Great Lakes, and \$13 million per year is spent for similar purposes on the Chesapeake Bay. A substantial amount of funds has also been devoted to studies of regional environmental problems in Philadelphia, Baltimore, Santa Clara, Kanawha Valley, and Denver, and to integrated state environmental programs in five states.

Although important, most of these initiatives either are not currently playing much of a role or they deal only with residual problems, such as nonpoint sources or contaminated sediments. They do not drive regulatory schedules and generally do not drive the level of compliance required. At most, they are supplements to the media-driven programs.

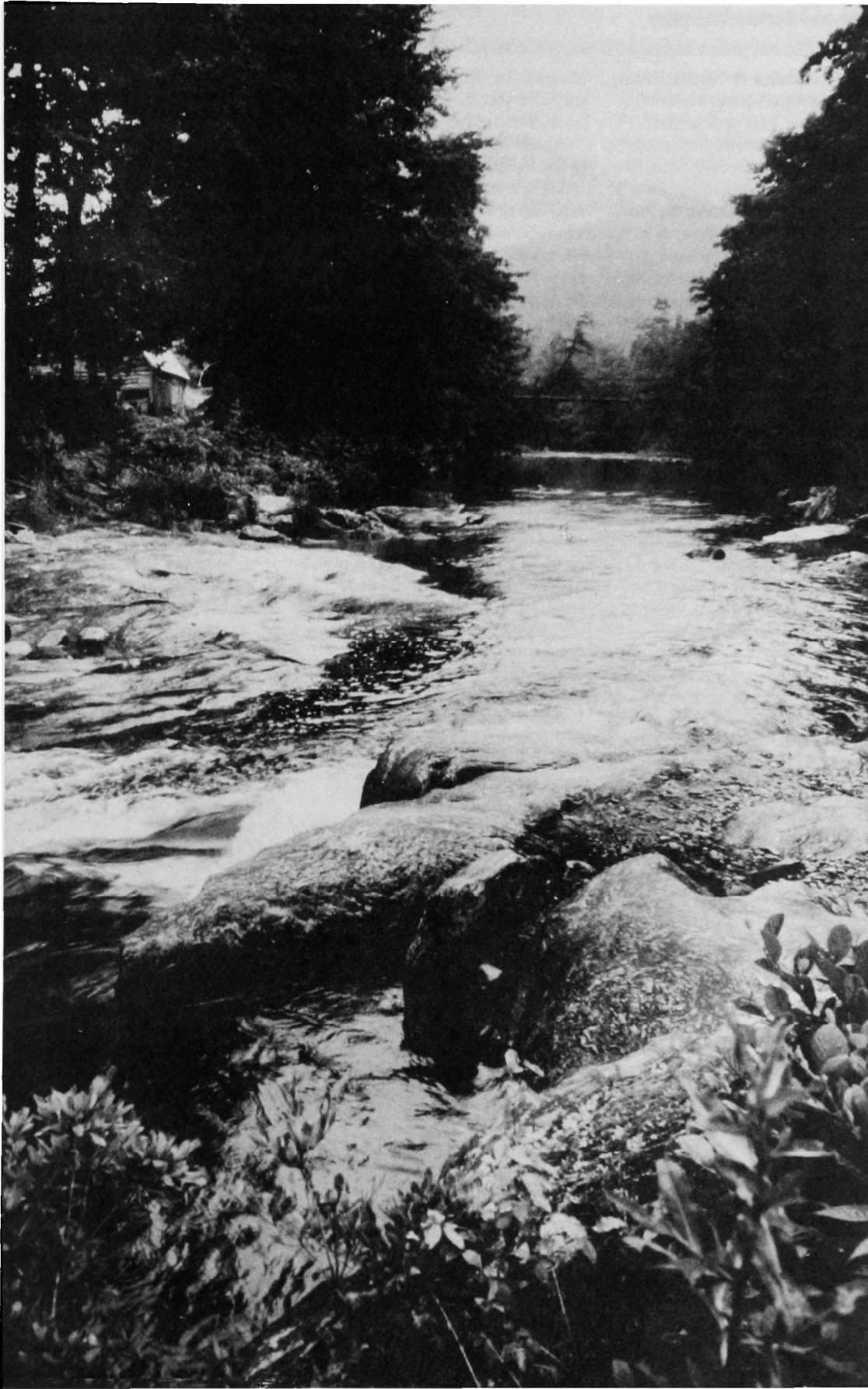
In short, a truly integrated approach to environmental management appears to be many decades and billions of dollars away. There is little real political will to pursue such an approach. The technical and management challenges are overwhelming in the near term, and there has not been an adequate commitment of either funds or people to lay the groundwork for transition toward such an integrated system. □

Signe Wilkinson. Reprinted with permission.



Progress And Challenges: Looking At EPA Today

Jon Riley photo. Folio.



The following section is an account of where EPA stands 20 years after the Agency was established and where it is headed in the protection of the environment. This account, excerpted from new reports by the Agency, describes successes, acknowledges failures, summarizes the dollar costs and benefits of its programs, and lays out new directions that EPA is charting to improve the results of its programs in the future.

Readers seeking more detailed information may wish to consult Meeting the Environmental Challenge: EPA's Review of Progress and New Directions in Environmental Protection and Environmental Investments: The Cost of a Clean Environment.

The "Conventional" Pollutants

During the past two decades, atmospheric levels of sulfur dioxide (SO₂), carbon monoxide, total suspended particulates, and lead have all been reduced, in some cases sharply. Between 1970 and 1988, estimated emissions of SO₂ dropped 27 percent, particulate matter emissions were down 63 percent, and lead emissions dropped a dramatic 90 percent. Emissions of nitrogen oxides (NO_x) increased slightly (7 percent) since 1970, but all areas of the United States except Los Angeles have met the nitrogen dioxide air-quality standard during the past 10 years.

Ozone and Carbon Monoxide

These successes notwithstanding, the challenges ahead remain formidable. The problem of ground-level ozone, or "smog," has proven particularly difficult. Atmospheric levels of ozone have gone up 2 percent in the last 10 years, although this is due in part to extremely warm temperatures during the summer of 1988. Ozone standards are still not being met in 96 major urban areas. Carbon-monoxide standards are also being violated in 41 metropolitan areas. Even in rural, hilly regions, emissions from woodstoves may create carbon-monoxide problems.

Although controls on cars, gas stations, and most other sources have reduced emissions of carbon monoxide and ozone-producing chemicals, these reductions are being offset by rapid growth in the number of sources. In particular, the

increase in cars and in miles traveled points to worsening problems unless the nation undertakes additional measures to prevent them.

Amendments to the Clean Air Act will strengthen federal and state ozone/carbon monoxide programs in the 1990s. EPA expects to design and implement these programs in cooperation with the states. The Agency will do a better job of collecting and evaluating data on emissions and atmospheric concentrations of these pollutants. It will set realistic timetables for areas to attain the standards, spell out the consequences for failure to attain them, and impose appropriate sanctions to bring nonattainment areas into compliance. EPA will need to broaden the scope of ozone and carbon-monoxide regulation to cover all sources, including commercial and consumer products and motor fuels.

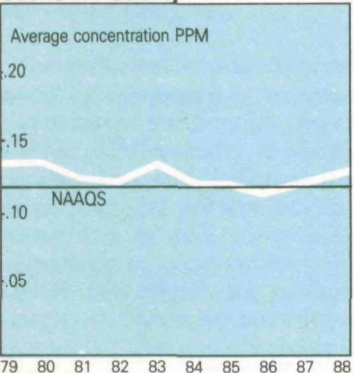
One important feature of the new program will assist in bringing clean-burning alternative fuels and clean-fueled vehicles into the marketplace, thereby reconciling the automobile and the environment over the long term. The Agency expects that a majority of American cities will attain the national standards by 2000.

Particulate Matter

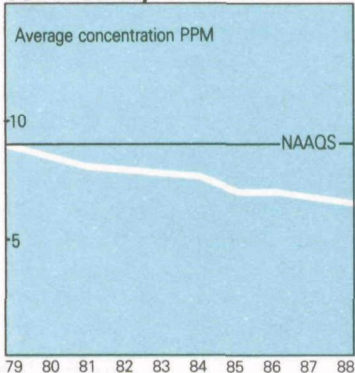
There has been considerable progress in reducing emissions of the larger particles that are found, for example, in dust, smoke, and diesel exhaust. However, smaller particles still require more rigorous controls. In July 1987, EPA revised its standards to monitor only those particles called "PM-10." These pose a risk to health because they are small enough to penetrate the most sensitive regions of the respiratory tract.

Approximately 30 million people live in areas where PM-10 levels exceed the standards. In addition to controlling industrial sources of these smaller particles, EPA is focusing on unconventional sources such as woodstoves, urban dust, and the open burning that is performed for managing forests and for agricultural purposes.

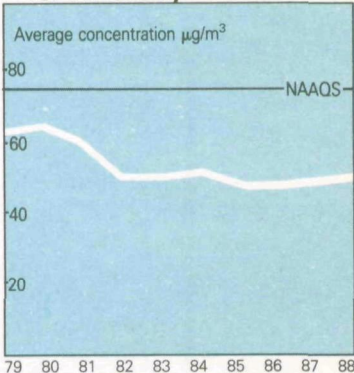
Ozone Air Quality



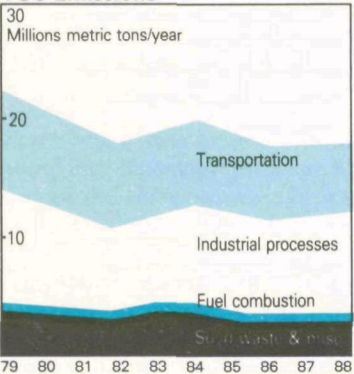
CO Air Quality



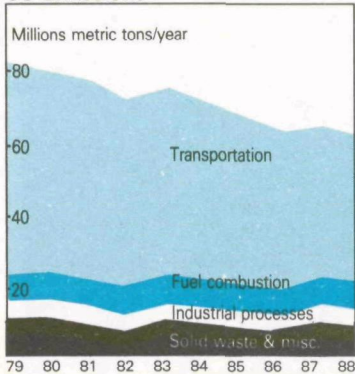
TSP Air Quality



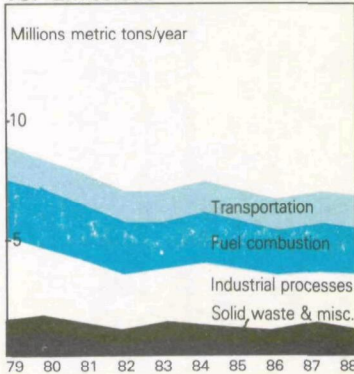
VOC Emissions



CO Emissions



TSP Emissions



Legend

- CO = Carbon monoxide
- VOC = Volatile Organic Compounds
- TSP = Total Suspended Particulates
- SO₂ = Sulfur dioxide
- NO_x = Nitrogen dioxide
- PPM = Parts per million
- NAAQS = National Ambient Air Quality Standards
- Ugm³ = Micrograms per cubic meter

Sulfur Dioxide, Nitrogen Oxides, and Acid Deposition

The Clean Air Act amendments require most areas of the country to attain the PM-10 standards by 1994. EPA intends to raise public awareness of the problem and ways to control it, develop more accurate data on emissions and atmospheric concentrations, and oversee the development of new state plans for meeting the standards.

Although controls have brought most areas of the country into attainment with the health standards for SO₂ and NO_x, they have not been adequate to check acid deposition, or "acid rain." Acid deposition is a regional problem that affects the health of animals, plants, and people and also reduces visibility and corrodes buildings. SO₂ and NO_x emissions that do not pose health or welfare problems near their sources can nevertheless travel long distances in the atmosphere and return as acid deposition. Two-thirds of SO₂ emissions in the United States come from the burning of fossil fuels by electric power plants;

about 20 percent come from other industrial sources. The primary sources of NO_x emissions are highway vehicles (31 percent) and electric power plants (36 percent).

The new Clean Air Act contains provisions for large reductions in emissions of SO₂ and NO_x to combat acid rain. The national goal for the year 2000 is to reduce SO₂ emissions nationwide by 10 million tons below 1980 levels—a 40-percent decrease. NO_x emissions will be reduced by 2 million tons below levels that would occur in 2000 without new controls—approximately a 10-percent decrease from 1980 levels.

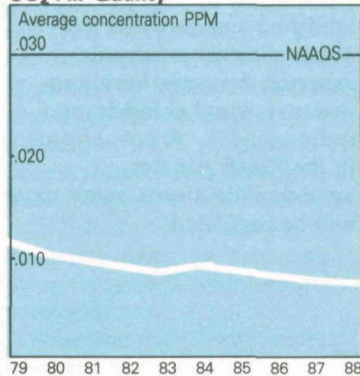
The Agency will achieve these targets by instituting a variety of reforms aimed at limiting emissions after 1995, principally from electric power plants. Sources will be permitted to "trade and bank" their allowed emissions, thereby achieving regional and national emission targets in the most cost-effective way—a market-based approach to air pollution regulation.

Acid Rain

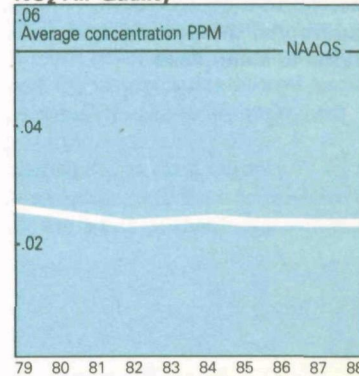
"Acid rain" refers to all acid deposition which occurs in the form of rain, snow, fog, dust, or gas. Manmade emissions of SO₂ and NO_x are transformed into acids in the atmosphere, where they may travel hundreds of miles before falling as acid rain. Acid rain has been measured with a pH of less than 2.0—more acidic than lemon juice. The political implications of the problem are important because the pollutants may originate in one jurisdiction but affect another.

EPA research has increased scientific understanding of the effects of acid rain, including the sterilization of lakes and streams, reproductive effects on fish and amphibians, possible forest dieback, and deterioration of manmade structures. These effects have been most obvious in the eastern United States and Canada and in western and eastern Europe. The Clean Air Act of 1970 helped curb the growth of SO₂ and NO_x emissions in the United States, and the 1990 amendments will bring significant additional reductions.

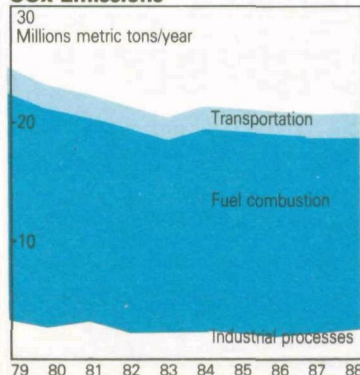
SO₂ Air Quality



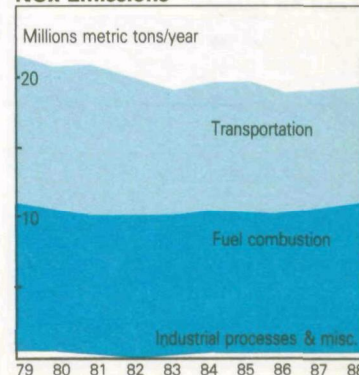
NO₂ Air Quality



SO_x Emissions



NO_x Emissions

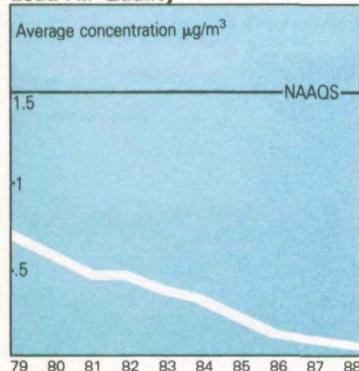


Lead

The dramatic drop in atmospheric lead levels over the past decade is mainly the result of EPA-mandated use of unleaded gasoline, required to maintain the effectiveness of catalytic converters, and reductions in the amount of lead permitted in leaded gasoline. In the early 1970s, over 200 billion grams of lead were used in gasoline each year; in 1989 less than one billion grams were used.

Lead emissions from stationary sources also have been substantially reduced with the implementation of state plans to attain the particulate-matter and lead air-quality standards. Current lead standards are being attained in all areas except in the vicinity of a few "point sources." In the 1990s, EPA's objective will be to bring these sources—principally smelters—into attainment through a combination of accelerated enforcement, additional monitoring, and revisions to state plans.

Lead Air Quality

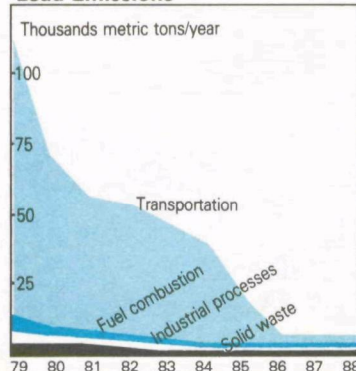


Air Toxics

The problem of toxic chemicals in the air requires more attention by everyone. "Air toxics" is the term generally used to describe cancer-causing chemicals, radioactive materials, and other substances not covered by the National Ambient Air Quality Standards for conventional pollutants. Air toxics result from many activities in modern society, from driving a car to burning fossil fuel to producing and using industrial chemicals or radioactive materials. They are one of the highest health-risk problems with which EPA is wrestling. Motor vehicles are by far the largest contributor to cancer incidence caused by air toxics in the United States.

The Clean Air Act requires special controls for pollutants that cause serious or irreversible health effects. These National Emissions Standards for Hazardous Air Pollutants are called NESHAPS. To date, EPA has established standards for only seven substances: arsenic, asbestos, benzene, beryllium, mercury, vinyl chloride, and radionuclides. A new approach in the Clean Air Act amendments means many more will be regulated.

Lead Emissions



Radon

Exposure to indoor radon is one of the most serious environmental health problems facing the American public—second only to smoking as a cause of lung cancer. Radon is a radioactive, colorless, odorless, naturally occurring gas that seeps through the soil and collects in homes. Radon problems have been identified in every state, and millions of homes throughout the country have elevated radon levels.

In 1988, EPA and the Surgeon General recommended that all Americans, other than those living above the second floor in apartment buildings, test their homes for radon. The testing is simple and inexpensive; homes with high radon levels can be fixed.

EPA has a number of activities under way in cooperation with such national organizations as the American Medical Association and the American Lung Association to motivate the public to reduce radon levels in their homes and schools. In the 1990s, EPA will continue to improve the techniques for radon testing, mitigation, and prevention, with special emphasis on schools and workplaces. The Agency will ensure the reliability of the radon-assistance industry and will promote the incorporation of radon prevention in building codes and radon inspections at the time houses are financed.

Over the past six years, the Agency has also carried out a program to help the states monitor and control high-risk local "point" sources and address multi-pollutant and multi-source urban toxics problems. The standards set by the Agency for exhaust and evaporative emissions continue to reduce air toxics from motor vehicles.

EPA's Toxics Release Inventory, a listing of annual toxic chemical releases to the air and other environmental media from large manufacturing facilities, has helped prompt actions by industries and communities to address the problem. In 1990, nine major U.S. companies reached an agreement with EPA to voluntarily reduce toxic air emissions at 40 chemical plants in 14 states. When fully implemented in 1993, the agreement will result in overall annual emissions reductions from these plants of almost 83 percent, or 9,460,000 pounds.

In the 1990s, EPA will attempt to reduce by 50 percent the nationwide emissions of 189 toxic pollutants listed in the proposed Clean Air Act amendments. The new Act will remove legal roadblocks that have hampered efforts in the past, particularly with respect to industrial plants. Sources of the regulated pollutants will be required to achieve emission reductions comparable to similar facilities that have the best controls. If the control technologies prove inadequate, EPA will take further regulatory action. States will be given more responsibility to regulate air toxics, and their capabilities will be strengthened.

Growing scientific evidence indicates that the air within buildings, even in the largest and most industrialized cities, can be more seriously polluted than the air outdoors. Many indoor air pollutants are thought to have an adverse effect on health. These include radon, asbestos, tobacco smoke, formaldehyde, pesticides, perchloroethylene (associated particularly with dry cleaning), paradichlorobenzene (mothballs and air fresheners), and a broad array of airborne pathogens.

EPA is taking the lead in coordinating activities to reduce public exposure to indoor air pollution. The Agency has prepared information materials

designed to raise public awareness of the problem and the strategies available to reduce and prevent it. These include specific guidance on construction of new homes and rehabilitation of existing ones.

EPA will continue to identify the health risks from exposure to indoor air pollutants. Further research is needed on diagnosing building-related illnesses and correcting their causes.

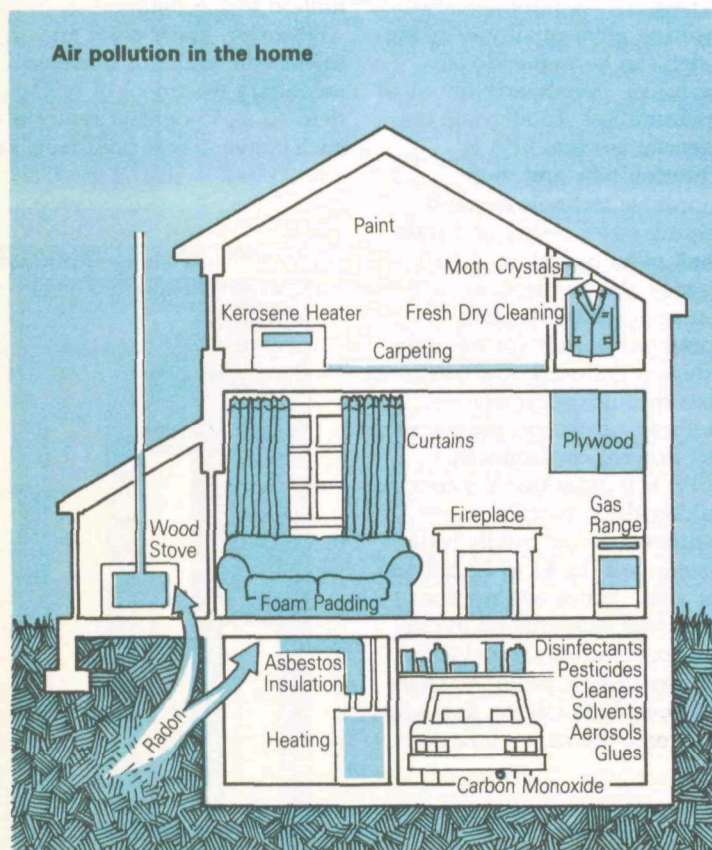
In addition to acid rain, two other international air-pollution problems rose to prominence in the 1980s: stratospheric ozone depletion and global warming (the so-called "greenhouse effect"). Since the early 1970s, scientists have predicted that emissions of such chemicals as chlorofluorocarbons (CFCs) would ultimately deplete the stratospheric ozone shielding Earth's inhabitants from the sun's harmful ultraviolet rays. Some studies indicate that these predictions may be coming true.

In 1978 EPA banned the use in this country of CFCs in non-essential aerosol propellants. On signing the Montreal Protocol in 1987, the United States committed to reducing other uses of CFCs 20 percent by mid-1994 and 50 percent by mid-1999. In response to evidence of accelerated rates of damage to the ozone layer, the Protocol was amended in June of this year to call for a full phaseout of CFCs and most other ozone-depleting chemicals by 2000. The Protocol also suggests a schedule for phasing out CFC substitutes that pose a threat, even though to a lesser degree. A fund has been established to help developing countries make the transition away from ozone-depleting chemicals.

Scientific complexity and uncertainty surround the problem of global warming. As a result, much of the federal

government's effort is going into research. In the Fiscal Year 1991 budget, the President proposes \$1.034 billion for the U.S. Global Change Research Program, a 57-percent increase over 1990. Under this program, EPA is evaluating the sources of greenhouse gases and is defining the potential consequences of climate change on the Earth's ecosystems. As the President noted in a 1990 article on climate change: "One cannot fail to see that deforestation, ozone depletion, ocean pollution, and the threat of global warming interconnect to challenge our future."

In conjunction with other federal agencies, EPA participates in the Intergovernmental Panel on Climate Change (IPCC), an international body organized in 1988 by the United Nations Environment Programme and the World Meteorological Organization. This year, the IPCC is preparing assessments of current scientific understanding and the environmental and social impacts of climate change, and possible policy responses to it. Negotiations on a climate convention will be undertaken on the basis of these assessments.



Drinking Water

America's water-quality record is a mix of remarkable improvements and hard-to-fix problems that all levels of government are struggling with. Controls on point sources of pollution such as wastewater-treatment and industrial plants have been quite effective, but widespread small sources are mostly unchecked. Toxic chemicals are a continuing problem. Pollution-sensitive fish have returned to some lakes and rivers, but aquatic habitats are becoming degraded in many coastal waters. At the same time, population pressures are increasing the sources of pollution and leading to increased demand for clean water.

EPA's program for the 1990s: maintain and enforce existing controls, put extra work into protecting high-value waters that are threatened, control toxic pollutants, assist state and local governments in reducing pollutants in run-off ("nonpoint sources"), focus more heavily on preventing further degradation as well as restoring currently polluted waters, and improve the ways in which the Agency assesses the quality of the nation's waters.

More Americans are drinking safe water than ever before. Diseases such as cholera and typhoid that stem from contaminated water have been eliminated in the United States. But toxic chemicals and microbiological contaminants continue to threaten both surface and ground-water sources of drinking water.

In 1974, the Safe Drinking Water Act (SDWA) authorized EPA to limit the amounts of various substances in drinking water. In 1986, amendments to the SDWA accelerated EPA's regulation of toxic contaminants, banned all future use of lead pipe and lead solder in public systems, mandated greater protection of ground-water sources, and streamlined procedures to ensure that public suppliers comply with the Act.

The SDWA also established

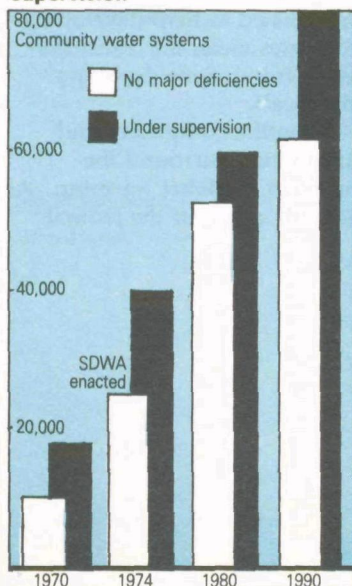
provisions to protect ground-water supplies from underground injection of wastes. These controls regulate the permitting, construction, operation, monitoring, and closure of injection wells.

EPA is striving to make further improvements in the nation's drinking water. Through the states, it monitors the operation of all public water systems, and it continues to evaluate new treatment technologies. By 1995, the Agency will set new standards for 108 contaminants and will work with the states to vigorously enforce them. It will complete initial monitoring and regulations for lead and for radionuclides, including radon. It will work to improve filtration of microbial contaminants.

These new requirements, while ensuring good-quality drinking water, can be tremendously expensive, particularly for small communities. To alleviate the financial burden, EPA is exploring new and more affordable technologies and helping states certify and train small plant operators. The Agency also is encouraging management efficiencies: Communities can, for example, reduce monitoring and treatment costs through aggressive wellhead-protection programs that prevent contamination.

EPA estimates that the costs for making the necessary improvements to public water systems will be \$1 to \$2 billion per year. States will need an additional \$200 million in one-time expenditures to develop and install new programs; they will need \$131 million annually to enforce the new regulations.

Community water systems are performing better with more supervision

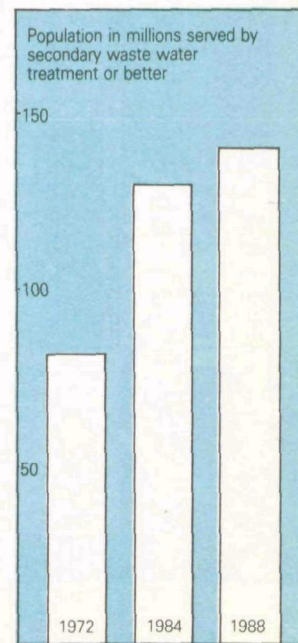


Rivers, Lakes, and Streams

For the past 20 years, EPA has been working with all levels of government, with industry, and with environmentally committed citizens to make America's waters fishable and swimmable. Most water-pollution controls in the 1970s were aimed at limiting discharges of the most common pollutants from industries and sewage-treatment plants. These efforts brought impressive results. For example, in 1972, 36 percent of the rivers assessed by the states supported beneficial uses such as fishing and swimming; by 1988, that figure had increased to 70 percent. Between 1977 and 1988, the number of people served by adequate sewage-treatment plants ("secondary" treatment or better) increased 84 percent—from 75 million to 138 million.

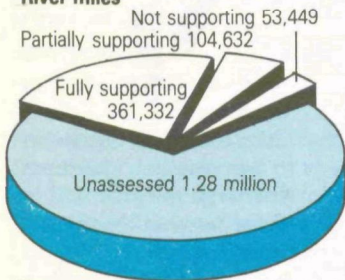
However, many cities and towns still have not achieved secondary treatment of sewage, defined as 85-percent removal of such conventional pollutants as

Sewage treatment has improved...



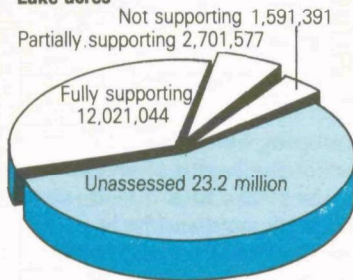
A 3D pie chart illustrating the distribution of responses to the question 'Do you support the proposed changes to the way the NHS is run?'. The chart is divided into four segments: 'Unassessed' (1.28 million, light blue), 'Fully supporting' (361,332, white), 'Partially supporting' (104,632, light grey), and 'Not supporting' (53,449, dark grey). The 'Unassessed' segment is the largest, followed by 'Fully supporting', 'Partially supporting', and 'Not supporting'.

Response	Count
Unassessed	1.28 million
Fully supporting	361,332
Partially supporting	104,632
Not supporting	53,449



A 3D pie chart illustrating the distribution of responses to the question 'Do you support the Government's policy on the environment?'. The chart is divided into four segments: 'Unassessed' (23.2 million, light blue), 'Fully supporting' (12,021,044, white), 'Partially supporting' (2,701,577, light grey), and 'Not supporting' (1,591,391, dark grey). The 'Unassessed' segment is the largest, followed by 'Fully supporting', 'Partially supporting', and 'Not supporting'.

Response	Value
Unassessed	23.2 million
Fully supporting	12,021,044
Partially supporting	2,701,577
Not supporting	1,591,391



requirements have been the subject of concentrated EPA enforcement activity in recent years.

Nonpoint-source pollution, which appears to be responsible for most of the remaining damage to rivers, streams, and lakes, also needs much more attention. Toxics and other pollutants often come from many small, widely dispersed sources that are very difficult to regulate. Urban run-off and drainage of pesticides, fertilizers, and animal wastes from farmland are typical of the problem. EPA recently

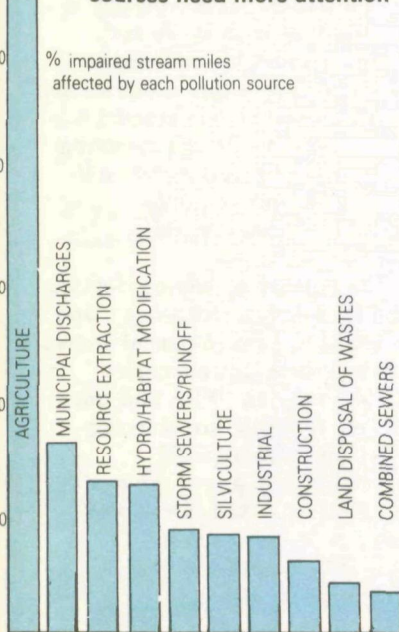
EPA is relying even more strongly on state and local governments to achieve the goals set for surface-water quality. The Agency will focus on eliminating risks from point sources of highly toxic pollutants; reducing risks from other toxic pollutants; controlling stormwater discharges, including combined sewer overflows; and providing leadership and assistance to states in controlling nonpoint sources—particularly agricultural. Further, EPA is seeking solutions to other high-priority concerns related especially to the nation's lakes, including eutrophication (excessive plant growth), contaminated sediments, shoreline modifications, and pollution reaching lakes from the air and from ground water.

Ground-water protection is an exceptionally complex issue, cutting across economic sectors, all levels of government, and most environmental statutes. Ground water is the source of drinking water for over half the population; it also supports ecosystems and serves as a water supply for industry and agriculture. Once contaminated, it can be difficult and expensive to clean up.

Since 1985, EPA has provided over \$40 million to help the states develop their own groundwater protection strategies and wellhead protection programs. By mid-1990, the Agency had approved six state wellhead-protection programs and was working with 24 others on theirs.

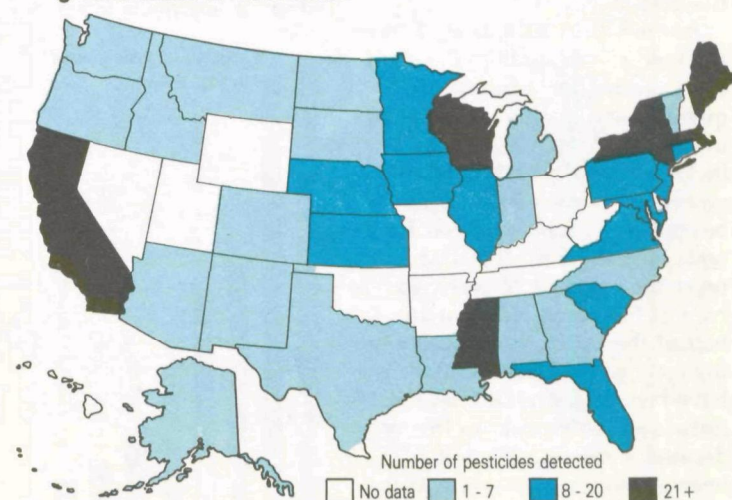
A bar chart titled '% impaired stream miles affected by each pollution source'. The chart shows the relative impact of nine different pollution sources on stream health. The sources are listed on the x-axis, and their corresponding percentages are represented by the height of the bars. The bars are arranged in descending order of height from left to right.

Pollution Source	% Impaired Stream Miles (Approximate)
Municipal Discharges	28
Resource Extraction	22
Hydro/Habitat Modification	20
Storm Sewers/Runoff	10
Silviculture	9
Industrial	9
Construction	6
Land Disposal of Wastes	4
Combined Sewers	3



Number of pesticides detected

Color	Number of pesticides detected
White	No data
Light Blue	1 - 7
Medium Blue	8 - 20
Dark Blue/Black	21 +



Oceans, Coastal Waters, and Wetlands

Oceans, near-coastal waters, estuaries, and wetlands have been underprotected in the past. Their deterioration was highlighted in the summers of 1988 and 1989 when swimmers fled beaches littered with medical waste and contaminated with fecal bacteria. One-third of the nation's shellfish beds are closed primarily because of pollution, resulting in millions of dollars in lost revenues. Twenty-five percent of estuarine waters that have been tested have elevated levels of toxic substances, and eutrophication is increasing the number of "dead zones" where fish cannot survive. Coastal fisheries and wildlife and waterfowl populations have declined, while population and industrial growth along the coasts have increased dramatically--more than 120 million Americans now live within 50 miles of the shore.

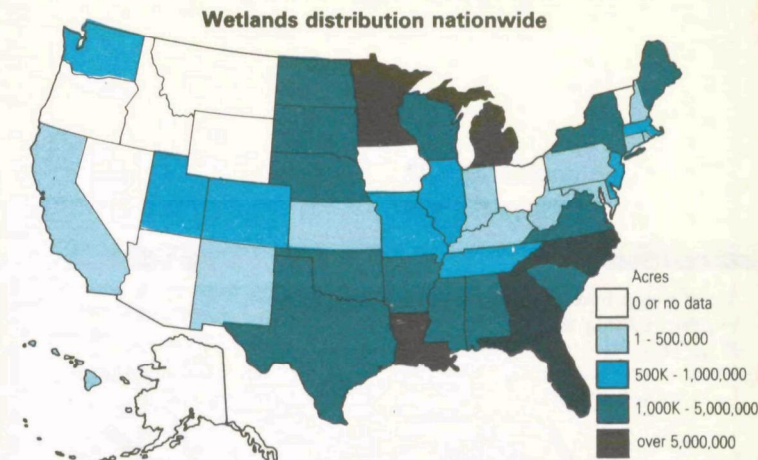
EPA has continued the restoration program for the Great Lakes and has launched programs in the Chesapeake Bay and 17 estuaries that the Agency has designated as part of a National Estuary Program. Further, EPA is working toward a ban on dumping sewage sludge and industrial waste in the oceans.

In 1989, EPA set a goal of "no net loss" of wetlands in the short term, aiming for a gain in the quantity and quality of wetlands in the long term. Wetlands include coastal marshes, inland swamps, marshes, tundra, and bogs. They provide habitat for a wide variety of wildlife and serve vital flood and erosion-control functions. More than half of the wetlands originally in the contiguous United States have been lost since the time of European settlement. In the two decades between 1955 and 1975, over 11 million acres were lost; others have been degraded by

pollution and hydrological changes so that they no longer perform many of their natural functions.

Currently, EPA and the Army Corps of Engineers are working to improve a jointly administered program that regulates the physical modification of wetlands and other waters. EPA also is providing guidance and support to state and local governments on wetlands protection and is working with other federal agencies whose activities affect wetlands.

To achieve no net loss of wetlands, the Agency is stepping up enforcement against activities that degrade them. EPA is becoming a center of wetlands expertise, providing more research, training, and communication on wetlands management. The Agency is helping states build comprehensive programs, including setting water-quality standards for wetlands and preparing conservation plans which incorporate both regulatory and non-regulatory approaches. EPA and other federal agencies are



developing better ways to monitor the health of wetlands.

In the 1990s, EPA intends to work with state and local governments to substantially increase the acres of shellfish beds open to harvest, reduce fishery bans and advisories due to contamination, decrease beach closures, and eliminate dumping of sewage sludge and industrial wastes in the oceans.

The Agency wants to encourage state and local governments in managing coastal development in an environmentally sound manner. Further, the Agency will strengthen nonpoint source programs in all coastal counties and tighten controls on point-source discharges of toxics, nutrients, and other pollutants to restore coastal water quality.

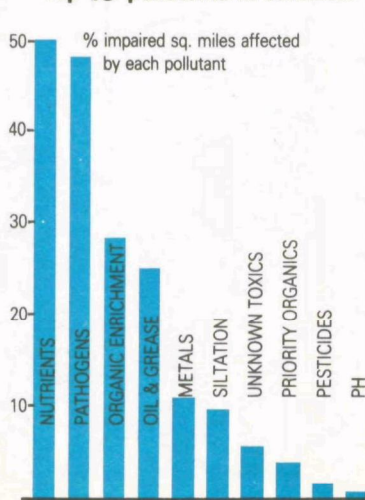
Raw-sewage flows from combined sanitary-storm sewers--a problem especially severe in

many older seaboard cities--needs to be curtailed. Storm-water discharge permits will be required for large cities in all coastal counties; smaller municipalities will also need help with storm-water problems. Operators of all types of offshore activities, such as oil and gas operations, will be asked to help protect marine waters and surrounding ecosystems from degradation. The federal government is taking enforcement actions to eliminate any illegal ocean disposal. EPA is working with other federal agencies and states to improve coastal water monitoring and to increase the number of estuarine/marine sanctuaries, protected refuges, reserves, and parks.

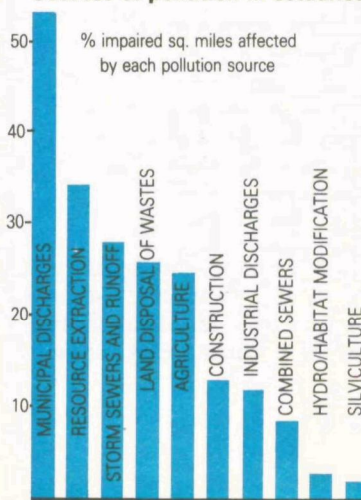
To help monitor and control sources of marine debris, the Agency is supporting citizen beach patrols. It is working in partnership with states and municipalities to implement plans for protecting estuaries and other coastal waters around the country, and EPA is promoting grass-roots/governmental alliances to improve public education about coastal problems.

The Agency is helping develop the knowledge, technology, and controls to protect coastal waters from pollutants transported through the air. EPA and other federal agencies are working with the international community to assess the health of the oceans and develop an integrated approach to preventing further ocean degradation.

Top 10 pollutants in estuaries



Sources of pollution in estuaries



Waste Disposal

Air and water pollution are easier for most people to conceptualize than land pollution. Yet, some U.S. lands are also threatened by toxic, radioactive, and other hazardous substances. Pollutants on the surface of the land or in the soil frequently migrate to surrounding air and water, particularly ground water. Sometimes this contamination results from direct applications of chemicals, as with pesticides; it can also occur as a result of improper storage or disposal of toxic wastes and other substances.

EPA and the states have undertaken a sweeping program to revolutionize waste management in this country—especially hazardous wastes. Before 1980, there was virtually no regulation of hazardous waste by the federal government and little by the states. People in the hazardous-waste management business often disposed of waste in municipal landfills and unlined lagoons or simply dumped it on the ground.

Better understanding of the environmental impact of such practices led to the enactment of the Resource Conservation and Recovery Act (RCRA) in 1976 and an increasingly complex, comprehensive regulatory program during the 1980s. This "cradle to grave" program regulates hazardous wastes from over 200,000 generators through transportation, storage, and treatment to final disposal.

Improperly managed hazardous and municipal waste may contaminate drinking water supplies, release toxic vapors into the air, or cause explosions. To ensure that hazardous wastes being generated today do not become expensive and complex clean-up problems in the future, EPA enforces the land disposal restrictions program. Many wastes that have not been treated

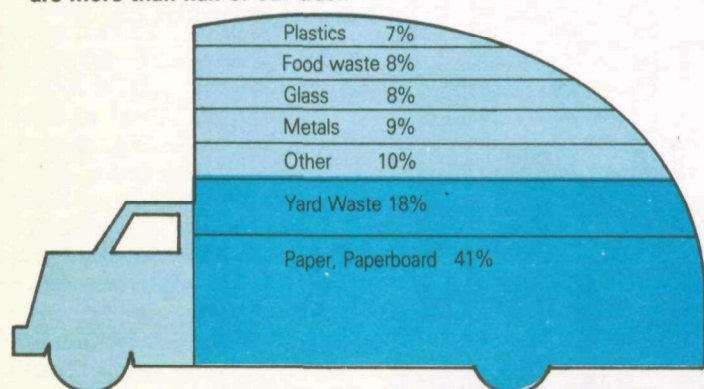
to specified standards are now banned from land disposal, and many more will be banned over the next several years. The treatment standards are designed to reduce the toxicity of the waste and stabilize it before it is disposed of on land.

EPA has also developed other environmentally protective requirements for land-disposal facilities, such as double liners to prevent contaminants from leaking into ground water, leachate-

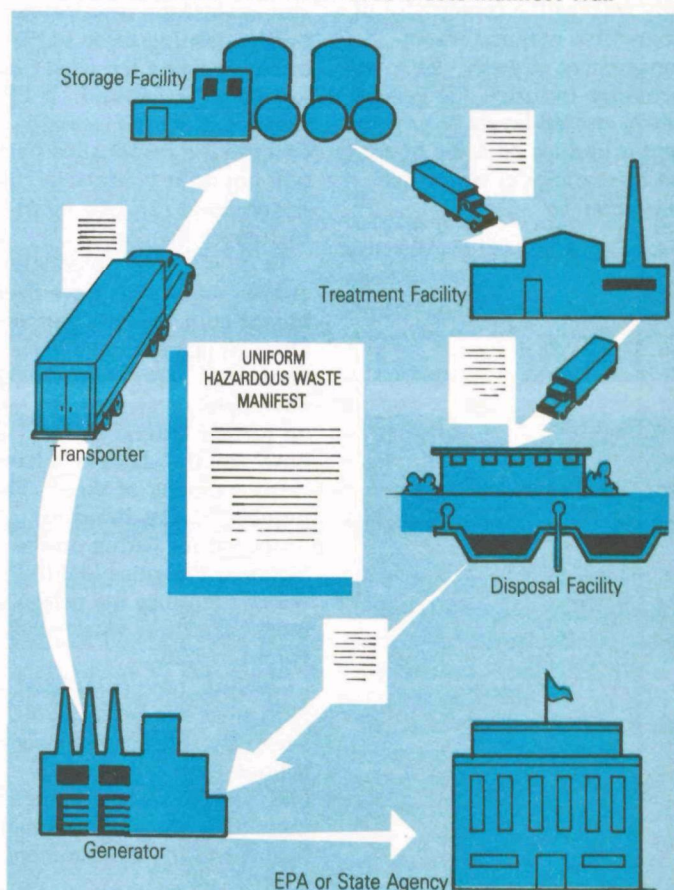
detection and collection systems, and ground-water monitoring. Facilities are regulated throughout their operating life and 30 years after they are closed.

Hazardous waste handlers must now clean up contamination resulting from past waste management practices as well as from current activities. Over the next decade, EPA will evaluate which facilities need cleanup and make sure that the worst sites

Paper and yard wastes are more than half of our trash



"Cradle to Grave": The Hazardous Waste Manifest Trail



A one-page manifest must accompany every waste shipment. The resulting paper trail documents the wastes progress through treatment, storage and disposal. A missing form alerts the generator to investigate, which may mean calling in the state agency or EPA.

Note: a manifest is unnecessary for waste treated and disposed of at the point of generation.

Cleaning Up Abandoned Hazardous Waste Sites

get cleaned up first. The Agency will also explore ways to create economic incentives that encourage ingenuity in practicing waste minimization and recycling.

Municipal solid waste is another growing national problem. Americans produce more than 180 million tons of trash each year. EPA has set a 1992 goal for reducing by 25 percent the amount of municipal solid waste, through source reduction and recycling.

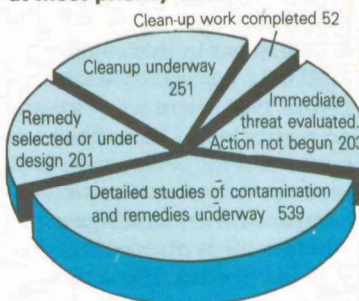
Pollution prevention is increasingly seen as the centerpiece of a progressive national waste-management strategy. EPA will encourage industry, the general public, and all levels of government to reduce both the quantity and the toxicity of waste that they generate.

One of EPA's most important responsibilities is managing cleanup of the worst of the abandoned hazardous waste sites in the United States. The Superfund program was founded under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA). These laws authorize EPA to respond to hazardous spills and clean up abandoned sites by either filing suit against the responsible parties, issuing these parties an order, or using the trust fund known as Superfund. If EPA must conduct the cleanup because the responsible parties will not do it voluntarily, the government can take court action to recover the costs.

To date, 32,506 potentially hazardous waste sites have been identified across the nation. Over 90 percent have been reviewed. More than 17,800 sites have been determined to require no further federal action; however, the states will have to clean up many of these. The number of sites listed or proposed for listing on the National Priorities List (NPL), which identifies the nation's most hazardous waste sites, comes to 1,207.

Cleanup, now completed at 52 NPL sites, has begun at 500 more sites. Short-term emergency actions were taken at 400 NPL sites to remove or control immediate threats to human health and the environment

Work has begun at most priority sites



while long-term cleanups got under way. Emergency actions also have been taken at another 1,300 sites not serious enough to be on the NPL but posing threats that needed to be addressed quickly.

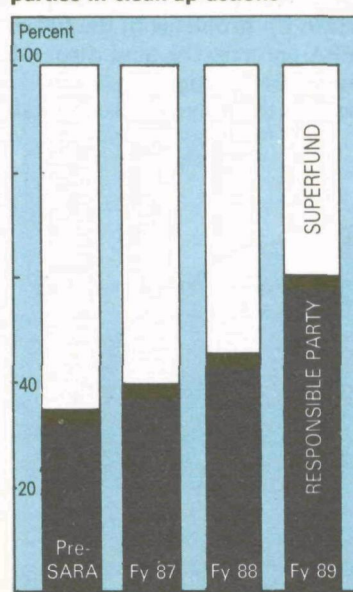
As part of SARA, Congress directed EPA to focus on permanent remedies for Superfund sites rather than simply containing untreated wastes on site. Treatment of wastes is now a major component of the remedies selected for many sites. Tremendous efforts are underway to develop the

technologies for permanent clean-up remedies. Under the Superfund Innovative Technology Evaluation Program, EPA is evaluating new technologies to destroy, immobilize, or reduce the volume of hazardous waste. EPA also is committed to increasing innovative technologies to apply to contaminated soils and ground water.

The number of abandoned hazardous waste sites has turned out to be much larger than was predicted when Superfund was created. Furthermore, cleanup has turned out to be complex, taking more time and resources than expected to complete the job.

After a recent review of the Superfund program, EPA is implementing a strategy for better managing cleanups in the 1990s. The strategy calls first for eliminating acute health threats. This has been accomplished at all current NPL sites. Long-term, more permanent cleanups then are conducted on a priority basis—the worst problems at the worst sites first. EPA is also accelerating the clean-up process and expanding the development and use of new technologies at sites. So that more cleanups can be conducted, EPA is placing greater emphasis on cleanup by those responsible for the waste. Finally, EPA is expanding the role of communities near the sites in clean-up decisions.

EPA is involving more responsible parties in clean-up actions



Underground Storage Tanks

Over two million underground tanks across the country store petroleum and other chemicals beneath gas stations and other operations. Chemicals escaping from these tanks can contaminate drinking-water supplies; fumes can cause health and safety hazards. EPA is working with the states to develop programs for cleaning up contamination from leaking tanks and preventing future leaks.

Regulations developed by EPA since 1984 now call for tank registration, leak detection, and leak prevention. Owners and operators must meet a range of requirements for the design, construction, and installation of their systems, including repair or closure of systems that do not meet the requirements.

EPA estimates that 20 percent of the regulated tanks are leaking or have the potential to leak. As of 1990, 63,000 releases had been confirmed, with one-third of these releases brought under control. If a leak occurs, regulations require that it be

cleaned up appropriately. In addition, owners and operators must demonstrate their capability to pay for clean-up costs or for damages resulting from leaks. A \$500-million Leaking Underground Storage Tank Trust Fund, established by Congress in 1986, can also be used by states for clean-up actions under certain circumstances.

State and local governments are in the best position to regulate underground storage tanks because of the high variability of soil and ground water in which the tanks are buried and because there are so many tank owners and operators—750,000 nationwide. In the future, states will become completely responsible for operating this program, although EPA will still identify and promote the most effective and least costly clean-up technologies. EPA will also continue to help states create innovative funding mechanisms to pay for cleanups.

Radioactive Waste

Radioactive waste, generated by both the commercial sector and the U.S. federal government, is usually classified as follows: *low-level waste* from activities such as research, diagnostic and therapy medicine manufacturing, electric power generation, and defense programs; *spent fuel and high-level radioactive waste* from nuclear reactors; *transuranic waste* (man-made radioactive atoms that are heavier than uranium) from defense programs; and *waste from mining and milling of uranium and thorium ores*.

In 1985 EPA issued standards for the management and disposal of spent nuclear fuel, and high-level and transuranic wastes. However, litigation forced the Agency to reconsider the standards that applied to release limits for permanent disposal systems for these wastes. EPA plans to repropose the standards in 1991 and promulgate them by 1992.

EPA also expects to promulgate standards in 1991 for

management and land disposal of low-level radioactive waste. The standards for commercial sites will be implemented and enforced by the Nuclear Regulatory Commission. The U.S. Department of Energy will implement EPA standards for federal government facilities.

In the 1990s, EPA will support regulatory efforts by providing better public information and education to help develop a balanced perception of the risks associated with radioactive wastes. By emphasizing technology transfer, the Agency will also make available EPA expertise in risk assessment and other skills needed by states and the private sector. EPA will promote pollution prevention by focusing on industrial processes and waste-segregation efforts that could significantly reduce the volume of contaminated waste.

Bioremediation: The Alaskan Oil Spill

In March 1989, the *Exxon Valdez* ran aground on Bligh Reef in Prince William Sound, flooding one of the nation's most pristine and sensitive environments with approximately 11 million gallons of crude oil. The spill, the largest in U.S. history, spread over 700 to 800 miles of shoreline, damaging the area's diverse wildlife and directly affecting the lives of many Alaskans.

A massive cleanup using conventional techniques such as booms, high- and low-pressure spraying, skimmers, and manual scrubbers was organized to remove oil from the

surface of rocks and beaches. These techniques, however, removed only a fraction of the oil on beaches, under rocks, or in beach sediments.

For years, EPA had been studying the use of microorganisms such as bacteria to enhance the degradation of oil and other chemicals. Until the *Exxon Valdez* accident, however, no microbial processes had been developed for removing crude oil from contaminated beaches.

In June 1989, EPA entered into an agreement with Exxon to test bioremediation for treating beaches in Prince

William Sound. Nutrient-rich fertilizers were applied to selected test beaches, allowing microorganisms to use the oil as food and thus degrade it.

Initial findings from field and laboratory tests during the summer of 1989 indicated that using nutrients to enhance biodegradation is effective and environmentally safe. All the treated areas appeared steadily cleaner through the end of the summer season, and no adverse ecological effects from the nutrient application were detected. EPA along with Exxon, the Alaskan Department of Environmental Conservation,

the Coast Guard, and the National Oceanic and Atmospheric Administration undertook further studies in the summer of 1990.

To date, the results are very encouraging. Tests have shown no toxicity associated with fertilizer application. A single application of fertilizer has been shown to increase the rate of oil biodegradation by two to three times over the rate of an untreated shoreline. This accelerated rate is sustained for several weeks, even after nutrient concentrations return to background levels.

Emergency Planning and Community Right-to-Know

The Emergency Planning and Community Right-to-Know Act of 1986, commonly known as Title III (of SARA), provides communities with unprecedented access to information about toxic chemicals in their communities and creates mechanisms for minimizing the threats posed by these chemicals. The law calls for extensive data collection and for the creation of State Emergency Response Commissions to guide state-by-state planning for chemical emergencies. The Commissions, in turn, have created Local Emergency Planning Committees to ensure community participation and planning. This has resulted in enormous public pressure on industries to reduce toxic releases and fostered better planning to prevent and respond to chemical emergencies.

One of the most visible features of Title III has been the Toxics Release Inventory (TRI), an annual inventory of toxic releases and transfers from over 20,000 manufacturing facilities nationwide. The TRI contains extensive data on more than 300 toxic chemicals, waste-management practices, and quantities of releases to the air, water, and land. TRI is based on the premise that the public has a right to know about toxics that may affect health or the environment. TRI data are available in many forms, including printed reports and computer access, at libraries or through EPA's TRI reporting center. A TRI National Report summarizes the data annually and provides detailed analyses of the types of releases and their sources. The information is a lever for action, as citizens exact pledges from local manufacturing facilities to reduce toxic discharges.

EPA expects the Toxics Release Inventory to be an important national tool for promoting pollution prevention and for documenting the success of pollution-prevention efforts in the 1990s. TRI continues to evolve: Chemicals of little or no toxic concern are removed from the list, while others are added. EPA is exploring improvements: collecting information on "peak releases" of toxics, expanding the types of industries required to report, and collecting data on pollution prevention at the reporting facilities.

The Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) have a unique place in environmental legislation. Most environmental laws regulate wastes, emissions, contaminants, or by-products, but TSCA and FIFRA can regulate how commercial chemicals are used. EPA has three main goals in dealing with commercial chemicals: *preventing* chemicals which pose an unacceptable risk from entering the market in the first place; *managing* the use of chemicals that are inherently risky, so that society can continue to reap their benefits; and *removing* chemicals from the market when the Agency determines that they pose an unacceptable risk.

Toxic Chemicals

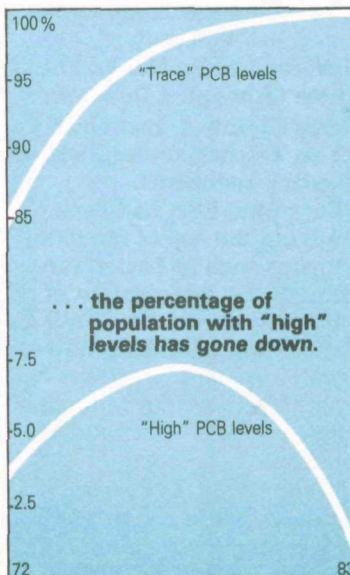
One of the main ways EPA controls toxic chemical risks is by preventing dangerous chemicals from being used at all. Since TSCA was enacted in 1976, EPA has reviewed more than 15,300 new chemicals proposed for commercial use. Most were determined to pose no unacceptable risk. However, several hundred were targeted for regulatory action, and hundreds more were withdrawn by their manufacturers in the face of anticipated action.

In 1984, EPA determined that TSCA authority could be extended to the oversight of products developed through biotechnology. EPA is now preparing regulations to implement the review of genetically modified microorganisms.

TSCA also authorizes the Agency to regulate chemicals already in use that have proved to pose an unacceptable risk to human health or the environment. EPA created one of the first comprehensive inventories of existing chemicals in the world. To aid in the huge task of assessing the 68,000 chemicals in the inventory, EPA can require manufacturers or processors to test chemicals if the Agency determines they may pose unacceptable risks and available data are insufficient to assess them.

Congress and EPA have determined that several chemicals pose an unacceptable risk, and the Agency has regulated them under TSCA. In 1978, EPA instituted regulatory controls over the manufacture, use, and disposal of polychlorinated biphenyls (PCBs) and banned aerosol uses of chlorofluorocarbons (CFCs). In 1989, the Agency banned the manufacture of most asbestos products; EPA has provided considerable grants and guidance

While nearly everyone has "trace" levels of PCB's . . .



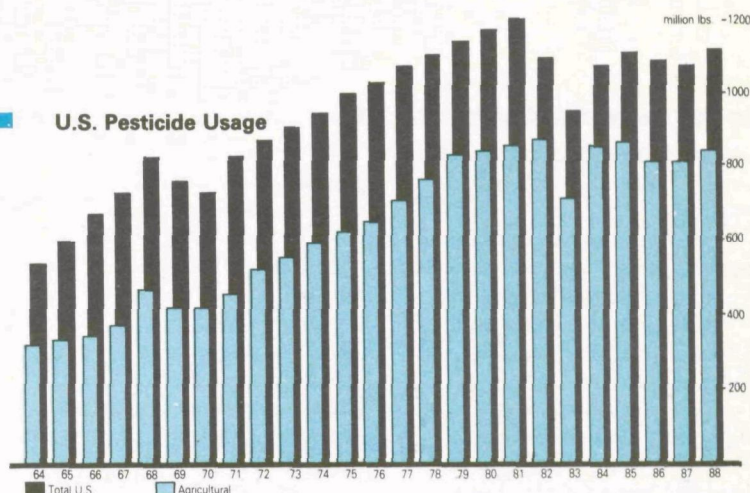
to protect children from exposure to asbestos previously installed in schools.

Under TSCA, EPA has gathered information on potential exposures, as well as health and environmental data, that many EPA programs and other federal agencies have used to better assess and reduce chemical risks.

EPA has undertaken a special effort to revitalize its review of the safety of existing chemicals in the 1990s. The strategy includes linking chemical screening more directly to risk management. The Agency will screen clusters, or like groups, of chemicals together. Screening activities will build on growing international efforts in which EPA is already a key player. To maximize productivity, rules for testing will be developed for groups of chemicals wherever possible.

The EPA pesticide program is the only one that licenses the use of chemicals, many of which are potentially hazardous to people or the environment. Unlike most commercial chemicals, most pesticides are designed to kill or otherwise control specific organisms. In doing so, they offer a wide variety of agricultural and other benefits for society.

Before a new pesticide may be marketed or used in the United States, it must be "registered" by EPA. In registering a new pesticide, the Agency is responsible for ensuring that the chemical, when used according to label instructions, will not present unreasonable risks to human health or the environment. The nation's pesticide law (FIFRA) requires EPA to take into account economic, social, and environmental costs and benefits in making registration decisions. If data indicate that a pesticide's risks may outweigh its benefits, EPA can simply refuse to register the product, or, it can lessen the



risks by limiting the amount of pesticide applied and/or limiting frequency or location of application; EPA can also restrict the use of the pesticide to only specially trained, certified applicators.

Before a pesticide is registered for use on a food or feed crop, a "tolerance" or residue limit must be set by EPA. Both domestically produced and imported foods are monitored to be sure that they comply with the tolerances.

In addition to registering new pesticides, EPA also is undertaking the monumental task of re-evaluating the safety of older pesticides already on the market.

EPA's pesticide program has a noteworthy record of accomplishments. Over the past 20 years, the Agency banned DDT (resulting in the dramatic return of the bald eagle), canceled the registrations of 34 other potentially hazardous pesticides, and eliminated the use of 60 toxic inert ingredients in pesticide products. EPA disposed of all stocks of the banned pesticide EDB and is currently disposing of dinoseb, banned in 1986.

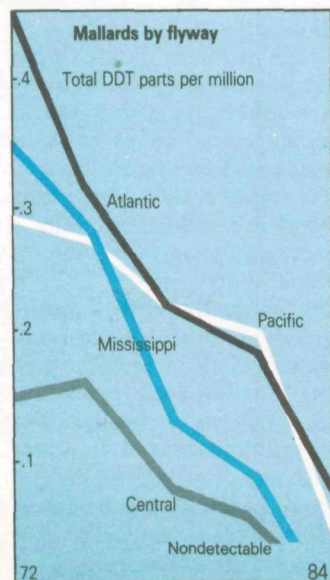
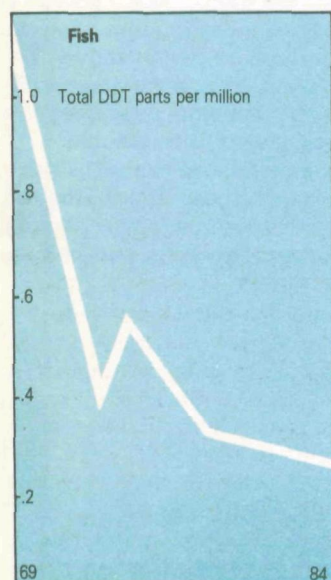
The Agency trained and certified 250,000 commercial pesticide applicators and over one million farmers. It established the National Pesticide Telecommunications Network, providing a toll-free number for

obtaining information on the use and disposal of pesticides, and how to recognize and manage pesticide poisonings (1-800-858-PEST). In 1990, EPA completed a nationwide survey of the extent of pesticide contamination of ground water and developed a strategy to protect drinking-water sources from becoming contaminated. The Agency is also implementing a program to protect endangered species from pesticides.

Although EPA is promoting the use of fewer and safer pesticides, the Agency is bound to discover additional pesticides that pose undue risks and require regulatory control. The Agency learned from its experience with the EDB and Alar situations during the 1980s that it needs to act more quickly when new data on old pesticides show evidence of unreasonable risks. The pesticide industry has become more responsive when serious questions arise about the safety of existing pesticides.

In the cases of the EBDC fungicides, aldicarb, and mercury in paint, manufacturers took voluntary action to halt problem uses of these pesticides while EPA's risk/benefit assessments continued. Under the President's leadership, EPA worked with other federal agencies to propose sweeping new food safety and pesticide regulation reforms. The proposed legislation includes

Levels of persistent pesticides have declined in fish and wildlife



COSTS AND BENEFITS

measures to reduce by half the time it takes to cancel a bad pesticide.

Pesticide usage in the United States appears to have stabilized in recent years, after steadily increasing in the 1960s and 1970s. The 1990 Farm Bill, currently before Congress, contains a number of provisions that could further reduce agricultural pesticide use and enhance environmental quality.

Since the United States is both an important exporter of pesticides and a major importer of food commodities, EPA is making significant efforts to prevent pesticide misuse and overuse in other countries. Further, the Agency wants to facilitate international trade in agricultural commodities by harmonizing U.S. and international pesticide standards. EPA has developed goals for international pesticide activities and has proposed a policy that would restrict the export of pesticides banned in the United States.

Total annual costs for pollution control in the United States have increased from \$26 billion in 1972 to \$85 billion in 1987 (all costs are in 1986 dollars using annualized costs at a 7-percent discount rate). Thus in 1972, the nation was devoting less than 1 percent of GNP to pollution control and is now spending close to 2 percent of GNP for the protection of the environment. By the year 2000, annual costs are expected to equal almost \$160 billion or about 2.8 percent of GNP.

Annual new investment in pollution-control capital reached a peak in the mid-1970s at about 3.4 percent of total capital investment and has been decreasing irregularly since then. In 1987, it stood at 2.3 percent; it is projected to rise to about 3 percent in 1990 and to fall to 2 percent by 2000. It is unlikely to have a significant effect on capital markets.

Breaking down total expenditures by media shows that in 1975, 32 percent of the total was for air and radiation, 48 percent for water, 20 percent for land (including solid-waste collection and disposal), and less than 1 percent for chemicals. By 1987, air and water expenditures had decreased about 4 to 5 percent each, and land had increased by 6 percent of the total.

By 2000, these allocations are expected to increase to 30 percent for air, decrease to 35 percent for water, and increase to 32 percent for land. Within the land category, cleanup of hazardous waste, including federal facilities and the underground storage tank program, accounts for the bulk of the increase.

Total costs incurred by the public and private sectors have remained fairly stable over much of the period 1972-1987. In 1987,

EPA accounted for approximately 8 percent of total costs, non-EPA federal agencies 3 percent, state governments 4 percent, local governments 22 percent, and the private sector 63 percent. In the next decade, EPA, the states, and the private sector are expected to account for somewhat lower shares of total costs, while the shares for non-EPA federal agencies and local governments will increase.

By the year 2000, it is estimated that EPA will account for less than 7 percent of total costs, non-EPA federal agencies almost 8 percent, state governments almost 3 percent, local governments 23 percent, and the private sector about 60 percent.

The increase in financial burden for pollution control placed on local government will be felt by taxpayers and utility rate payers, with small communities particularly affected. Potential cumulative cost of the environmental regulations in the municipal sector may require that the average national household spend an additional \$100 per year by 1996. Both municipalities under 2,500 persons and over 250,000 persons will experience the largest average increases in total user charges and fees paid on a per-household basis, with potential average annual increases in user charges and fees of \$170 and \$260, respectively. The dramatic change in small communities' burdens may warrant some mitigating measures.

The nation has earned a significant return for its investments in environmental protection. Emissions and ambient concentrations of pollutants have generally declined or, in a few cases, remained constant even though population and economic activity have steadily increased. These trends indicate that

substantial health, welfare, and ecosystem damages have been avoided as a direct result of federally mandated pollution controls. For example, the phaseout of leaded gasoline over an eight-year period has cost about \$3.6 billion. The quantifiable benefits, on the other hand, add up to more than \$50 billion, including nearly \$42 billion in medical costs avoided.

In terms of percentage of gross domestic product, the United States has spent somewhat more on environmental protection than have many Western European nations. For example, in 1985, the most recent year for which data are available for most of these countries, non-household pollution-control expenditures in the United States were 7 to 74 percent higher than comparable expenditures in the Netherlands, the United Kingdom, France, and Norway, and 6 percent less than in West Germany. This may make U.S. goods traded in international commerce somewhat less competitive, but the difference is small and appears to be shrinking over time.

Nevertheless, it is imperative that the United States pursue all opportunities to make protection efforts more cost-effective. To this end, EPA is expanding its use of economic incentives as a supplement to traditional "command and control" strategies and is also developing its capabilities in strategic planning, economic analysis, and pollution prevention. □

Facts to Reflect On*

by Ross Ettlin

EPA workforce in 1970: 5,500
EPA workforce in 1990: 17,170
EPA budget in Fiscal Year (FY) 1971: \$1,289,000,000
EPA budget in FY 1990: \$5,145,000,000
Percent of EPA's budget allocated to regional offices in 1981: 15
Percent allocated to regional offices in 1991: 43
Increase in the U.S. population from 1970 to 1990: 48 million
Present ratio of increase in cars to the increase in U.S. population: 2:1
Estimated percent increase in ambient carbon monoxide by 1990 if 1970 emissions controls had remained unchanged: 140
Number of ozone molecules one chlorine atom can destroy: 10,000
Global carbon-dioxide concentrations in 1970 (parts per million): 320
Global carbon-dioxide concentrations in 1986 (in ppm): 346
Lung cancer deaths each year EPA estimates are due to radon: 5,000-20,000
Major federal environmental statutes EPA administers: 11
Pages of EPA statutes (1989): 670
Total number of EPA regulations in 1989: 9,000
Money awarded EPA in civil and criminal penalties in 1989: \$45,300,000
Times EPA officials testified before Congressional oversight committees in 1989: 168
Letters to EPA's Administrator and Deputy Administrator in 1989: 49,052
Freedom of Information requests submitted to EPA in 1989: 35,205
Number of times the Superdome in New Orleans could be filled with the hazardous waste produced annually in the United States: 1,500
Superfund sites placed on the National Priorities List (NPL) by end of 1982: 418
Sites on the NPL by end of 1990: 1,207
Superfund sites with clean-up work completed to date: 52
Emergency hazardous waste removals under the Superfund program: 1,700
Acres of wetlands lost annually in the United States: 350,000-500,000
Percentage of U.S. municipal landfills expected to reach capacity in 15 years: 70
Percentage of Americans who rely on ground water as drinking water: 50
Approved local pre-treatment drinking water programs as of 1983: 65
Approved pre-treatment drinking water programs as of 1990: 1,442
Estimated number of underground storage tanks leaking or potentially leaking and contributing to ground-water contamination: 400,000
Average level of DDT found in humans in 1970 (in parts per million): 8.0
Average level of DDT found in humans in 1983 (in ppm): 2.0

*With all due appreciation for the example of "Harper's Index"

(Ettlin is an editorial assistant with EPA Journal.)

Win/Win on the Environmental Front

by Frederic Krupp

Twenty years ago, power plants sent acrid smoke into our skies. Pesticides poisoned people, water, and wildlife. Forests were felled without a fleeting thought about the future. And through it all, most politicians and the public slept soundly in the soft comfort of the *status quo*.

Fortunately, since 1970, more and more people are waking up to the increasingly persistent signals of an environmental alarm clock trying to warn us that if we do not get up soon, it will be too late. And although there are politicians and corporate leaders that continue to hit the environmental snooze button, the growing consensus on the need for sweeping environmental action will soon rouse them from their slumber.

There can be no doubt that there is a growing consensus among the public that the environment must be considered in every decision. A recent Media General-Associated Press survey found that four out of five Americans believe pollution threatens the quality of their lives, that 75 percent believe current anti-pollution laws are too weak, and that Americans favor the prohibition of excessive product packaging.

Every indicator suggests Americans care about the environment, are beginning to take personal steps to protect it, and are starting to change their behavior and purchasing habits to ensure that we have a cleaner world. These new attitudes represent a dramatic change from the early 1970s.

In the two decades since the original Earth Day and the founding of EPA, the environmental movement's goals have permeated the American psyche, worked their way into the nation's laws, politics, and economic system. While we haven't made nearly enough progress, the progress we have achieved can teach us how to make more.

What approach is most powerful? The answer can be found in one word:

solutions. As it has grown, the environmental movement has increasingly recognized that behind the dams and power plants that threaten major environmental harm, there are often legitimate needs—and that long-term solutions lie in finding alternative ways to meet those underlying needs.

To see how the consensus on environmental protection has been promoted through the power of solutions, we need only look at perhaps the most poignant example of our environmental ills, one that rears its head no matter where we turn—waste.

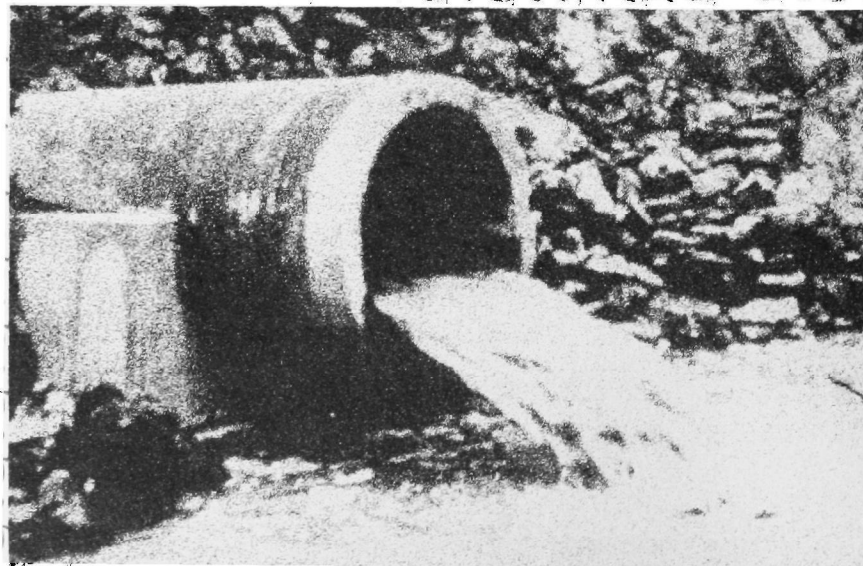
Until recently, environmental protection was based largely on dealing with pollution and waste after it had been produced. From sulfur dioxide to toxic residues to municipal refuse, the issue was not how much was produced, but where to put it. Today, from the highly touted programs initiated by corporate giants like PG&E and 3M to the increasingly powerful "green consumer" movement, the consensus among all parties has clearly shifted from disposal and treatment of emissions and

waste to the preferred approach of waste reduction.

Waste output and economic growth have tended to increase at corresponding rates. We must decouple the two if we are to protect our environment. Many companies have already found that by taking environmental protection into account at the very earliest stages of their planning, they can reduce the amount of pollution they produce while increasing profits.

Take for example, the case of California's Pacific Gas and Electric Company, the nation's largest investor-owned utility. In the late 1970s, the company was planning to spend nearly \$20 billion during a 10-year period on new coal and nuclear power plants. The company, and many utility regulators, said the plants were indispensable to California's economic health; others thought they would be an unbearable imposition on the state's environment.

An Environmental Defense Fund (EDF) team—a lawyer, an economist, and a computer analyst—developed a package of non-polluting alternative energy



(Krupp is Executive Director of the Environmental Defense Fund.)

sources and conservation investments, including cogeneration (use of waste industrial heat to generate electricity), voltage controls, and utility-financed insulation and efficiency improvements, that not only met the same electrical needs, but also meant lower prices for consumers and higher returns to PG&E's stockholders. The company ultimately adopted EDF's plan, and today it even pays to lease the computer model EDF used to develop the plan.

The alternatives not only made every one of the proposed large power plants (and the pollution they would produce) unnecessary, but it also helped the state avoid the financial disasters of half-built plants that plagued the Washington Public Power Supply System (WPPSS). Overly ambitious construction plans developed by WPPSS ultimately caused the multi-utility-owned operation to default on billions of dollars in construction bonds in the early eighties. Costly litigation on the default continues to this day, nearly a decade after the construction projects were halted.

In the decade since EDF unveiled its alternative plan, California utilities have not had to break ground for even a single large power plant. PG&E says 8 percent of its power now comes from cogeneration and about 2 percent from hydroelectric, solar, wind, and other renewable and non-polluting energy sources. These alternative supplies have left the state with spare capacity for at least the next eight years. And PG&E has invested more than \$1 billion in conservation. Clearly, the company's investment in preventing pollution has paid off.

Other companies, most notably 3M, have achieved similar success by keeping



3M photo.

the environment in mind when considering their corporate bottom line. The Minnesota-based company's much publicized "Pollution Prevention Pays" program is reported to have saved more than \$1 billion since its inception.

But the consensus on waste reduction and pollution prevention does not stop at the factory or power-plant gates, it has even been adopted by individual consumers. From West Germany's "Blue Angel" label, introduced in 1977, to America's more recent "Green Seal" program, the so-called "green consumer" movement is on the rise.

A July 1989 survey found that 77 percent of Americans say a company's environmental reputation affects what they buy. Based on these consumer demands for greener products, Proctor & Gamble last year introduced a detergent in a reusable container. Wal-Mart has asked its suppliers to provide more recycled and recyclable products; hundreds of them are now on the shelves. K-Mart and at least a dozen grocery chains have announced similar programs, all based on consumers' demands for products made from recycled materials or for products that produce less waste. What steps the Federal Trade Commission may take to regulate environmental claims will be important in determining whether consumers are offered genuine "Earth-friendly" alternatives or, through false marketing hype, are misdirected in ineffective or even counterproductive ways.

The growing trend toward recycling around the country also reflects the logical and powerful appeal of the "waste-avoidance" solution. Though not

"Pollution Prevention Pays" program of the Minnesota Mining and Manufacturing Company. By switching to a water-based system to coat medicine bottles, 3M eliminated 24 tons of solvent emissions. Such waste prevention initiatives are clearly "win/win" solutions, attaining both environmental and economic aims.

as preferred as true waste reduction, recycling is the best way to handle many materials. It avoids pollution, saves energy, and conserves natural resources. As landfill costs have soared and incinerators have proved hard to site and operate, many cities and towns have turned to recycling to shrink their growing waste disposal problems.

For example: 82 percent of the households in Olympia, Washington, have signed up to receive special recycling containers, and more than 92 percent of the people living in Barrington, Illinois, participate in the city's voluntary curbside recycling program.

According to a recent issue of *BioCycle* magazine, the number of curbside recycling programs nationwide increased from 1,042 in 1988 to 1,518 in 1989—an increase of 46 percent in one year. Current estimates suggest the new popular programs are being introduced at an accelerating rate.

The approach of tackling environmental problems through the advocacy of constructive solutions has had a great deal of success in the last 20 years. But that does not mean that the environment does not face continued challenges. The news that humankind has punched a hole in the ozone layer and threatens to warm the entire globe indicates that tinkering is not enough—we need fundamental changes. Mere opposition is seldom enough to win those changes. The true successes of the last 20 years demonstrate the power of proposing solutions.

The environmental movement must move forward with consumers and industry, showing people not only what *not* to do, but also what can be done to ensure safe, sustainable growth. The American public does not want to be faced with a continuing draconian choice between improving our economic well-being or preserving our health and natural resources. With the increasingly popular problem-solving approach to environmental protection, we can have both. □

Outfalls are still with us, but discharges are cleaner than they once were. One of EPA's first priorities was to reduce pollution coming from specific, identifiable sites called "point sources." The emphasis is now shifting toward control of diffuse, "nonpoint" sources.

Starting Fresh with Environmental Education

by Senator Quentin Burdick

America's young people aren't waiting to express their concerns about the environment. Pictured is three-year-old Collette Taylor, among the demonstrators at a Rocky Flats protest held at the Colorado capitol last year.

As any parent knows, it is more effective to teach an infant not to throw food than to clean the kitchen floor after each meal. Likewise, it is easier to increase environmental awareness than it is continually to clean up waste, pollution, and other damage to the environment.

EPA has grown significantly in the last 20 years as it has faced increasingly complex and interrelated environmental problems. So far, the emphasis of EPA's expanded mission and programs has been largely on cleaning up long-standing, obvious pollution. But for cost-effective environmental protection, both EPA and Congress need to focus on education and pollution prevention.

The advantages of preventing pollution before it occurs are increasingly apparent. The Superfund program, for example, demonstrates how complicated and expensive it can be to restore land that has been polluted by hazardous chemicals. The Exxon Valdez oil spill in a formerly pristine area spurred Congress finally to adopt comprehensive legislation both to strengthen response to oil spills and to prevent future accidents.

The nation faces an enormous challenge in terms of preventing pollution, global warming, and ozone depletion and promoting resource conservation, recycling, and waste reduction. Government and concerned citizens can do much to curtail pollution from specific sources. Each individual who adopts better habits at home and at work helps reduce waste and conserve resources.

We must encourage Americans, especially young people, to do their part to protect the environment. Investing in environmental education may be the best way the government can build a foundation to address effectively a multitude of pressing national and global environmental problems.

The obvious place to start educating the public about the environment is the classroom. Children are curious about the natural environment and can adapt to

an environmentally conscious lifestyle more easily than adults. And today's young people will need the planet's dwindling, precious resources in the next century.

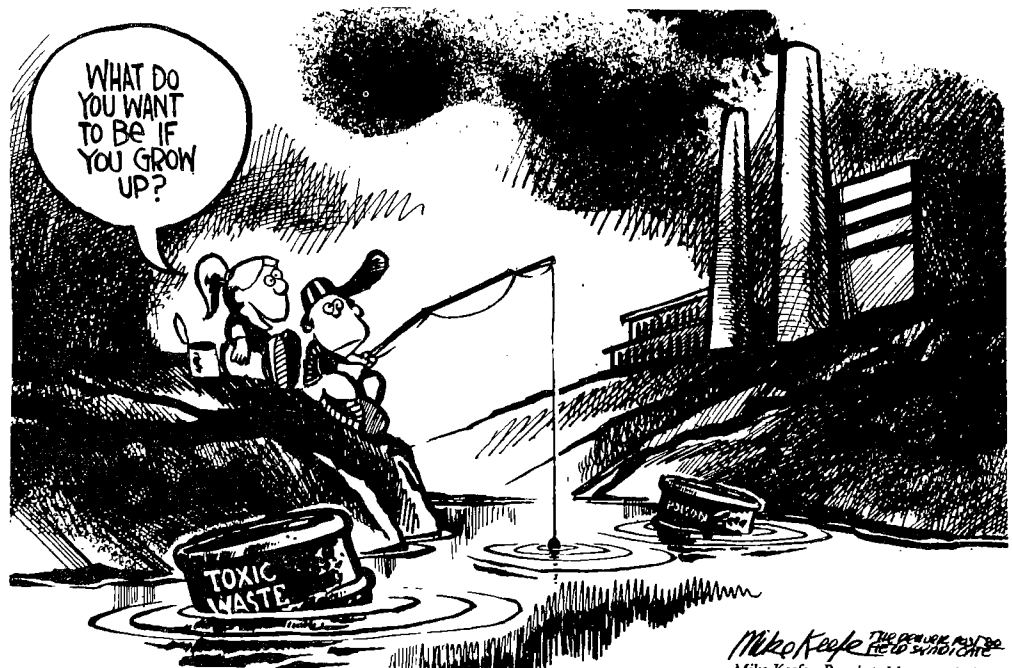
Just as we require courses in math, science, English, and history, we should include environmental education in every student's education. Teachers, counselors, and even lunchroom personnel should be alert to opportunities to teach young people about reducing waste, recycling, conserving resources, and other ways to help preserve the environment and natural resources. Encouraging these activities is what environmental education is all about.

Environmental education is not a new idea; in fact, the need for federal support on this front was recognized in the late 1960s. The first Earth Day, in April 1970, sparked new interest in national and international efforts to preserve the planet. Just before EPA's creation that year, Congress passed the National Environmental Education Act, sponsored by Senator Gaylord Nelson. The program was based at the Department of Education and had great potential to bring environmental issues into the classroom.

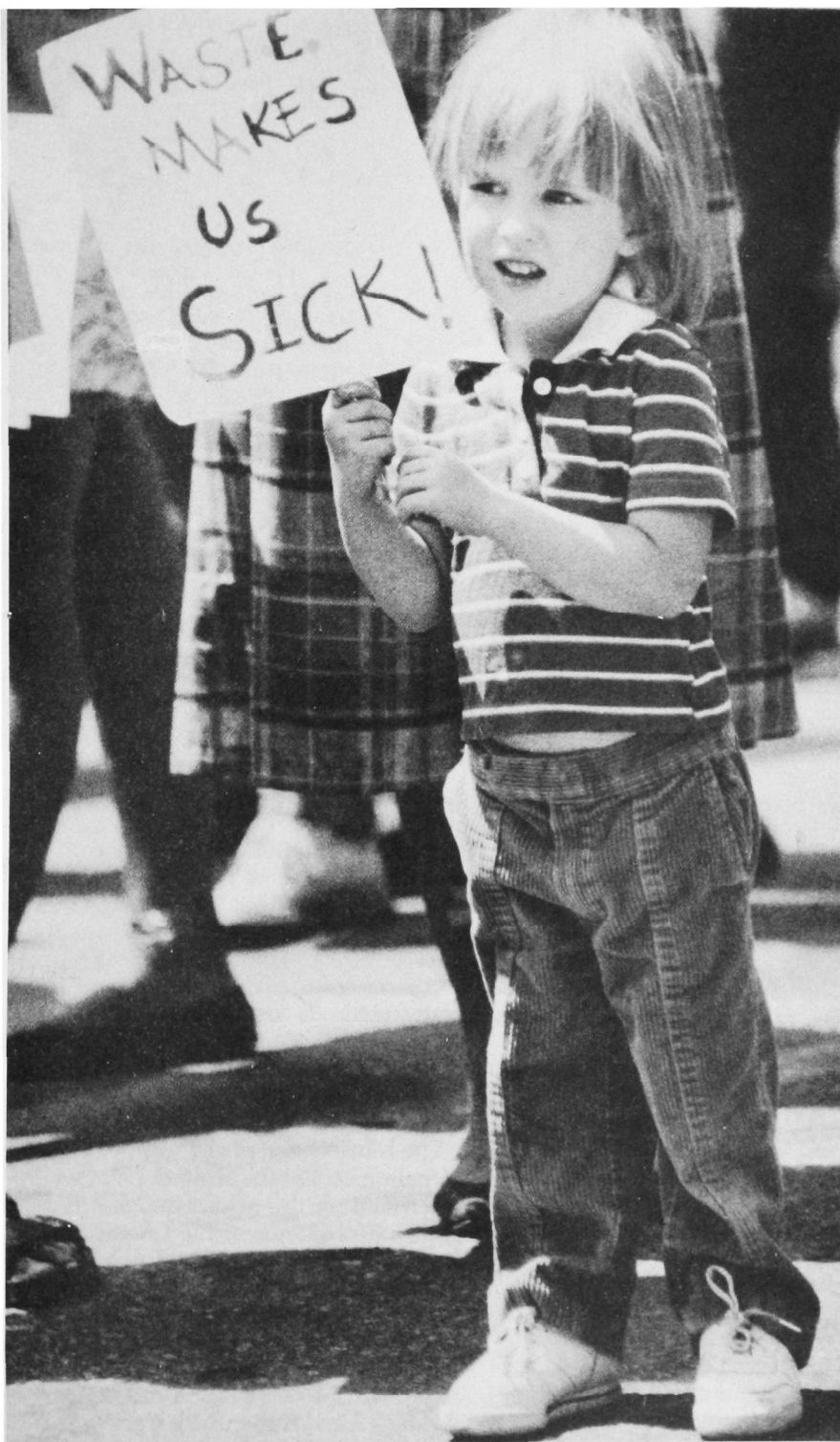
Yet while EPA grew into a vital regulatory force, the environmental education program never took off. The program died after just 10 years because of underfunding and lack of aggressive implementation by the Department of Education. The Act was repealed in 1981 as part of the Omnibus Budget Reconciliation Act.

I believe it's time to reestablish our nation's commitment to environmental education. Last year, looking toward the 20th anniversary of Earth Day, I introduced the National Environmental Education Act; Representative George Miller (D-California) introduced companion legislation in the House. The goal of this legislation is to renew the federal role in environmental education.

Twenty years ago, the Department of Education was the best agency to coordinate environmental education. Today, EPA is best equipped to implement a strong environmental education program. EPA knows firsthand the many problems facing our environment—oil spills, global warming, ground-water contamination, hazardous waste disposal, radon gas, and others. The National Environmental Education Act therefore proposes to give EPA the primary role in environmental education.



(Burdick (D-North Dakota) chairs the Senate Environmental and Public Works Committee.)



Recognizing budget constraints, I do not propose an elaborate program. The bill authorizes \$15 million per year to:

- Establish an Office of Environmental Education at EPA
- Expand curriculum development and teacher training
- Provide small grants to local school systems and colleges
- Support college-level environmental interns in federal agencies
- Provide national and regional awards to recognize excellence in environmental education.

An EPA Office of Environmental Education could work with the Department of Education to provide environmental-education training for classroom teachers and develop model curriculum. Each classroom teacher who becomes more aware of environmental issues and integrates environmental concerns into his or her curriculum could reach dozens of schoolchildren each year.

Also, the new office would administer a grant program to support innovative environmental-education programs and projects. Grants would be capped at \$100,000, and 25 percent would be for \$5,000 or less. The possibility of even

limited federal funding could be a major incentive for a school to produce creative environmental-education ideas and projects.

Internships established in federal environmental and natural resource agencies would allow college students to see the rewards of environmental work. I often hear complaints about the shortage of scientists and other professionals trained in environmental areas who are willing to work in government. Part of the long-term solution is to attract more young people to pursue environmental careers.

Our society recognizes excellence in many areas, ranging from athletic ability to entertainment to financial success. But we do little to recognize exceptional commitment to the environment. I propose establishing several awards for environmental educators, including awards in honor of Henry David Thoreau, Theodore Roosevelt, and Rachel Carson. These environmental heroes are perfect examples of what individuals can do to protect our natural resources.

The new office could encourage other environmental education efforts as well. Across the nation, nonprofit organizations, local and state educational agencies, and other federal agencies (e.g., the Fish and Wildlife Service and the National Forest Service) are implementing a wide range of environmental education programs. This legislation is designed to complement, not supplant, those efforts.

The 20th Anniversary of Earth Day renewed both Congressional and public interest in protecting the planet. Establishing an Office of Environmental Education and fully implementing these programs would be a major step forward for environment protection. As indicated in testimony before my committee, EPA is ready and willing to accept this challenge.

Over the long run, we will need widespread public understanding of complex environmental problems to protect our air, our water, and the world around us. A small investment in environmental education could make a big difference in our planet's future.□

Editor's note: In its closing days, the 101st Congress passed environmental education legislation similar to that described in this article.

Rediscovering Ecology

by Douglas P. Wheeler
and Douglass Lea

Complex problems, like cleaning up the Chesapeake Bay, require complex responses. Around 1975, ecological thinking began to regain momentum as people realized that treating the bay solely as a water-pollution problem wasn't enough. Pictured is a skipjack, a traditional vessel on the bay.

More than two decades have passed since the U.S. government last mounted a comprehensive and effective response to overwhelming evidence of widespread environmental destruction. In the tradition of other "wars" on persistent problems, Congress and the Nixon Administration identified the key enemy of the era—the pollution and waste of important resources—and mobilized a response that was vigorous, sweeping, and, apparently, decisive. New policies were declared; new agencies, including EPA, were created; and initiatives were launched against specific environmental problems, bringing a vast array of laws with strange acronyms.

Meanwhile, outside the confines of government actions, the American public was engaged in the first stirrings of a new environmental and conservation ethos. Earth Day 1970 symbolized the new ethos, but the changes in public consciousness were too pervasive and gradual to be captured by a single event in the same way that Pearl Harbor, for example, stands for the advent of World War II. Grassroots politics began to take on a green coloration. The major environmental organizations expanded rapidly in wealth, power, and numbers. Millions of individuals changed their everyday patterns of external behavior to reflect changes in internal values and consciousness.

Even basic vocabulary was affected. Emerging from the closets of arcane science, the word *ecology*, for instance, entered everyday language, becoming, in fact, a rather common usage. Thus, for example, a biographer of the late Lewis Mumford, distinguished authority on cities and architecture, described Mumford's mindset as follows:

Above all, Mumford's ideal cities incorporate "balance" and

"wholeness"—two attributes that sum up his approach to life. He was this century's leading proponent of "ecological thinking," a way of seeing life whole in all its variety and interconnectedness. Like a biologist at work in nature, he ceaselessly searched for interrelationships, and he always placed the subject he was writing about—a book, a building, or an entire city—within its larger cultural context.

To halt the decline of an ecosystem, it is necessary to "think like an ecosystem."

Unfortunately, however, the popular new word and the holistic thinking it conveys were largely ignored in official discourse. During the late 1960s and early 1970s, while the strategies and organizations for waging war on environmental enemies were taking shape, the accompanying debate fell into traditional ways of thinking about problems: linear and fragmented, based on discrete cause-and-effect relationships and case-by-case distinctions. The most congenial settings for this kind of thought are the courtroom, the classroom, and the laboratory, those very settings where variables can be controlled, abstractions applied, and anomalies rationalized. The real world, of course, is messy and demands an epistemology, a system of knowledge, of its own—one that is something like ecology.

Ecological thinking had to wait, however, until the limits of the traditional approaches became obvious and burdensome. Ironically, the founders of the modern conservation movement, who prepared the ground for the initiatives of 20 years ago, were chiefly concerned with the use and abuse of land and, therefore, were ecologists in

fact, if not yet in name. Listen to the language of "The Land Ethic," the classic essay in *A Sand County Almanac*, written in 1949 by an environmental founding father, Aldo Leopold: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

The new report from EPA's Science Advisory Board (SAB), *Reducing Risk*, is a strong signal that the time for ecological thinking finally has arrived. For example, the report recommends that EPA, in considering risks, give as much attention to ecological processes as it does to human health; it also recommends that the Agency develop better methods for estimating the real value of ecosystems. In a sense, the SAB report merely ratifies changes already begun at EPA and, indeed, in the larger environmental community.

The rediscovery of ecology really began to gain momentum around 1975, when interested parties acknowledged that the growing problems of the Chesapeake Bay, once the world's most productive estuary, were possibly intractable. Certainly they were resistant to traditional problem-solving techniques. On the theoretical level, the Chesapeake dilemma is an expression of W. Ross Ashby's Law of Requisite Variety. Basically, Ashby's law says that a system of strategic control succeeds only to the extent that the strategic system develops a complexity equal to that of the system it seeks to encompass and influence.

Although developed in the context of cybernetics (the study of automatic control-and-communication systems), Ashby's law applies to ecology with special relevance. By 1975, it was widely known that the complex causes of biological decline in the Chesapeake basin, an incredibly dense ecosystem, would defeat all attempts to apply simple solutions, particularly those relying on command-and-control models. The complexity of the problems demanded an equivalent complexity in terms of response. Hence, the usefulness

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of the Law of Requisite Variety--and the rediscovery of ecological thinking. To halt the decline of an ecosystem, it is necessary to "think like an ecosystem."

Over the past 15 years, EPA officials have gradually learned to think comprehensively about the Chesapeake's watershed and to use the Agency's full arsenal of offices and authorities to address the various dimensions of the system's deterioration. Moreover, to generate the "requisite variety" of response strategies, a vast array of auxiliary organizations, jurisdictions, and disciplines have been brought to bear on the bay's problems. Now state and local governments and nonprofit organizations all play leading roles in the continuing drama.

Similarly, a focus on the bay as an ecological system means bringing together a complex weave of talents and perspectives. For example, Will Baker, President of the Chesapeake Bay Foundation, which has mobilized grassroots support for the bay, says, quite pointedly, "What happens on the land affects the water. We've learned that you cannot save the bay unless you save the land."

As the Chesapeake Bay experience has shown, attacking water pollution alone is

no longer sufficient. Greenways and setbacks are necessarily part of the program. Non-point sources of pollution, buffer zones, organizational conferences, nutrient levels, and sustainable growth: All of these things are being considered in relation to each other.

Thus pesticides are being tested in the field. Species population levels and predator-prey ratios are attracting more interest than the one-dimensional effects measured on indicator species in laboratories. Microcosms and ecosystems hog the spotlight. Overall satisfaction with the evolution of the Chesapeake Bay program has led EPA to develop a National Estuary Program that replicates the Chesapeake approach in 17 other estuaries and in the Great Lakes region.

The challenge today is to move the ecological approach beyond its present tentative, patched-together status. By linking together ecology and human health and calling for a reevaluation of accounting methods that undervalue ecological resources, the SAB report highlights important steps toward establishing a firmer foundation for ecological initiatives. Recent diplomatic conventions designed to decelerate the destruction of the planet's protective ozone layer and the buildup of greenhouse gases provide international legitimacy to ecology's traditional

concerns about the interrelatedness of apparently distant and superficially discrete phenomena.

Taking ecology into the very heart of our educational system is the last frontier. It is important, therefore, to follow the recent opening of EPA's Office of Environmental Education with a legislative mandate to spread ecological awareness to even the youngest and most unlikely of our citizenry. To cope with the complexity, turbulence, and uncertainty of the 21st century, the next generation will need to be extraordinarily well prepared in the ecological sciences and sensibilities. That generation will be forced to do nothing less than anticipate the unpredictable, plan for the unintended, and prepare for the unexpected.

All knowledge and skill become problematic under conditions of rapid change. Thus, education, of necessity, must become continuing education--an ongoing series, inspired by constant feedback and new information, of abrupt adaptations, subtle refinements, and quick adjustments. Only a deep grounding in ecological processes can equip the next generation to cope with such discontinuities. ▢

Changing Perspectives

Forging New Links with Economic Policy

by Howard K. Gruenspecht



Mike Brisson photo.

Flexible market incentives can be a more efficient way to achieve environmental goals than command-and-control approaches. A tradeable allowances system is included in the new Clean Air Act to reduce sulfur-dioxide emissions from coal-burning power plants.

In a world where we can't have it all, economics can play a key role in illuminating the tradeoffs that inevitably arise between the pursuit of environmental objectives and other social wants and needs, or between the many environmental concerns that compete for our attention and resources.

Two decades of experience with federal environmental statutes has taught us that significant environmental progress can be made. Since 1970, when EPA was established, emissions of particulates, volatile organics, carbon monoxide, and lead are down by 25, 29, 38, and 96 percent respectively. At the same time, we have also learned that lofty-sounding goals of zero risk or zero pollution have more inspirational than operational value and that flexible market incentives often provide a better way to achieve environmental goals than command-and-control approaches. These lessons will be of critical importance as we seek to accelerate our rate of economic growth while maintaining our commitment to environmental progress in the years ahead.

Traditionally, economic analysis of environmental issues begins with the notion of the "possibilities frontier"—the set of combinations of goods and services and environmental quality that can be attained using the technical knowledge, labor, capital, and natural resources available at a given point in time. Ideally, our decisions move us along this frontier. For example, a decision to build wastewater-treatment plants and automobile-emission controls instead of new factories and more cars would represent a sacrifice of ordinary goods for greater environmental quality.

Economics recognizes that, for a number of reasons, certain unregulated private markets may allocate too few resources to the maintenance of environmental quality. In considering how environmental policies can be applied to offset such failures of the

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private marketplace, economics has two distinct concerns: cost-effectiveness and efficiency.

Cost-effectiveness reflects our interest in remaining on the possibility frontier rather than inside it. For example, it makes no sense to give up \$5 billion in goods and services each year to achieve a 10-million ton reduction in sulfur dioxide emissions if the same reduction could be achieved for only \$4 billion through adoption of a better regulatory approach. It is estimated that the tradeable allowances system proposed by the President for reducing sulfur-dioxide (SO_2) emissions will result in just such an annual cost savings compared to the command-and-control alternative.

We should not, of course, become so enraptured with the cleverness and power of flexible, cost-effective, regulatory schemes that, like the Alec Guinness character in the movie *Bridge over the River Kwai*, we forget to ask whether the program itself is desirable. The notion of efficiency reflects our interest in the selection of environmental objectives that advance rather than detract from our total well-being. To apply the efficiency test in our acid rain example, we would compare the cost of the last ton of emissions reduction to the value of the resulting decrease in adverse environmental impacts. Because it relies on explicit dollar valuations of environmental outcomes and impacts, efficiency is often a much more controversial standard than cost-effectiveness.

The simplicity of the static analysis of tradeoffs outlined above, a virtue in many respects, is a vice in others. One major limitation is a failure to account for the key role of time itself. For example, the cost of emissions reduction is often lower at new plants, where controls can be "designed in" from the beginning, than at existing facilities, where controls must be retrofitted. This observation underlies the present Clean Air Act requirement that newly built plants be much cleaner than existing ones, so that total emissions fall over the long run as old plants are replaced.

Experience has shown, however, that where standards for new plants raise construction and operating costs significantly, they may have the unintended consequence of extending the lifetime of old plants, so that anticipated environmental progress is delayed. Indeed, the slow replacement rate for existing coal-fired power plants, a major source of SO_2 emissions, led to the decision to make major new reductions from old plants rather than ever-tighter new plant standards the centerpiece of the Administration's initiative to reduce emissions that cause acid rain.

As we look forward to the next 20 years of environmental progress, it is a safe bet that the time factor will become increasingly important in many environmental issues. Some of the major dynamic interfaces between the economy and the environment are previewed below.

The Environment and the Economy: The Future Versus the Present?

Over time, the analysis of environmental tradeoffs necessarily involves choices that affect future possibilities as well as today's mix of environmental quality and economic goods and services. In a world where conflict sells better than almost anything but sex, tradeoffs between economic growth and the pursuit of environmental objectives have sometimes been characterized as nothing less than a battle that pits the interests of future generations in a livable planet against the rampant materialism and conspicuous consumption of the present. A lifting of the rhetorical veil reveals a picture that is far more complex.

First, the discussion of tradeoffs in the abstract language of growth rates or dollar costs of environmental protection should not obscure the importance of economic growth to the satisfaction of basic human needs such as food, shelter, and health care, both now and in the future. In many developing countries, a few tenths of a percentage point change in the annual rate of economic growth can mean the difference between real progress and growing despair. Second, it is no accident that environmental movements are strongest in the richest

countries; experience has shown that environmental awareness rises as material living standards improve. Continued economic progress is, therefore, a prerequisite for winning the cooperation of developing countries in addressing global-scale environmental issues, such as deforestation and ozone-depletion, that are high on our own environmental agenda.

Many current environmental concerns, whether local, national, or global in scope, involve costs and benefits that are widely distributed across present and future generations. How should the interests of our progeny be reflected in our present decisions? The notion of sustainable development expresses the widely held desire to leave future generations in the best possible position to satisfy their wants and needs, both environmental and otherwise. Sustainable development recognizes that the possibilities open to future generations will be determined by the environmental, physical, and human-capital resources that we bequeath to them. These resources are, in part, substitutable—many combinations of knowledge, physical, and environmental capital are consistent with the same level of future well-being. Future generations, by applying the resources we place at their disposal, will be able to change their mix—just as we are doing by tackling some of the environmental problems left by earlier generations.

How do U.S. bequests to future generations compare to those of other industrialized countries? Our spending on environmental protection (1.8 percent of national output in 1988) is already among the highest of all nations, and is expected to increase by 50 percent relative to output by the beginning of the next century. In contrast, our rate of capital investment (gross investment outside of housing has fluctuated around 12 percent of output in recent years) is the lowest of the six major industrialized countries. In education, our per-pupil expenditures on primary, secondary, and higher education are also among the highest in the industrialized world, but

we rank relatively far down the list in direct measures of educational attainment.

The Dynamic Element in Target Selection

Clearly, not all environmental problems can share equal priority given limits on our regulatory resources and our desire for consumer goods and services. Exercises like the EPA's 1987 *Unfinished Business* report and the just-released report of the Science Advisory Board, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, are a useful step in ordering our environmental priorities.

As in our acid rain example, the costs of emissions abatement generally decrease as more time is allowed for the development of new technology and the natural replacement of existing plants with new ones. Time is also an important factor on the impacts side of the equation. The passage of time allows for changes in existing practices, replacement or relocation of capital assets, and the development of new practices and technologies, all of which can significantly ameliorate adverse impacts. Just as a cost-estimate based on the immediate replacement of all present facilities would greatly overstate the true costs of a phased environmental program, an impacts estimate calculated as if environmental changes occurred all at once is almost certain to overstate actual adverse effects.

In evaluating response strategies for issues where time is important, does "a stitch in time save nine," or is it best to proceed cautiously? Undoubtedly, the proper mix between research and action will differ across issues. Commitments that allow for the replacement of existing capital as it wears out are generally less economically disruptive than those requiring massive retrofitting. If off-the-shelf technologies have economic and environmental drawbacks of their own, strategies that promote the development of new and improved technologies can be an attractive alternative to those that lock in currently available technologies for an extended period.

Ultimately, the split between action and research, or between phased and immediate action, should reflect the deepest possible understanding of the role of time as a determinant of both impacts and response costs.

The Costs of Environmental Regulation: Hardware Versus Software

Time is money. There is perhaps no better illustration of this aphorism than the case of the U.S. nuclear power industry, whose economic viability has been demolished over the past decade by the large cost overruns resulting from the steady lengthening of the time to complete its projects. From another perspective, delays affecting plant construction or modifications needed to bring new products to market can severely damage the competitiveness of firms operating in a world market where

minimizing the interval between product design and product introduction is increasingly recognized as a key competitive advantage. While appropriate regulation can be a constructive force, regulatory procrastination, which has contributed significantly to project delays, engenders major social costs for which there is little, if any, offsetting benefit.

In today's competitive world, the "software" of regulatory programs, through its effect on time lags and opportunities for innovation, can prove to be as significant as the costs of pollution control "hardware" in determining the economic effects of environmental regulation. It is the software that determines the degree of flexibility, the procedural complexity, and the degree to which programs focus on ends rather than means.

The need for better regulatory software is particularly acute given the rapid expansion of the regulatory agenda. For example, EPA projects that approximately 54 new final regulations will be needed to implement the provisions of the pending Clean Air Act Amendments in the first two years after enactment. This is an eight-fold increase over current air-office efforts. A change in the method of regulation to approaches that are less prescriptive and more flexible is essential if regulators are to carry out their new mandates without inducing gridlock. A switch to economic incentives, by way of example, could achieve policy objectives without the need for repeated interventions to pass judgment on individual technologies.

Conclusion

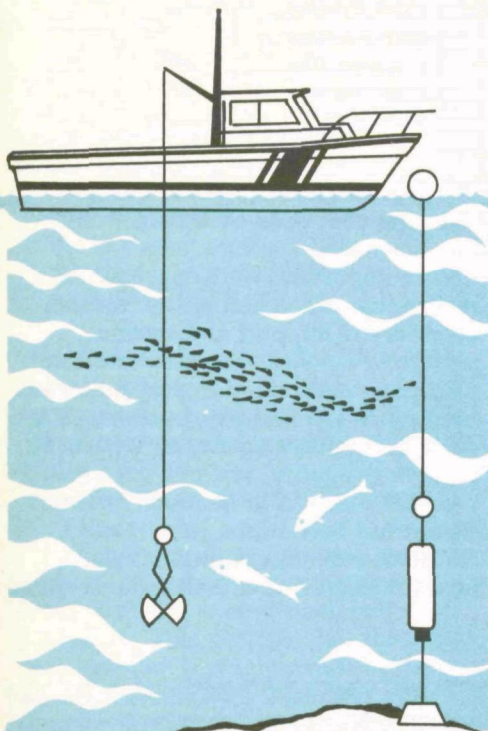
The traditional "timeless" framework for the analysis of environmental policy tradeoffs has yielded many valuable insights. However, the element of time itself now looms increasingly large in many aspects of environmental policy. Our success in achieving a combination of environmental quality and economic growth that will best serve the interests of future generations will depend on our ability to adopt prioritization schemes, regulatory approaches, and evaluations of impacts and response measures that explicitly account for the role of time. □



The National Pollutant Discharge Elimination System (NPDES) team in the early 1970s. They developed and implemented the statutory regulations for EPA to issue 60,000 water-pollution control permits--the largest environmental permitting program ever.

Environmental Science: Helping Shape EPA's Agenda

by Erich W. Bretthauer



EPA, working with other federal agencies, is involved in a long-term program to assess the health of the nation's ecological resources. The effort is known as EMAP (the Environmental Monitoring and Assessment Program). One facet of the research is the collection and testing of bottom sediments.

(Bretthauer is EPA's Assistant Administrator for Research and Development.)

It is frequently said that environmental policies and regulatory decisions must be firmly grounded in science: In other words, science must lead policy. Not so commonly recognized, however, is the degree to which scientists look to policymakers for guidance about future research. In reality, policy decisions and scientific research are inextricably interrelated and mutually dependent on each other for progress. This is apparent in the evolution of environmental science and policy over the past 20 years, as even a cursory overview shows.

Twenty years ago, when EPA was created, the focus was on reducing or eliminating, if possible, the obvious pollutants in the nation's air and water. Our policy goal was to make the air breathable for even sensitive members of the population and to make our surface waters suitable for fishing and swimming. To support this goal, EPA's research concentrated on identifying the potential adverse effects of a small number of ubiquitous pollutants in the air and water and on developing technologies—such as flue gas desulfurization or low nitrogen oxide (NO_x) emission-burners—to curb emissions of these pollutants into the environment.

Thus, in 1970 EPA's clinical health research facility in North Carolina was established to assess the effects of low levels of pollutants such as sulfur dioxide (SO₂) and ozone on human health. That early beginning generated a body of knowledge that has been the basis for many of our regulations and policy decisions concerning air pollutants. During these same years, EPA's Office of Research and Development (ORD) labs began research on ways to limit pollutant emissions from large point sources such as power plants and industrial facilities. Over the next decade, this research found expression in countless regulations and policies.

During the late 1970s and early 1980s, while we were achieving measurable success toward our early goals, attention shifted to less visible pollutants: chemicals such as heavy metals and volatile and non-volatile organic compounds in the environment and their

effects on human health and on important species in our ecosystems. These toxic chemicals were emitted in much smaller quantities than the so-called "classical" pollutants such as SO₂ and nitrogen oxides (NO_x). As many of these more ubiquitous chemicals were brought under control, public concern shifted toward effects such as cancer and birth defects suspected to result from exposures to toxic chemicals.

At this juncture, our policies called for EPA to identify the relationships between exposure to toxic chemicals and adverse health effects—and to reduce or

EPA must be a science agency as well as a regulatory agency, and our science and research base has to be much broader than it has been in the past.

eliminate the contribution that these toxic chemicals made to the burden of disease and death in our society. Also at this time, our policies began to shift increasingly toward using risk assessment as an analytical tool and as an important part of the decision-making process. As a result, our research efforts focused on developing methods for identifying small amounts of toxic chemicals in the environment (exposure is, of course, a significant component of risk assessment) as well as on methods of assessing the human health and environmental risks from chemical exposures. We also studied the impact of toxic chemicals on other species and the ways in which these chemicals move through the environment and how they may be transformed in the process.

During these years we accomplished groundwork research in risk assessment and risk reduction that resulted in significant progress on both fronts. EPA's first risk assessment guidelines were crafted and published during this period. The Agency's approach to external review of our risk assessment procedures was also established at this time, involving public comment, comment by scientists outside of EPA, review by the EPA Science Advisory

Board (SAB), and full public discussion and publication.

During the 1980s, regional and global environmental issues drew increasing concern. Foremost among these issues were tropospheric ozone pollution, acid deposition across regional and national boundaries, and the likely depletion of the stratospheric ozone layer by chlorofluorocarbons (CFCs). These concerns triggered long-term research efforts to model the movement of pollutants across large geographic regions and to study the effects of acid deposition on streams and lakes.

The models and other data that developed from this research enabled EPA to understand and evaluate problems such as acid deposition and to develop policies that reflected our scientific understanding. For example, we were able to analyze the causes of acidification of lakes and streams in New England and Florida and to assess the likelihood that this acidification was due to acid deposition; in some cases, it was possible to determine that the acidification was due to other causes.

At the same time, renewed attention was focused on the scientific underpinnings of risk assessment. As a result, revised, more detailed risk assessment guidelines were published, based in large part on risk assessment publications of the National Academy of Sciences and the President's Office of Science and Technology Policy. As before, intensive public and scientific review and debate preceded the publication of these new guidelines.

Similarly, EPA and the Office of Research and Development became increasingly concerned about finding practical solutions to environmental problems. During this period, a series of programs was developed in innovative technologies—in biotechnology, in radon mitigation and indoor air quality in homes, and in control of CFCs—that was to result in specific, cost-effective solutions to environmental problems in the middle and late 1980s.

It was this kind of problem-solving research that led, for example, to the development of the "suicide gene," a small piece of DNA inserted into

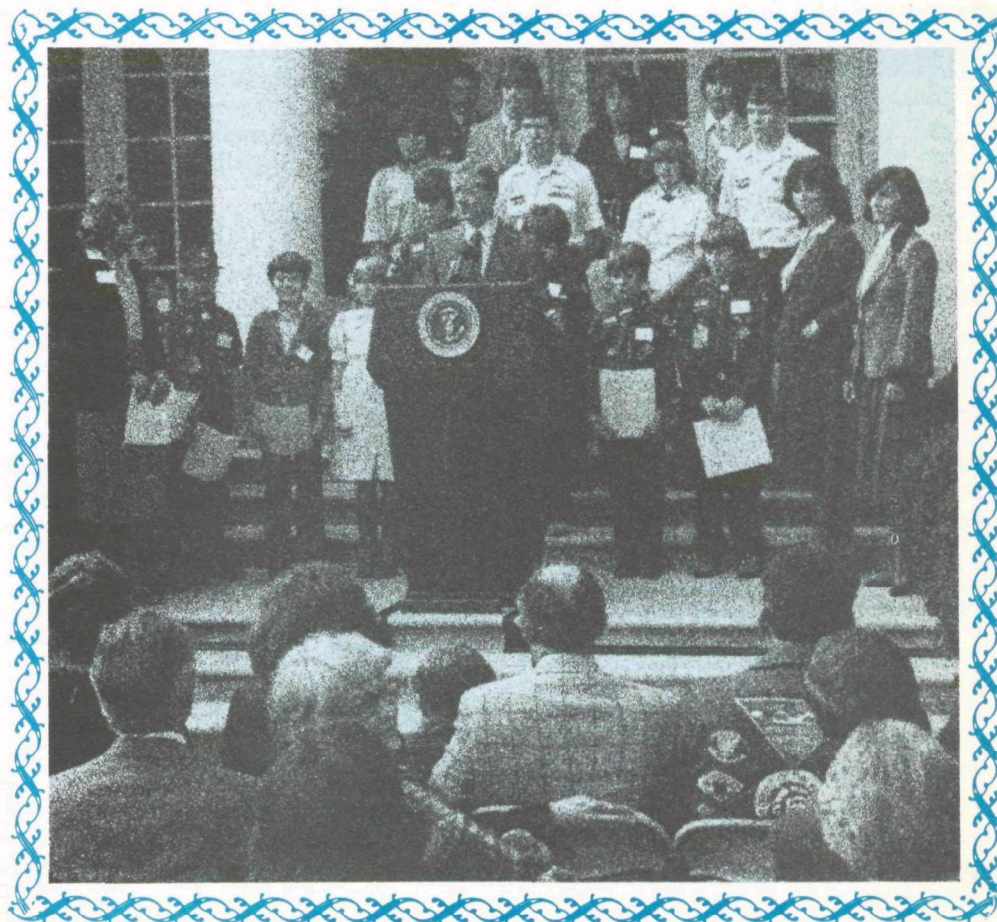
microorganisms effectively preventing them from living outside the confines of a specific laboratory experiment. This research enabled ORD to mobilize quickly when the *Exxon Valdez* spilled a huge amount of oil in Prince William Sound in Alaska. The result was an extremely successful biological method for cleaning up oil-fouled beaches. This problem-solving approach also resulted in a highly successful joint venture with the private sector: recycling CFCs from automobile air conditioners when cars are brought in for service.

Today, our point of view is shifting again. More than ever before, we are aware of the global scope of many environmental problems and the need to formulate policies to deal with them in their full complexity. The SAB's recently published report, *Reducing Risk*, has highlighted the need to focus on issues such as global climate change, loss of habitat, loss of biodiversity, and stratospheric ozone depletion and accordingly to change our approach to environmental protection and redirect our research efforts. (See article on page 8.)

The new SAB report has also reinforced the point that the end-of-the-pipe

solutions that have been at the heart of our policies in the past are often economically inefficient and environmentally inappropriate. Consequently, we are turning our attention to ways in which we can prevent pollutants from being generated in the first place. Our policy goals are shifting from reducing emissions to protecting the Earth's resources through production patterns and life patterns that are inherently less stressful to the environment. At the same time, however, we continue to tackle the many pressing issues of the past that have not yet been satisfactorily resolved, such as attaining our ground-level ozone standard, reducing emissions of dioxins from manufacturing facilities, etc.

More important, we have come to realize that our vision of the research necessary to support and sustain tomorrow's policies for environmental protection and pollution prevention has been much too narrow. In short, EPA must be a science agency as well as a regulatory agency, and our science and research base has to be much broader than it has been in the past. This conclusion reinforces findings put forward in an earlier SAB report entitled



One of EPA's long-standing projects is the President's Environmental Youth Awards. President Jimmy Carter honored a group of these young environmentalists.

Future Risk: Research Strategies for the 1990s, issued in 1988, which stated:

Research is the most fundamental of the tools that promote environmental quality. Without the strong scientific and technical knowledge that results from research and development programs, standard-setting would not be possible, control technologies would not exist, and there would be nothing to enforce EPA is more than a regulatory agency. It is a research agency responsible, along with other federal agencies ... for defining the nature of—and possible solution to—the nation's environmental problems.

The SAB also recommended that EPA "plan, implement, and sustain a long-term research program" and that ORD "develop basic core research programs."

Over the past two years, ORD has taken the SAB's charge very seriously. We have created a special core research program to generate data and methods that will be valuable in developing long-term solutions to environmental problems. This program has three major components: ecological risk, human health risk, and risk reduction. The ecological risk component of the core program, in particular, deserves mention in light of the Agency's heightened policy concerns about ecological impacts. (See Administrator Reilly's comments on this point, page 6.) This component, called the Environmental Monitoring and Assessment Program (EMAP), involves research to better understand the status of ecosystems in this country and around the world and to detect and identify trends, either in exposures or in effects, that may be occurring over time. In addition, EMAP entails research to identify appropriate ecological indicators, so that at some time in the future we may be able to extrapolate today's observations to predict the future health of important ecosystems.

Working cooperatively with other federal agencies, including the National Oceanographic and Atmospheric Administration and the Forest Service, EMAP has already started to assess the health of estuaries on the east coast of the United States and of some northeastern forests. When fully implemented in a few years, this

program will cover all the ecosystems of the country and will provide a conceptual framework for other federal agencies, states, and foreign countries to use in assessing ecological health.

A major frontier for assessing the risk that pollution poses to human health is the question of exposure—how much of particular pollutants are we exposed to and how much of that exposure actually reaches vulnerable organs in our body. This is currently one area of great uncertainty. It has been called the weakest link in the risk assessment process.

The increasing global complexity of environmental problems makes the working partnership between science and policy-making more important than ever for the coming years.

To address the issue of exposure, ORD developed a program some years ago to investigate human exposure to chemicals, called the Total Exposure Assessment Method (TEAM). This program followed people during their daily activities, measuring exposures through personal monitors that they wore wherever they went. In addition, people kept diaries of their activities during the day and recorded the foods and medications they ingested. The results of these studies clearly demonstrated that many exposures of concern resulted not from industrial sources, but from ambient pollution at home, at work, and during transportation. As a result, human exposure research has become a significant part of our core research program, too.

As in the past, EPA's approach to risk assessment is once again being called into question by both scientists and policymakers. As a result, we have established a major research program to investigate the methods and the uncertainties that are a part of the risk-assessment process; the exposure research discussed above is one such effort. In addition, working together with the National Academy of Sciences, we have established a Committee on Risk Assessment Methods, which will advise us of opportunities for improvements in our current approaches. We have also begun a joint effort with EPA policymakers to foster and ensure consistency in risk assessment approaches across all of the Agency's programs.

As a part of ORD's overall core research effort, we are also developing a program to support the Agency's new policy of pollution prevention. This program is looking at broad sectors of society to identify changes that individuals, industries, commercial establishments, and others can make to eliminate the production and emission of pollutants into the environment. This program is the logical extension of our past efforts to develop solutions for environmental problems that are on the forefront of technology, efficiency, and effectiveness.

In summary, the research programs and policies of EPA have gone through distinct changes over the past 20 years. They have changed in a mutually dependent way, with science defining the limits of policies, and policy directions defining the needs for research. In some instances, however, these two efforts have not been well integrated, so that a science base was lacking when policymakers needed to make decisions. It is important to ensure good two-way communications between scientists and policymakers, so that policy decisions are consistently based on sound science, and a sound science base is ready when policymakers need it. The increasing global complexity of environmental problems makes the working partnership between science and policy making more important than ever for the coming years. □

Reflections on the Role of a Cabinet-Level EPA

Representative
Mike Synar

What would be the role of a Cabinet-level EPA? What challenges would such an organization face? Such questions have been discussed as legislators considered whether to give the Agency Cabinet status, and the debate will probably continue in the next Congress. EPA Journal asked several legislators who have been involved in the debate for their views on these questions. Their comments follow.



If and when EPA is elevated to Cabinet status, I believe it will have only one new challenge: to meet the high expectations of the public and Congress. Among other things, this will mean playing a more visible and aggressive role in helping solve the many international environmental problems facing us and going to the Cabinet table as an equal partner when confronting other federal departments over their environmental responsibilities.

Beyond this, an ongoing challenge facing EPA—today and as a future Cabinet department—is helping Congress and the public better prioritize our environmental goals to accommodate limited available resources. It is both discouraging and ironic that our understanding of environmental problems and

our view that they must be properly addressed have grown in *inverse* proportion to the resources we have available to spend on them.

Recognizing that our loftiest goals for environmental protection cannot be fully reconciled with the technological and economical realities facing us, we must now set our priorities accordingly. As a result, EPA must help recraft the nation's environmental priorities to ensure that our increasingly scarce resources are directed toward areas presenting the greatest health and environmental risk. This will also entail rethinking our traditional ways of paying for regulatory programs and remediation efforts.

I enthusiastically support Bill Reilly's repeated statements that pollution *prevention* must be the nation's first environmental priority. If we have learned nothing else from 20 years of environmental regulation, we have learned that preventing pollution is far cheaper than cleaning it up. But EPA must match its words with meaningful actions throughout its disciplines. And it must ensure that these outreach efforts go beyond the easy target—big businesses—and extend to small businesses, communities and community groups, schools, volunteer organizations, and the like.

As part of its longer-term prevention efforts, I believe EPA must also work with Congress and others to find practical ways of making voluntary environmental

protection efforts—above and beyond the precise requirements of the law—attractive to businesses. EPA must focus special attention on small businesses and small communities (particularly in rural areas), which can be significant contributors to environmental pollution and which are especially hard-hit by compliance costs.

Finally, Congress should assist EPA in looking for ways to reduce the amount of scarce money and valuable manpower which are currently devoted to litigation of environmental rules and regulations. With greater emphasis on alternative techniques for resolving disputes, for instance, we may be able to devote more of our limited resources to real environmental action.

EPA deserves the stature implicit in Cabinet-level status. Again, the challenge will be to put that additional stature to good use in our international efforts and in dealing with other federal agencies, and to find better and more efficient ways of addressing our existing environmental problems.

(Synar (D-Oklahoma) is Chairman of the House Subcommittee on Environment, Energy, and Natural Resources.)

Senator
Steve Symms



Whether or not EPA is elevated to a Cabinet-level department or remains an independent agency matters little, except perhaps to assuage some egos. The major challenge facing EPA today is the way it is perceived by the American people. Is it viewed as a resource, someplace to turn for help in solving environmental problems? Or is it viewed as an environmental gestapo, a department of storm troopers to be avoided at all costs?

That challenge of becoming a friendly, useful resource in the eyes of the public will only be that much greater if the Agency is elevated to Cabinet-level status.

There exists a pervasive American view on environmental protection that is not prudently ignored. A poll compiled by the

Conservation Foundation asked Americans to respond to the question, "Is it possible to have both high environmental standards and a growing productive economy at the same time?" Seventy-five percent responded emphatically, "Yes!"

In 1988, George Bush said "I am an environmentalist" and then proceeded to run on one of the most free-market, pro-economic liberty platforms of any President in our time. In his inaugural address he declared, "We know what works; freedom works. We know how to secure a more just and prosperous life for man on Earth: through free markets ... and the exercise of free will unhampered by the state."

That doesn't sound like a man who favors the big government solutions and the heavy regulatory hand of past environmental crusades. Why did Americans elect him?

Obviously they believe in a type of environmentalism that can coexist with economic development: one that works with them, not against them. They believe in an environmentalism that is effective without undermining the institutions of private property and free markets that are sweeping the world and are rooted in our own Constitution.

Is it possible to promote environmental values within a framework of capitalism and economic growth? Not only is it possible, but it is EPA's only real future. The greatest challenge to our environment, the field where the battle will

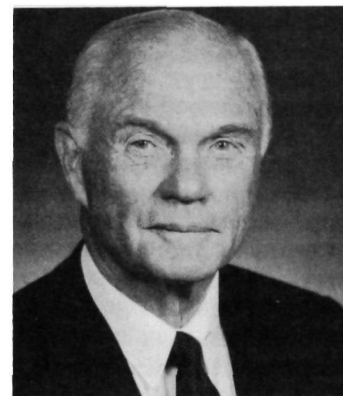
be won or lost, is in the minds of men and women. We will never have a national environmental police force large enough to prevent a person from dumping oil down a gutter. The unmonitored release, the unseen spill, the orphan barrel of hazardous waste can be prevented only by influencing the attitudes and values of individuals.

EPA's role must be to promote environmental values, not to hamper them. Does pitting the environment against a family's ability to put food on the table and a roof over their head accomplish that goal? When a chemical is accidentally spilled, is EPA seen as the first place to call? Or dreaded as the last?

In debating EPA's future, the question must be asked, "When the nation calls for new thought and new ideas about how to protect our environment without decimating our industry; when the American people demand a clean environment AND private property and free markets; when the age of this new environmentalism desperately demands new leadership, will the EPA be ready to meet the challenge?"

Currently, the public view of EPA is closer to the gestapo model than the helpful-agency model. Regardless of whether EPA is elevated to Cabinet status, the task is to reverse the public image and become a place where people look for help.

Senator
John Glenn



It is my hope and expectation that this year, or in the near future—if the initiative can finally get past inter-committee differences in the Senate—EPA will become a Cabinet-level department.

The reasons why this should happen have been discussed widely in *EPA Journal* and the popular press. In addition to continuing EPA's important fight against the polluting and poisoning of the air, the seas, and our drinking water, a Department of the Environment would face the broader challenges of what we now recognize as humankind's assault on the overall ecology of the Earth.

As we elevate EPA to department status, a couple of provisions in the proposed legislation will, I believe, be of major importance:

- First, anyone who has dealt with environmental concerns is

(Symms (R-Idaho), a former fruit farmer, is on the Senate Environment and Public Works Committee.)

(Glenn (D-Ohio) chairs the Senate Committee on Governmental Affairs.)

aware of the tremendous number of studies conducted in the field, quite often with conflicting approaches, methodologies, and conclusions. It hardly stretches the truth to say that one can take almost any position on an environmental matter and find a study that will back it up.

Therefore, in the bill we propose, the new department would include a Bureau of Environmental Statistics which would assess environmental studies and masses of data in much the same way that the Bureau of Labor Statistics does in its field. Anyone who doubts the need for such assessments need only look back at the lengthy debate over the Clean Air Act on the Senate floor.

•Second, given the Governmental Affairs Committee's responsibilities for the efficiencies as well as the organizational aspects of government, we looked at existing inter-departmental and inter-agency overlap with respect to environmental regulation. Even a cursory first look made it apparent that almost every department and agency is involved in some way in administering or otherwise carrying out environmental laws, rules, and regulations, and that many of these activities overlap.

It also became apparent that a full analysis of such a huge and complex problem was beyond the Committee's capability: hence the Presidential Commission on Improving Environmental Protection in the legislation we propose. Its mission: Make recommendations to the President and Congress on ways to improve the application of environmental laws, including reductions in overlapping jurisdictions, uncertainty, and conflicting authorities. Of course, any proposals such a commission might make would only be recommendations for further Congressional consideration.

But perhaps the most important point is this: Unless the Earth is infinitely resilient, then the efforts of this generation and the next to preserve it—especially of organizations such as the proposed Department of the Environment—may determine whether or not our descendants will long survive.

Make no mistake. There is a distinct possibility that we, as a species, are heading rapidly toward disaster. Because we are burning fossil fuel in ever greater amounts, the concentration of carbon dioxide in the air is increasing exponentially. If the greenhouse model of global warming is correct, as many leading scientists believe, then the planet will experience massive, global disruptions in climate, with potentially catastrophic consequences.

Global climate change is by no means our only concern. Every year, people cut down an area of tropical rain-forest greater than that of the state of Ohio. We are transforming fertile lands into deserts, allowing our topsoil to erode away at a phenomenal rate. And without topsoil, we cannot grow crops.

Naturalists tell us that we are causing the extinction of roughly 100 species of plants and animals every day—a statistic that simply boggles the mind.

The hope for somehow reversing this depressing downward spiral rests largely with those private and government-sponsored organizations that have a global, long-term perspective and the credibility, influence, and power to convince the world's societies to begin acting in common self-interest. As one of the most visible and influential of these, the new Department of the Environment must seize the initiative in making our citizens aware of the seriousness of the world's ecological problems. It must lead us in confronting and overcoming those problems.

Senator William V. Roth



In the midst of growing demands and shrinking budgets, the new Secretary of the Environment would be setting out to improve America's environment in the 1990s. This task will not be easy. The visibility and clout of Cabinet-level status are needed to bring environmental problems and solutions to the forefront of this nation's agenda.

The list of environmental threats has grown considerably in recent years; so has the number of environmental statutes intended to protect us from such threats. On problems ranging from air pollution to contamination of lakes and streams, and disposal of hazardous wastes, the workload will be bigger and oversight responsibilities broader. To meet these regulatory responsibilities in a time of scarce funding will require a high-powered, high-

(Roth (R-Delaware) is Ranking Minority Member of the Senate Governmental Affairs Committee.)

profile Department of the Environment.

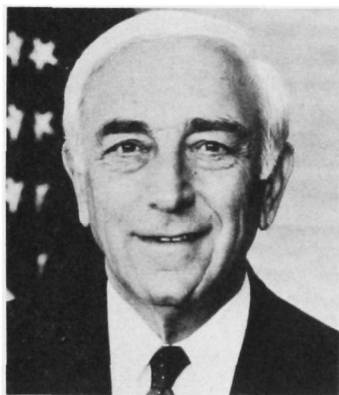
A seat at the Cabinet table would give the new Secretary prominence and prestige in the Administration, in Congress, and in the international community. This new stature would send a clear signal that the United States is moving expeditiously to address environmental problems. The Secretary, much like the Surgeon General, could use his or her visibility to educate Americans and to encourage all of us to "pitch in." The environment is one of the few government-regulated areas where everyone is affected and everyone can help. More difficult, perhaps, will be the executive tasks of the Secretary: setting a clear agenda among competing interests, lending focus to a very scattered field, and building a national consensus among many conflicting voices.

The Secretary would also need to play a strong hand at the international negotiating table. The rise in common global problems—climate change, ozone depletion, acid rain, ocean pollution—will require decisive American leadership to achieve common solutions. The Secretary, acting as a peer with foreign counterparts, would be able to assert American interests and initiatives. In this role, he or she could help bring nations together—to show, finally, that our differences are small when compared with the problems we must face and solve together.

Senator
Frank R. Lautenberg

I see great opportunities for the Secretary of the Environment, in concert with the Secretary of State and other Cabinet officials, to bring about new coalitions and new compacts, among both developing and industrialized nations. To note only one example, the Secretary could call on the advanced democracies to help developing nations take control of their environmental problems, even as they labor to improve their economies and give their people a better life.

But the Secretary's greatest challenge will be to work the will of the people. Time and again, in poll after poll, Americans have asked their government for environmental protection and stewardship. They have asked that a clean environment be given top billing now, before it is too late. They have asked for it, the President has pledged it, and we must now accomplish it.



We face no greater challenge over the next few years than restoring the integrity of our environment.

The environment is under assault. In my home state of New Jersey alone, 42 million pounds of toxic chemicals go into our air each year, 55 million pounds into the water, and 5 million pounds onto the land.

In the United States, each of us produces 1,300 pounds of garbage a year. That's 1,300 pounds per person of plastic bottles, newspapers, beer cans, diapers, waste paper, and styrofoam, and it's more than we know what to do with.

As Americans, we contribute more, per person, to the depletion of the ozone layer than any other people on Earth.

Our climatic system has been weakened by the cutting down of forests and by burning fossil fuels and otherwise releasing

greenhouse gases. The climate seems to be changing faster than at any other time in human history, and the planet appears to be getting warmer.

And in other countries environmental degradation has reached a crisis point. The pollution in Bitterfeld, East Germany, is so severe that its children fall ill soon after birth, and its people live five to eight years less than the average East German. The burning and clearing of tropical forests in Southeast Asia, Africa, and Brazil are resulting in a loss of biological diversity. Experts predict that 15 percent of all plant species will be eliminated by the year 2000. And devastating floods in Bangladesh have been exacerbated by deforestation in the Himalayas.

The planet won't take it anymore—not without a fight, not without protest.

This challenge goes right to the future health of our planet. It goes to our natural resources, the building blocks of our ecology and environment. It goes to the basic essentials of nature, which provide our sustenance. It goes right to our ability to survive as a modern society.

Few challenges we face are more important than the protection of our environment. Today, all of us must be environmentalists. Today, the government needs to give the environment the status it deserves.

Making EPA a Cabinet-level department is one small step toward giving environmental issues this priority. That's why Senator David Durenberger (R-

Minnesota) and I introduced legislation on the first day of the 101st Congress that would serve two important functions:

First, it would demonstrate a new commitment to protecting the environment. It would tell people in the United States and other nations that this country puts a high priority on preserving the environment and enhancing the public health and welfare.

Second, it would help EPA do its job. It would give EPA increased clout in:

- Obtaining necessary funding
- Working with other departments whose actions affect the environment
- Making national policy decisions
- Dealing with other nations who send Cabinet-level ministers to meetings to discuss environmental issues.

We *can* meet the environmental challenges we face. But it won't be easy. Making EPA a Cabinet-level department is not in itself enough: We need more funding, tougher enforcement, and strong leadership. And making EPA a Cabinet-level department is no substitute for strong environmental policies: We need new or tougher laws on air, water, and solid and hazardous waste.

But as we accelerate our efforts to meet the environmental challenges of the future, I believe that creation of a Department of Environmental Protection is one action we must take to increase our chances to succeed. ...

(Lautenberg (D-New Jersey) serves on the Senate Environment and Public Works Committee.)

The Agency and the Public: Journalists Comment

Angry citizens at a public meeting in Casimalia, California, in 1989. This long-standing dispute involves a commercial hazardous-waste landfill.

EPA is frequently on the front lines in dealing with the public. Its programs involve a wide range of controversial issues; its decisions affect millions of people. In the day-to-day business of grappling with environmental issues, how can EPA communicate successfully with the public? More specifically, how can the Agency effectively inform people of its mission, build understanding of its policies and decisions, and respond to public expressions of concern?

For this forum, EPA Journal asked eight environmental journalists around the country to share their thoughts on these questions. Their responses follow:



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Bill Dawson

At an EPA public meeting a few years ago, I witnessed a clear case of government and governed talking past one another.

Plans for cleaning up a Superfund site were being aired. EPA officials were thorough and professional in explaining how they intended to deal with the toxic waste. I don't recall much that distinguished this Superfund presentation from others. In my experience, they have tended toward the technical and, perhaps as a consequence, a bit toward the tedious.

When time came for questions at this meeting, a concerned woman from a nearby neighborhood addressed EPA officials. She

wanted help in getting her garbage picked up regularly. At a meeting about hazardous waste, household waste was her top priority.

That exchange, while not typical, reminded me of something I try to keep in mind as a reporter that might help EPA improve its public communications: Basically, remember who you're talking to.

Environmental issues can seem distant to people mainly concerned with maneuvering through the obstacles of day-to-day life. And despite the recent burst of media attention to the environment, many people still have only passing knowledge of the arcane details inherent in these issues and the exotic terminology that cloaks such topics.

Whatever means EPA might choose to bridge this gap, a few guidelines can enhance understanding and interest:

Minimize use of the special lexicon used by environmental professionals. Present enough background information—including political controversies, scientific uncertainties, and experts' disagreements—to portray frankly the context for policy decisions. Finally, note links between issues to illustrate their interconnectedness. I find, for instance, that people are fascinated to learn that ozone-depleting CFCs are also greenhouse gases.

(Dawson is the environmental writer for the Houston Chronicle.)

Charles Seabrook

Action speaks louder than words. If EPA wants to get a message to the public that the government is serious about stopping pollution, EPA must put its money where its mouth is. The Agency must get rougher on polluters. When EPA causes a recalcitrant polluter to go to jail or forces a polluting company to clean up its environmental problems, the Agency is sending a message loud and clear that it is serious about protecting the environment. It's amazing how the word gets around.

The public's perception, however, is that most polluters are still getting away with fouling the environment. In the 1980s, EPA seemed

reluctant to carry out its responsibilities, and the public got the impression that the agency was unwilling, even incapable of preventing environmental degradation. Now, as the Agency tries to rebuild its tarnished image, it must convince the public that it means business. Press releases about what EPA proposes to do are fine, but they don't amount to a hill of beans if EPA doesn't carry out its promises.

The Agency has proposed numerous times, for instance, to take serious action against cities that perennially violated federal clean-air standards, but the action has never come. Instead, more cities have been added to the list of violators than removed from it.

Even when action is taken against a polluter, one wonders if the effort was really worth it. For instance, EPA sends out a notice that XYZ Company, which grossed \$50 million last year, was fined \$25,000 for violating a certain environmental record. For a company that makes millions of dollars each year, a \$25,000 fine is peanuts.

Perhaps the public would be better served if EPA described in detail the bad things that XYZ company actually did. When the public finds out that a company is polluting a stream in a community, public pressure can be much more effective in making the company mend its ways than the prospect of fines. Most companies seem to fear public opinion and bad publicity more than fines.

(Seabrook is an environmental writer with the Atlanta Journal-Constitution.)

David P. Ropeik

These are times of worry, of fear. Everywhere the environment seems under siege. Global warming, ozone depletion, rain forest

destruction, smog, acid rain, ground-water contamination ... the list of problems is frighteningly long; the issues are complex. How the news media explain these issues to the public will help decide whether society moves constructively toward solutions or accepts environmental destruction as inevitable.

I think the news media irresponsibly foster the fatalistic view by pounding the public with negative environmental news.

Admittedly, the news is pretty bleak. There isn't much positive about a Love Canal, a fetid Boston Harbor, a former president who ignored the clear truth about acid rain for years, or the current lack of leadership in Washington which, despite scientific consensus on global warming, still refuses to take the relatively painless actions the rest of the industrialized world is now embarrassingly out front on. The news is often genuinely pretty damn bleak.

But the media unquestionably play up the negative, play to the public's health fears that stories about environmental threats implicitly involve. Does this sell papers, boost ratings? Sure. A negative story just seems more dramatic, more journalistically satisfying, than a positive one.

EPA can help. Regional officials should find reporters they can trust who will handle stories responsibly and then keep those reporters well-informed about everything the Agency is doing, whether it's newsworthy or not. EPA regional administrators should contact local newspaper editors and TV news directors to advocate this kind of coverage, not just call them when another dump site has been found or a polluter fined.

And the news media can do a better job. More reporters should be assigned to environmental "beat" coverage so they could develop the background knowledge vital for understanding and explaining complex issues.

With environmental stories, which so often involve issues of public health, reporters and editors have to be much more vigilant than usual against the temptation to sensationalize. I don't suggest we ignore "bad" news, just that we be balanced, that we take into account the potential for unduly fueling public fear that our writing, reporting, and decisionmaking can have when dealing with such volatile issues.

Walter Cronkite used to sign off his newscasts, "And that's the way it is." All the public knows about "the way it is" is what the news media gives them. If we give the public only frightening stories of environmental health threats, only news of an environmental destruction, with no hope of turning things around, that hopelessness may invade the public psyche, and our news coverage will become a self-fulfilling prophecy. We can and must do better.

(Ropeik is environmental reporter at Boston's WCVB-Channel 5.)

Myron Levin

EPA needs to do a better job of communicating health and environmental risks. It's a difficult challenge because EPA legal mandates do not cover some of the most important hazards, and public education programs are skewed as a result.

EPA's outreach to the public is unavoidably driven by its regulatory duties. Citizens tend to assume there is a perfect fit between the hazards EPA regulates and the things that are most harmful to health and the environment. This assumption is understandable but mistaken.

Consider the issue of Superfund sites, a dominant subject of environmental news. Yet many experts believe the risk of disease and death from waste dumps is less than from certain unregulated (and less

publicized) hazards like second-hand smoke, radon gas, home and garden chemicals, and even perfectly legal industrial air emissions. People can do more to reduce their risk of cancer by cleaning up their diet than by worrying about a dump site a few miles away.

Most people don't know such things. EPA should try to do a better job of telling them, without defending or easing up on toxic polluters.

The public's lack of perspective on health and environmental risks is reinforced by the press, which is yanked along by the news hooks that regulation invariably provides such as clean-up orders, financial penalties, consent decrees, Superfund site lists, and the like. Unregulated hazards usually have no news hooks and, in many cases, barely dent the news columns. Citizens' groups rise up to slay the dragons depicted in the news, generating more news hooks, and so on in endless cycle.

There wouldn't be a problem if the press were more thoughtful and enterprising. But even knowledgeable reporters with independent sources have trouble breaking away on the more elusive and time-consuming stories that put risks in context.

For EPA, the situation presents a dilemma and an opportunity as well. Lacking enough bodies to do all the work Congress has assigned, EPA has little reason to go looking for additional work.

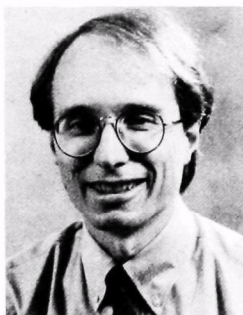
Still, working harder at risk communication would not have to drain the budget. There would certainly be payoffs. A more discerning public would want EPA to have the manpower and authority to be a better environmental cop. And citizens would be better prepared to protect themselves from hazards within their control.

(Levin, an environmental reporter, works for the Los Angeles Times.)

(Continued on next page.)

Jane Kay

EPA has a great name. No public relations firm could think of a better one. It's simple, straightforward, and



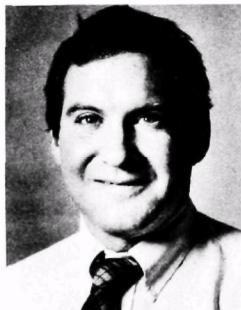
Dawson



Seabrook



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Shabecoff



Bishop

euphonious, and it inspires confidence.

Yet EPA can better live up to its name as the nation's guardian of the environment and health by better conveying to the public EPA's mission, its record, its faults, and its tribulations. From a reporters' point of view, EPA could accomplish this by lifting controls on media queries, increasing meetings between reporters and high-level officials, and giving us a wider perspective instead of bits and pieces of information.

Two presidents ago, the EPA staff was accessible to reporters. But now the Agency has a policy that questions must be funneled through its Communications and Public Affairs Office. The rationale is that this practice makes life simpler and more consistent. On the contrary, it delays and controls; it makes researching stories time-consuming and cumbersome.

Other agencies that deal with sensitive issues—the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, for example—don't discourage direct contact with their experts. Their staffs use judgment and discretion, and if they can't or don't want to answer our questions, they refer us to someone who does. The EPA policy suggests that the Agency has something to hide, and a change would be a breath of fresh air.

Just as Bill Reilly at times makes himself available to reporters to say what's on his mind and find out what's on ours, the regional administrators might do the same. Twice yearly, reporters could get an overview and an update on important issues in the region. In one region, the top issues might be air pollution or ground-water cleanup. In another region, ocean dumping might have the highest priority. Thus, the press could take a more profound approach in its reporting than simply reacting to crises or announcements.

EPA doesn't need a bigger

work load, but it could help reporters tame the beast of information by giving us overviews of various programs. For instance, at the end of 1989 the Agency prepared a valuable report on enforcement accomplishments. Getting a big-picture look at Superfund sites, pesticide controls, and new policies in handling biotechnology and lead would go a long way in combatting the piece-meal approach that we now struggle with both in and outside the Agency.

(Kay is an environmental writer with the San Francisco Examiner.)

Janet Day

EPA ... SARA ... HSWA ... FIFRA ... MCL ... NPL ... NPDES ... EIS ... VOC ... TCE ... PCB ... CO ... SO₂ ... NO_x ... parts per million ... parts per billion ... milligrams per liter ... rad ... rem ... millirem ... picocurie ...

Such seemingly simple acronyms and measurements become intimidating jargon when tossed out to the general public at meetings or in newspaper stories.

In the two decades since EPA's inception, the public's knowledge of environmental issues has increased, but so have skepticism and fear as new laws are created with new acronyms to understand.

The question of how EPA can more effectively communicate with the public implies the Agency is not doing that part of its job very well. Such is not the case in the regional office I frequently contact, where project managers and their staffs are available to the media rather than routing calls through the press office. Public hearings, community meetings, informal press briefings, and regularly published project information

updates help the public understand the various issues.

But the communication could be better.

Laws, abbreviations, measurements, and scientific conclusions all need to be fully explained in lay terms.

In many cases, the Agency needs to explain what studies, reports, and projects are *not*, as well as what they are. When announcing a clean-up agreement, settlement, or study, Agency officials should fully explain its limits.

People need to know that risk analyses are not going to provide a definite link between a pollution source and someone's cancer; that dose reconstructions are only best guesses of what may have happened in the past; that diet, occupation, and heredity have as much to do with cancer as does exposure to pollution; or that the smoke from a fireplace contains the same suspected carcinogens as cigarettes.

The public needs to hear that there are no easy answers and that nothing occurs quickly. A process, its shortcomings, and its expected results need to be as fully explained as the issue itself.

In our area, the problems are many and the solutions complicated.

Denver is surrounded by Superfund sites and choking under some of the dirtiest—albeit improving—air in the country. The city is downwind from a deteriorating nuclear weapons plant and adjacent to the Army's most polluted piece of property.

Colorado and other Western states are dotted with old mines oozing toxic metals into streams. These states have become targets of crowded Eastern states looking for landfill space and incinerators.

The Rocky Mountain West is struggling to find enough water to meet its future needs and to keep that water clean.

Facing all this, residents of the region have a lot of questions. They're struggling to understand concepts such as

acre-feet of water, the 404c veto process, state implementation plans, best available control technology, and the difference between low-level and transuranic radioactive waste.

Into the middle of this mess step EPA and state and local health officials, each trying to simplify issues yet accurately portray situations ranging from leaking underground storage tanks to nuclear-waste disposal. The public and the media as its interpreter have a lot to digest.

(Day is an environmental reporter with the Rocky Mountain News in Denver.)

Philip Shabecoff

At the outset, let me say that EPA already does a better job of communicating with the public than any of the other federal agencies I have covered during my 20 years of reporting in Washington. This is largely attributable to the "fishbowl" policy instituted by former Administrator William D. Ruckelshaus in 1983 to restore the Agency's then-tarnished credibility. As long as the leaders and staff of the Agency continue to be accessible, open, and honest with the press and public, its communications effort cannot go too far wrong.

There is, of course, room for improvement. My impression is that the Agency can do a better job in dealing with people at the local level, at least in some of its regions. While reporting stories on waste dumps, or incinerators, or pesticides, or water-pollution problems, I have heard frequent complaints from angry or frightened citizens that EPA officials do not seem interested in their problems and only listen and become active when threatened by a lawsuit or political reprisals.

I understand that regional offices are often overworked. But conveying a sense of understanding, caring, and responsiveness to those people

who feel immediately threatened by environmental pollution is critical to the success of the Agency. Some way must be found to improve community outreach on a permanent basis.

Most of all, however, the Agency can improve its communication with the public by developing a firmer sense of its own mission. Although I have found the career staff of EPA to be among the most dedicated public servants in government, they frequently receive mixed political signals from whomever happens to hold elective power. This ambiguity inevitably is communicated to the American people. Is the Agency on their side or the side of the polluters?

There are other federal agencies for promoting economic growth and commerce. EPA was created as an advocate for and protector of public health and the environment. That is the message it must convey more clearly.

(Shabecoff is an environmental reporter for the New York Times.)

Gordon Bishop

In this "Decade of the Environment," EPA has a rare opportunity to reach out directly and openly to its grassroots constituents: the millions of people who consider themselves "environmentalists."

From President Bush to the rank-and-file members of hundreds of national and local ecological organizations, America is ready for a real "Environmental Revolution" involving practically every consumer and producer, each of whom is ultimately responsible for the quality of his or her own life and that of future generations.

Few governmental agencies have the high media visibility of EPA, ranking right up there with NASA and the Pentagon in name recognition. The

Agency's mission is clearly defined and readily identifiable: *environmental protection*.

As a journalist covering the environment regularly since Earth Day 1970 (but having written my first pollution article in March 1960), I have carefully tracked EPA from its inception, watching it grow into what may soon be a full-fledged Cabinet-level operation. During these past 20 years, EPA cultivated a fruitful relationship with the media and flexed its new-found might in trying to halt and reverse some 200 years of industrial pollution. The public rallied behind this new kid on the block—and EPA responded by cracking down on the polluters.

In the New York-New Jersey region which is my "beat," EPA opened its doors immediately to public participation, and a new eco-consciousness emerged.

By the 1980s, however, EPA began losing some of its popular appeal by not being forceful enough with polluters and distancing itself from the hard-core environmental activists demanding timely enforcement of anti-pollution laws. Environmentalists from coast-to-coast began suing EPA to do the job it was created to do: clean up the environment and prevent further pollution.

EPA was obviously not communicating effectively with the public. It was losing its credibility as America's environmental leader.

To regain that public trust, EPA's leadership must go to the people in their communities, listen to what they have to say, and then represent those people, honestly caring for their concerns. This cannot be done in Washington, DC, or from EPA's regional offices, but only in town halls, schools, and civic centers where residents are meeting to deal with their environmental problems.

(Bishop is environment editor and columnist for the Star-Ledger in Newark, New Jersey.)

What Do You Expect of EPA?

A State Official

by Chris Gregoire

What do you expect of EPA? The Journal posed this question to three respondents who have very different perspectives on the Agency: a state official, an environmentalist, and an industrialist. Their commentaries follow:



Washington State Dept. of Ecology photo.

Part of the Hanford nuclear site in south-central Washington state. EPA, the Washington State Department of Ecology, and the U.S. Department of Energy have entered a tri-party agreement for a 30-year cleanup of hazardous waste at the site.

EPA and the Washington Department of Ecology have a great deal in common. Both agencies were born as a result of the great environmental movement in our country, and we both are celebrating 20th birthdays this year. We at Ecology deal with the same issues as EPA: air- and water-pollution control and prevention, solid- and hazardous-waste management, and toxics cleanup. Ecology has a few other tasks as well, like water resources and shorelands protection.

Ecology's staff interact daily with EPA officials in a variety of ways. Our relationship is complex. Each agency is independent of the other, yet our mutual duties bring us together. For instance:

- EPA has delegated vast environmental enforcement authority to Ecology in air-pollution control and hazardous-waste management. EPA officials audit our efforts to make sure we are meeting federal standards; however, in most cases, our state laws are stricter than the corresponding federal ones.

- EPA provides grant money to Ecology for several environmental protection efforts.

- Ecology and EPA cooperate in many efforts regarding private industry, especially concerning cleanup of contaminated sites.

- Importantly, Ecology and EPA are the voices of environmental regulation in Washington State.

So, what do I expect of EPA?

Listen to the public. Our citizens expect to be consulted at every step in the process, including the beginning of decision-making. It is my personal goal that Ecology is never criticized for holding too few public meetings and hearings. We want to give the public a chance to discuss the merits of environmental issues before decisions are made.

EPA should have the same attitude. We both must educate the public on environmental issues, provide ways for people to respond, and demonstrate we are listening to their comments.

A good example was the assistance EPA provided in an innovative planning effort called Washington Environment 2010, launched by Governor Booth Gardner. A "state of the environment report" assembled all data on the status of Washington's ecosystem, including air and water quality, land uses, and wildlife and fisheries resources, then predicted what the condition of these resources would be in 2010 if trends continued. The resulting picture was sobering, if not dismaying. With the help of the public, we then set a vision of what we wanted the environment to look like in 2010. Last, with much advice from the public,

(Gregoire is Director of the Washington State Department of Ecology.)

we drew up an agenda designed to fulfill the vision.

Environment 2010 has proven a great success. The state of the environment report won wide acceptance, with the public turning out in record numbers at statewide and local 2010 meetings. The governor and key legislators endorsed the agenda, and EPA provided a grant to help fund the effort. EPA staff helped state officials develop the initial report, worked with the public at statewide and town meetings, and aided in developing the action agenda. The whole effort was a fine example of involving the public.

Get the job done. I expect EPA to find ways to accomplish environmental goals that will not make them captive to bureaucratic rules and regulations that hinder the effort. As my friend Marc Roberts of Harvard's Kennedy School of Public Affairs would say: "What is the question to which this is the answer?" Will a rule, regulation, or process make the environment better? I expect the Department of Ecology to live by that standard; EPA should as well.

Recognize a state's uniqueness. Fair, impartial enforcement of national standards is essential. However, it is equally important to recognize that every state has its own unique history, geography, public perceptions, and political reality. In pursuing national goals, EPA should give each state the latitude it needs to develop its own best course of action.

A full partnership. We need EPA to ask our agency the tough questions, listen to us, and respond to our concerns. Together, the state and federal government can make environmental laws work.

The Hanford nuclear site in south-central Washington is an outstanding example in which EPA and Ecology have cooperated in dealing with a difficult problem. This U.S. Department of Energy (DOE) facility has produced nuclear-weapons materials since the Manhattan Project days of World War II. Huge amounts of radioactive and chemical wastes have been generated as

a byproduct, and much of these wastes has been stored or disposed of inadequately. The danger of widespread contamination has been very real.

Until 1987, DOE officials maintained that the facility did not have to comply with state or federal environmental laws. Ecology and EPA used a combination of legal threats and negotiation to develop a unique three-party agreement to clean up the site and bring its facilities into compliance with state and federal hazardous waste laws.

Demonstrate leadership. EPA should provide a national vision of environmental protection and enhancement. Leadership is more than just writing new laws and regulations. We need a program which invites the states and the public at large to participate in reaching the vision.

Enforcing environmental laws, even in an environmentally conscious state like Washington, isn't easy. We, at the state level, have great pressures from opposing forces whenever we develop or implement a new environmental standard. We have only limited staff, resources, and expertise. We need EPA's help.

As a state agency, we need EPA's pressure for support in carrying out our mission. Finding a location, for example, for a hazardous waste incinerator and landfill has been very difficult. There is understandable opposition from neighbors of candidate sites, who are worried about health and economic consequences. Knowing that EPA is watching to make sure we are following federal standards correctly helps alleviate their fears.

Ecology and EPA will have great opportunities to work together in the years to come.

We both have a problem with the public perception of risk from pollution. Many believe that pollution must be reduced until there is no public health or environmental risk. Their view has been supported over the years as standards for specific toxic substances have been made increasingly more stringent. It is my personal view that this policy will lead us into a trap where vast amounts of

money are going to have to be spent to achieve minuscule reductions in risk. And, although government shouldn't decide what the public wants, EPA and the state agencies around this country should find a way to communicate with the public not only on risks, but on the costs of reducing those risks.

On the problem of wastes, the State of Washington set official goals last year to reduce the amounts of wastes produced in the state by 50 percent by 1995. We lead the nation in solid-waste recycling at 28 percent; however, achieving a 50-percent reduction is a very tall order indeed.

We now have a handle on the major waste producers in our state, and they are required to achieve waste-treatment goals that are prescribed in permits. New manufacturing techniques will yield significant reductions. However, the major decrease we plan for the 1990s will have to come from yet another source, and that is the citizen. We can't write permits for 4.5 million individuals or periodically inspect their homes. We can, however, educate them to recycle their solid wastes voluntarily, reduce their dependency on products that result in hazardous waste, and dispose of the rest properly.

Frankly, in the case of recycling, our citizens have been way ahead of government. Citizens in several cities forced local officials to start curbside recycling programs instead of expanding landfills or building incinerators. They then signed up for curbside recycling pickups at their homes. More than 75 percent of Seattle residents, for example, embraced voluntary recycling almost immediately.

In conclusion, I'm encouraged by the direction EPA is taking under Bill Reilly and Hank Habicht. Further, I have had consistently good rapport with the administrators in the Seattle regional office. Both our agencies are headed into their third decade. Will the 1990s be the decade of the environment? Will our agencies lead the nation into a new millennium of ecological quality? It's an intriguing challenge, and an opportunity for government and our citizens.□

What Do You Expect of EPA?

An Environmentalist

by Michael McCloskey

In its 20 years of existence, EPA has accomplished a great deal, and it has passed through some of its darkest moments. Nonetheless, it still strikes many environmental activists as an agency that has lost its way.

Despite more sympathetic leadership now than in the recent past, it still has not overcome its most fundamental problems. What might those problems be? They can best be understood by considering five basic questions:

• Is EPA willing and able to do its job?

To do the job assigned to it, EPA needs talented, innovative staff in adequate numbers. However, the Agency has suffered from hiring freezes that have left it far short of the staffing it needs to handle a workload that has doubled over two decades.

EPA has also lost any inner-directed sense of how to pace and present itself as an agency that intends to fulfill its mission. It has suffered too much from rough handling by political appointees, and a legacy of intimidation hangs over it.

The net result has been a hemorrhaging drain of many of its most experienced and imaginative people. As a consequence, inexperienced, junior staff are handling too many taxing responsibilities. Now the Agency must rely on its contractors even to design the questions that EPA, in turn, asks them to answer. In short, EPA lacks enough experience and brainpower to be effective. Its institutional memory is in the hands of its contractors.

In fact, EPA seems almost the model for Marver Bernstein's theory of agency decay. (According to Bernstein's theory, regulatory bodies typically follow a life pattern that begins with genuine ardor to carry out their legislated mandates but then proceeds through fairly predictable stages of disenchantment and decline.) In its early years, EPA was full of zeal to achieve its mission. Now after 20 years,

it is middle-aged and cautiously balancing its objectives. Some observers even detect in EPA the early stages of senility, in which an agency just "goes through the motions."

Yet one can understand why EPA seems gun-shy. At the outset, Congress may not have foreseen how politically charged EPA's work would become. Every decision the Agency makes is freighted with political importance. Instead of just doing technical work, EPA is caught in the middle of endless cross fire between complaining industries and environmentalists. Too much is at stake for EPA to be left alone.

When compelled to do the work of politicians—when it must mediate disputes over controversial questions—EPA is forced into work that it is ill-equipped to do. Lacking hired cadres of politicians, it suffers a mismatch of talents. It adapts by trying to stay out of harm's way; it tries to minimize the

number of times it exposes itself to the withering fire. It thus leaves the job to a kind of trial by combat among the other parties.

• What, then, is EPA's attitude toward its work?

Environmentalists suspect that EPA sees itself less and less as an advocate for the environment and more and more as an umpire calling "balls and strikes." When EPA began, environmentalists thought it would serve as a counterforce to the Commerce Department, which is an advocate for business and industry. We wanted a critical mass of talent to be recruited for a single purpose: improving the environment. Once environmental objectives were consolidated and given to the new agency, we thought EPA would avoid getting caught in the kinds of conflicts over competing missions that had

What it's all about
An idyllic scene with
two Canada Geese at
Shiawassee National
Wildlife Refuge,
Michigan



Frank R. Martin photo. U.S. Fish and Wildlife Service.

(McCloskey is Chairman of the Sierra Club.)

occurred within other federal departments and agencies. It would be judged, we thought, by a single measure: Is it leading the way toward a better environment?

But is EPA putting forth strong positions that challenge skeptics in the Office of Management and Budget and the Commerce Department? All too often, EPA puts forth proposals that are compromised from the start and then weakened even further in the process of attrition. The process of compromise begins too early within EPA.

And is EPA any longer concerned with getting results? Environmentalists had hoped that EPA, like the Corps of Engineers, would have a "can do" attitude, that it would dauntlessly persevere to push down pollution levels. Yet many now sense that EPA sees itself less as a "mission-oriented" agency and more as a process-oriented one. EPA often seems to be concerned with moving

paperwork along as if that were an end in itself.

Moreover, much of this paperwork is cast in the context of an ostensible quest for "good science" to undergird the Agency's work. EPA may feel it can escape from political cross fire by claiming its proposals simply reflect a pursuit of the implications of scientific research. Yet, characteristically, much of EPA's mission involves very different, value-laden notions—such as margins of safety, burdens of proof, burdens of risk, the benefit of the doubt, and acting ahead of definitive proof of cause and effect relationships.

The quest for the Holy Grail of "good science" plays into the hands of the agents of delay—those in industry who will always want to put off the day of reckoning by pointing to shortcomings in what is definitively proven. The cry of "good science" originates with industries seeking exemptions and delays. It is all too easy for EPA to "study issues to death" and duck making decisions.

EPA's managers need to realize that the Agency's mission can be achieved only by making value judgments and acting in a timely way—acting in advance of full scientific understanding. Although lately (since 1989), EPA seems to have restarted its engines and begun issuing regulations once again, the long-term record is one of growing indifference to its statutory mandates. For instance, it has done little to implement the Toxic Substances Control Act (TSCA), or to regulate toxics in air pollution, or to require pre-treatment of wastes by industrial water polluters.

As a result, in frustration, Congress has taken away more and more administrative discretion and made more and more things mandatory. EPA and Congress have drifted into an unhealthy relationship, with neither trusting the other. An ultimate expression of EPA's defiance of Congress can be seen in its own efforts to select priorities for its work with near indifference to Congressional direction. It acts as if it has discretion where it doesn't, as if Congressional mandates were somehow not the law.

If EPA is overloaded, unable to do parts of its work, it should say this plainly to Congress and ask for guidance.

● How does EPA view the public?

EPA's best chance of gaining the public support it needs lies in reaching out and communicating clearly with the public. Through much of its history, it has failed to do that.

EPA acts as if it can surmount difficulties by being invisible and inscrutable. Like most bureaucracies, EPA has its own specialized vocabulary and speaks almost in code regarding its work. To make its work sound more scientific, the Agency tends to overcomplicate its actions. The result is that it talks only to itself and a small cadre of specialists who have made it their business to crack the code.

But the public is seldom able to fathom what EPA is talking about. And EPA does not even seem very interested in talking to the public. Most press statements are as "gray" and uninteresting as possible. Only a halfhearted effort is made to translate jargon for public consumption.

EPA does get into the press, due to the importance of its decisions, but its actions often come across as arbitrary and inscrutable, partly because no advance work has been done to give the public a proper frame of reference. All too often, some hypertechnical decision suddenly hits the newspapers, and EPA's friends haven't even been briefed.

With the exception of a time in the late 1970s, EPA has not seemed interested in presenting itself in an attractive and intelligible way to the public. It acts, in short, as if it doesn't need friends.

EPA could mobilize support by developing and clearly defining standard indicators of pollution levels across the country. There should be indices of the severity of pollution of different media, nationally and locally. These should be communicated through graphic devices, like thermometers, which are easy to understand.

But these have never been developed. EPA has not made it easy to understand



why more regulation is needed. EPA seems to prefer to operate in a public-relations vacuum.

• How does EPA relate to the environmental movement?

Most of EPA's programs have been shaped by the environmental movement's efforts to persuade Congress to tighten the laws relating to the environment. Some of these laws would not exist were it not for the movement's exertions. Moreover, lawsuits filed by environmental groups have at times been the principal enforcement mechanism for environmental laws.

Yet the environmental movement is not treated as the Agency's core constituency. Instead it is kept at arm's length, almost as if contact might contaminate EPA. Environmentalists are rarely put on EPA's advisory boards or asked for opinions on how things should be done. Environmental lobbyists who know the legislative history are often ignored.

Part of this reaction may stem from political fear during times when environmentalists have been at odds with sitting administrations. Yet, the basic indifference persists regardless of administrations. EPA career people keep a very low profile regarding first-hand dealings with people in the environmental movement. As a consequence, EPA comes across as remote and indifferent.

The problem is compounded by the unevenness of the contest between environmental and industry lobby

groups. Environmentalists are unable to assemble a vast team to match industry in stalking the course of every piece of rule-making and standard-setting. They cannot stand toe-to-toe to match industry on an incredible variety of highly technical questions. EPA could help environmentalists be more competitive by regarding them as a source of assistance. Instead, EPA treats them as just another vested interest lobbying for special advantage.

All of this is made worse as the process is turned into an endurance contest. Our ill-equipped and thin forces can rarely finish these long marches. But not only do we fall out; so also does the public interest. Every step in long processes that go on for years becomes another potential failure point or ambush point where industry can prevail and sideline further regulation. As a result, EPA is left with no one to rally needed help.

To survive, EPA needs to shorten these processes, pass through fewer ambush points, and enlist allies from the environmental movement to help defensible proposals advance to see the light of day.

• Is EPA accountable?

As the years have passed, EPA has not delivered "fishable and swimmable water" by 1983, nor much of anything else by Congressional deadlines. EPA does not act like it is accountable to Congress or the public. It acts more like an assembly of people showing up for work and collecting pay checks.

EPA does not make it easy for the public to determine whether it is getting results. When reports are issued on trends in air-pollution levels, it is difficult to see a coherent pattern in the material presented. Changing standards, shifting monitoring stations and data sites, and confusion over technical terms like "boxplots" and variable use of geometric and arithmetical means: All these suggest almost a calculated desire to keep the reader from understanding what is being said. The reports on progress made in cleaning up water pollution are even worse; for example, the conditions of different sets of water bodies are compared each time, making it difficult to discern any real pattern.

The public is kept at bay, and it is hard to know whether conditions are getting better or worse. No good baseline has been set against which to measure progress. There are no indices of composite conditions. International standards of comparison are seldom employed. We have no idea how the United States compares with other advanced nations—for example, Sweden, Switzerland, and Japan.

Many in the environmental movement also fear that the "books were cooked" during the Reagan years and that figures now offered to show advances during the 1980s are simply not true. That is why Congress is being urged to set up a Bureau of Environmental Statistics which would be insulated from politics.

EPA may be caught in a sort of "Catch 22" in which it seeks to distance itself from politics and in doing so becomes even more suspect of being unresponsive and unaccountable. Frankly, most of the environmental movement has no idea whether EPA is delivering the goods or is dawdling and hiding.

EPA's failure to be accessible and to communicate intelligibly has left it wounded and vulnerable. It is seen largely through the prisms afforded by the political appointees placed over it. Its career cadres need to break out of their isolation and put the Agency in touch with those who want it to succeed.

They will be surprised how easy it is to recruit allies. But those would-be allies can only be supportive if they are armed with solid information and treated as collaborators.

It is time to initiate a new era for EPA. □



"Does our 'P' stand for pollution or procrastination?"

Reprinted by permission of NEA.

What Do You Expect of EPA?

An Industrialist

by Frank Popoff

If American industry could wave a magic wand, what kind of EPA would it create? No doubt this is a question many of us in the chemical industry have contemplated during the past 20 years. After all, with the possible exception of the Internal Revenue Service, no federal agency wields more power over businesses such as ours than does EPA.

But the answer might surprise some people. Those who think we would choose to transform the Agency into a skeleton of its former self, devoid of influence and strength, are mistaken. In fact, just the opposite is true. I believe industry's best interest lies in an EPA that is strong and successful, credible and consistent, with the conviction to base its decisions on science and technology—not on political expedience.

It's vitally important for EPA, as industry's environmental watchdog, to have some bite behind it. Much of industry's credibility with the public hinges on how well people feel EPA is doing its job. While the prospect of ineffective regulators may seem appealing to some in the business community, the long-term consequences of such weakness would be devastating.

As history has shown repeatedly, when the public perceives that industry is making off with the store while government looks the other way, the subsequent backlash is swift and severe. The result can be arduous, ending up in unreasonable regulations that cost taxpayers dearly without achieving significant benefits.

One way to strengthen EPA is to elevate the Agency to Cabinet-level status. The Chemical Manufacturers Association

(CMA) is on record as supporting such a step. The resulting Department of the Environment would be in a stronger position to take the lead in forming new partnerships to break the "environmental gridlock" which now grips this country.

By environmental gridlock, I mean the adversarial relationship which too often exists among government, industry, and special interest groups. Our increasingly complex environmental problems seem to be stuck in a traffic jam, with everyone honking horns from all sides and nothing much being accomplished.

Industry is as much to blame for this situation as anyone else. In the past,

we've been reactive, not proactive, at times recalcitrant, and not as enlightened as we should have been with respect to environmental concerns. In recent years, we've come a long way in improving our performance. For example, in 1989 members of the CMA voluntarily launched a bold initiative called "Responsible Care." This self-help program—members helping members—is designed to promote continuous improvement in the chemical industry's environmental, health, and safety performance.

As an indication of industry's extensive commitment to this program, CMA



Dow photo.

The Dow Chemical Company is involved in several waste-reduction programs, including one at its Specialty Chemicals Department in Pittsburg, California, where a major reduction has been achieved in air-pollutant emissions.

(Popoff is President and Chief Executive Officer of The Dow Chemical Company.)

member companies have voted to make participation in Responsible Care an obligation of membership in the association. That obligation includes pledging to observe a number of guiding principles and practices, including a commitment to achieve ongoing reductions in releases to air, water, and land. Those who fall short will be disassociated.

Programs like this are an important step. Now, we need EPA to be the catalyst in lowering the level of rhetoric and getting everyone to the table. Government has to take the initiative. I believe EPA Administrator Bill Reilly has the requisite respect and confidence of the environmental community, industry, Congress, and the President to bring all the parties together.

At the same time, it's important to remember that industry brings to the table the technological know-how that can help lead to meaningful solutions. The stakes are too high and problems too urgent for this gridlock to continue.

A stronger EPA would be more likely to formulate policy based on sound scientific data instead of political pressure and public opinion polls. We commend Mr. Reilly for his efforts to do just that. Over the years, science seems to have taken a back seat to politics as a criterion in setting our national environmental agenda. EPA needs to be more successful in getting Congress to agree to its priorities rather than the other way around. True, Congressional oversight is an important part of the process. But when you consider that more than 90 committees and subcommittees now have jurisdiction over some aspect of EPA, it becomes easy to see how pressure from Capitol Hill can stifle the Agency's effectiveness in setting sound scientific policy.

Along those lines, we believe EPA should closely examine the way it uses risk assessment in its decision-making process. We encourage the increased use of risk assessment as a tool for prioritizing what needs to be done. Our society's resources are limited, so it is vital these resources are spent in attacking the problems which most affect the public.

However, risk assessment should be used only as a tool in priority setting, not

as the final regulatory criterion. Other elements need to be factored into the equation: costs, benefits, alternatives, and technical feasibility. As a recent example, we believe EPA effectively took these criteria into account when it contributed to the debate surrounding a new Clean Air Act. But when these pieces of the puzzle are ignored, the result can be laws and regulations which only hurt industry and cost us jobs without benefiting anyone.

The key to environmental improvement is to set targets that are cost-effective and attainable. And once a suitable target is

Our increasingly complex environmental problems seem to be stuck in a traffic jam, with everyone honking horns from all sides

established, industry should be given the flexibility to decide which technology is most appropriate to get the job done. In other words, give us a destination based on sound data and realistic standards; then let us figure out the best way to get there.

Educating the public about environmental issues—especially environmental risks—also should be an important EPA objective. There is so much information floating around from so many sources that it's difficult for anyone to figure out what to believe. Here, EPA can step in with its scientific expertise and help put things into perspective. Such perspective was badly needed during the recent Alar apple scare.

We would also like to see EPA use creative policies and regulatory strategies to encourage pollution-prevention and waste-reduction activities, instead of focusing on end-of-the-pipe treatment. Most of our regulations today deal with the management, treatment, and disposal of waste *after* it is produced. By taking a voluntary waste-reduction approach at Dow, we have been able to eliminate many wastes *before* they ever reach the end of the pipe.

Our company has a program called WRAP—Waste Reduction Always Pays. It's an appropriate name because not only is waste reduction good for the environment in that it greatly reduces emissions, it's also good for the bottom line. For instance, our Louisiana Division spent more than \$12 million on 47 waste-

reduction projects over the past two years and will be spending another \$4 million this year alone. These projects reduce thousands of pounds per year of waste and emissions. Beyond that, they provide hefty dividends in the form of lower operating costs and higher productivity by enabling us to improve product yields and reuse and recycle waste into valuable products.

The environmental dividends have been substantial. Thanks in large part to these waste-reduction efforts, our air emissions in the United States have dropped by more than 50 percent since 1984, and we are committed to another 50 percent reduction by 1995. Several companies in our industry have similar success stories. EPA should take the lead in encouraging others to hop on the waste-reduction bandwagon.

Finally, we encourage EPA to seriously consider the global nature of our industry when formulating its policies. This means assessing how regulations enacted in this country will affect our ability to compete abroad. We all want a healthy environment. We also want a healthy economy with the necessary resources to address environmental concerns.

At Dow we believe that in the coming years environmental issues will have more bearing on our company's success than any other factor. I'm proud of our progress, but at the same time I realize there's room for continuous improvement. We can do better, and we will do better.

EPA can help by setting a national agenda for environmental reform, playing a leadership role in getting industry, special-interest groups, and government to work together on solutions, and by using science to guide Agency decisions. Quite simply, if EPA can succeed, we'll all be winners. □

The Road We've Travelled

by Phyllis Myers

The creation of the Environmental Protection Agency on December 2, 1970, was not a major press event. Only brief articles inside *The Washington Post* and *The New York Times* mentioned the new agency and Congress' unanimous confirmation of William Ruckelshaus as its first Administrator. To *The Wall Street Journal*, the occasion merited seven lines at the end of its domestic news summary.

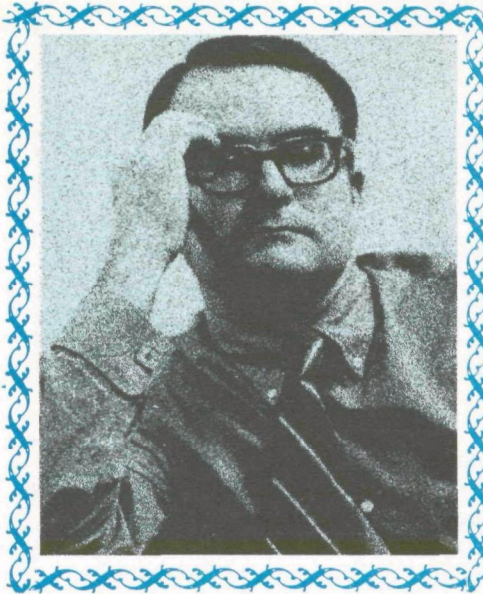
With words still surprisingly fresh, President Nixon called for the creation of "a strong, independent agency ... to make a coordinated attack on the pollutants which debase the air we breathe, the water we drink, and the land that grows our food."

There was little quibbling in Congress over Nixon's reorganization plan, which transferred air, solid waste, radiological monitoring, water hygiene, and pesticide-tolerance functions from the Department of Health, Education and Welfare; water quality and pesticide-label review from the Department of the Interior; radiation-protection standards from the Atomic Energy Commission and the Federal Radiation Council; and pesticide registration from the Department of Agriculture. The transfers included 56 research laboratories located all over the country. Many of the "charter" employees at their desks on December 2nd in the new agency remain with EPA today—about 300 at headquarters, and 1,200 throughout the regions and field stations.

EPA's authority was strengthened within weeks by the reauthorization of the Clean Air Act. The new amendments called for national standards for ambient air quality, and state plans describing how the standards would be attained. After EPA approval, the plans were to be enforceable by state and federal law.

Each of the responsibilities transferred to EPA would receive stronger authority within the decade; and new programs

(Myers has authored a number of publications and articles on environmental issues and is President of State Resource Strategies. For this article, she interviewed EPA employees past and present and has written here a retrospective view of the Agency based on their comments.)



William D. Ruckelshaus

would be added. Congress addressed each issue separately, in part because its own responsibilities for the environment were fragmented.

The new agency, meanwhile attracted long-haired, bright, enthusiastic, and unseasoned workers. "Every young person worth his salt came here looking for a job," says Chuck Elkins, now head of the Toxic Substances Office.

EPA's Early Years

Ruckelshaus and his staff set up temporary offices at the old Normandy building, near the White House. The building, slated for demolition, was "the pits," recalls Phil Angell, who was recruited to staff the new agency's public affairs office. "I had a little grey office: a grey desk, a grey chair, a grey manual typewriter, and a fluorescent fixture. That was it."

Other headquarters personnel were scattered in separate program offices around the Washington region. Alan Eckert, now Associate General Counsel for Air and Radiation, remembers the first "all hands" meeting. "We had to rent a movie theater because there was no room in our offices large enough."

Ruckelshaus let his staff know early on that he wanted to "hit the ground running." Soon after, he announced that EPA was filing violation notices on three cities—Atlanta, Cleveland, and Detroit—for lagging performance in building wastewater treatment plants.

He followed with action against the Jones and Laughlin Steel Company and other industrial giants.

His commitment to stronger enforcement was evident in the number and quality of attorneys brought on board. The first two months saw five times as many enforcement actions as all the programs united under EPA had initiated during any similar period. John Quarles, general counsel and later deputy administrator, remembers: "We were caught up in the spirit of the times, the personality of Ruckelshaus, and the fact that in a new agency everything was up for grabs."

DDT was already under a limited ban when Ruckelshaus took office. The issue he faced was whether to suspend its use entirely. Testimony from blue ribbon scientific panels about its effects on mammals, manufacturers' arguments that direct effects on humans had not been proven, agronomists' warnings about its importance to the economy, and a law suit filed by the Environmental Defense Fund crossed his desk. He made the long-awaited announcement to phase out domestic use of the pesticide in June 1972 at the United Nations Conference on the Human Environment in Stockholm. He said he was convinced by "evidence in the record" that the storage of DDT in human tissue and its persistence in the food chain posed "a warning to the prudent" that people "may be exposing [themselves] to a substance that may ultimately have serious effects on ... health."

Reauthorization of the Clean Water Act in 1972 completely revised the nation's approach to water pollution. After contentious debate about "zero discharge," Congress set an interim goal of "fishable" and "swimmable" waters to be attained within a few years. It mandated national effluent limits for industrial and municipal discharges and a permit system based on these guidelines. The measure was approved over White House objections to the "budget-wrecking" \$18 billion grants program to build wastewater treatment plants.

Confidence that environmental protection was a finite job soon began to erode. Dr. Robert Fri, who was Ruckelshaus' deputy, remembers: "It all seemed so straightforward at first. But

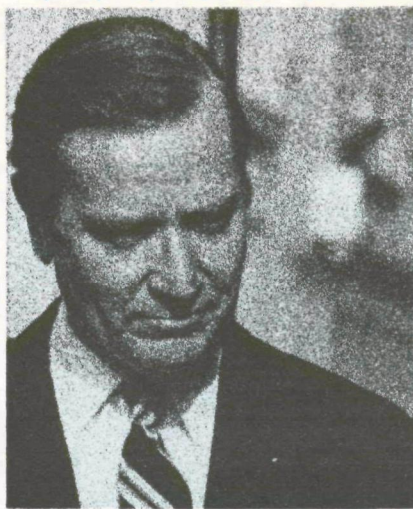
even in the two years I was there, one could easily see how difficult it would become." The statutes reflected Congress' conviction that technological breakthroughs would follow if only industry were forced to spend enough money. "At this stage, the Agency was able to argue that cost was not an issue Pollution was egregious. It would have been difficult to spend dollars unwisely." Ruckelshaus refused to grant extensions requested by automobile manufacturers to meet hydrocarbon and carbon-monoxide standards, in effect forcing adoption of the catalytic converter.

As Watergate clouds darkened over the nation's capital in 1973, the White House asked Ruckelshaus to take over the troubled FBI. His successor at EPA was Russell Train. The climate had changed perceptibly, Train recalls. His confirmation by Congress took three months, in contrast to the one day for Ruckelshaus. A *Who's Who* description of Train as a "conservationist" and his earlier work on a surface mining bill disquieted some industry critics. "There was a nice passing of the flame, though," says Train. "I was sworn in by Attorney General Eliot Richardson, with Deputy Attorney General Ruckelshaus looking on. They were both soon gone, after Richardson was fired and Ruckelshaus resigned."

The DDT decision was put to the test when a plague of Tussock moths hit the Northwest forests. The only known control was DDT. "All the region's governors, including Tom McCall, a strong environmentalist, its powerhouse Senators—Jackson and Magnuson—and the entire House delegation supported using DDT," Train recalls. "We were told that the normal cycle would lead to the collapse of the Tussock moth at some point. But when? If it went beyond one year, the economic impact would be enormous. I announced my decision to approve the use of DDT under carefully controlled conditions in a Seattle press conference. I remember today environmentalists sobbing in the room."

Despite his strong conservation credentials, says Train, "my relations with environmental groups were about as hairy as that of most Administrators. One evening [Supreme Court Justice] Byron White said to me, 'You're the most litigious son of a bitch. Your name is on a thousand lawsuits.'"

Nevertheless, by January 1975, writing in *EPA Journal's* inaugural issue, Train



Russell E. Train

could point to "real headway Our investments in municipal and industrial point-source controls are beginning to pay off in pollution reduction—in lower counts of bacteria and biodegradable oxygen demand, and in less phenols. In air, total suspended particulates and sulfur-dioxide concentrations have significantly declined." In 1976, the Toxic Substances Control Act (TSCA) was finally passed. The Kepone tragedy at Hopewell, Virginia, PCB contamination of the Hudson River, and the accidental poisoning of cows by PBBs in Michigan, had kept the toxic issue simmering. Al Alm and Terry Davies, who had worked under Train at the Council on Environmental Quality (CEQ), had written an influential report on toxic substances that led to the law. (Davies is now EPA's Assistant Administrator for Policy, Planning, and Evaluation.)

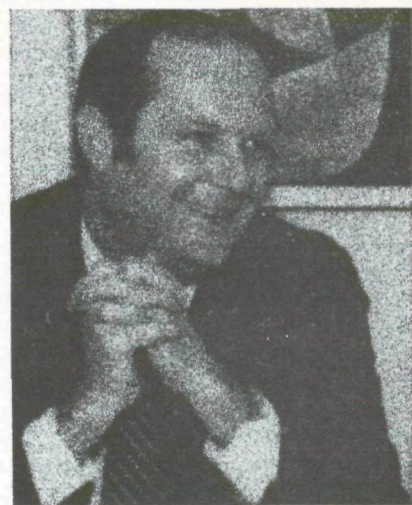
"We began to think about ways to deal with risk," says Alm, who became an assistant administrator under Train at EPA. "Train asked me to develop a policy on cancer. The Carcinogens Assessment Group was the beginning of risk assessment machinery. We issued effluent guidelines and set up the organization for TSCA. The Safe Water Drinking Act was passed, and then the Resource Conservation and Recovery Act (RCRA). We set up the beginnings of the Science Advisory Board (SAB). We did a lot. There weren't so many encumbrances then."

The Late Seventies

"We didn't realize how complex the job would be," says Doug Costle, President Carter's choice for EPA Administrator. Costle had directed the study that led to EPA's creation. His appointments included David Hawkins as assistant administrator for air, formerly an attorney for the Natural Resources

Defense Counsel, and Tom Jorling, who as minority counsel on the environmental and public works committee had played a substantial role in crafting EPA's water and air statutes. Steve Jellinek, formerly with CEQ, was named to implement TSCA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which was overhauled in 1978.

Costle faced not only a growing backlog of regulations and lengthening deadlines,



Douglas M. Costle

but also widening recognition of the costs and time it would take to meet the ambitious goals mandated by Congress—if they could be met at all. In the beginning "most of us thought we would take care of the big problems in short order, and then it would be a matter of maintenance," says Elkins. "We began to see this wasn't the case in the late 1970s when we were missing all the deadlines in the new programs. We thought then that the deadlines were tough, but now we see they were laughable."

The laws were written so that we would need a policeman at every corner," worried Costle. Court suits, filed by environmentalists on the one side and industry on the other, became a fact of Agency life. "The Clean Water Act ... assumed zero emissions were achievable," says Costle special assistant Mary Ann Massey. "The Natural Resource Defense Council sued, and the court directed EPA to comply with the law. 'How can we do it?' we asked. 'You figure it out,' said the court."

"But," says Massey, "we also began to think about the bubble policy. This was

Bill Drayton's idea, putting an imaginary dome over a region and allowing industry to trade emissions within the region, providing they didn't exceed the limits for the overall bubble." Drayton, who directed the Planning and Management Office, observes: "First, government writes the rules. Then it creates the situation where the regulatees can make a counterproposal and find cheaper ways of accomplishing the same things. Innovation in pollution control technology is unquestionably the most important need If you're stuck with static technology, then the environment is in big trouble, since pollution is increasing."

Meanwhile, Three Mile Island, Valley of the Drums, and Love Canal catapulted to headlines and TV screens. Grassroots heroes and heroines aired fears about "ticking time bombs." As a result, EPA was positioned more firmly as a health protection agency.

Hazardous waste had been addressed in the Resource Conservation and Recovery Act (RCRA), the "cradle to grave" legislation enacted in 1976 to regulate its generation, storage, transportation, and disposal. "Congress thought the job was done when it passed ambitious laws," observes Sylvia Lowrance, director of the Solid Waste Office. "But its laws just set forth broad requirements. When this office was established, we didn't know who managed hazardous waste, where waste was, and what the problems were." Today one of EPA's largest programs, the Office then had 11 people watching over an inventory of municipal landfills.

The crises also led to the creation of a ground-water office in 1984. "We had a lot of Lois Gibbs stuff. People were excited, rightfully so," says Marian Mlay, today the Office's director. "Costle asked us, 'What are we doing about ground water?' I didn't know what ground water was. Yet it supplies half of our drinking water."

"We were always running behind," says Costle. "Every Christmas in Woodstock, Vermont, there's a horse parade through town. Always at the end, there is one carriage with a man holding a shovel. When you see him, you know the parade is over. EPA was like the guy who was picking up the shovel, going from one pile to another."

In 1980, in one of his last presidential acts, Carter signed the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), authorizing

a "shovels first, lawyers later" approach whereby EPA would respond immediately to emergencies caused by abandoned waste dumps. A five-year, \$1.6 billion trust fund—Superfund—was established, financed primarily by a tax on industrial chemicals. The federal government could sue for recovery of costs if the liable parties could be found.

Defederalization

In 1981, the Reagan agenda of defederalization, severe budget cuts, and regulatory reform swept through the nation's capital. EPA was widely seen as a special target. In the words of Anne Gorsuch, EPA's new Administrator, "There was no riper pasture for regulatory reform than EPA." Gorsuch was, like her predecessors, an attorney. Otherwise, her credentials differed substantially. She had gained visibility as an outspoken conservative in Colorado's state legislature. "When

management, and through it one controlled policy direction." Personnel was reduced by 22.6 percent, and the budget pared from \$701 million to \$515 million, in constant dollars, excluding Superfund. The federal share of construction grants was reduced to 55 percent, and the long-term federal commitment from \$90 billion to \$36 billion. Nevertheless, widening public perception that serious environmental hazards were being mismanaged or worse was brought to a head by dioxin contamination at Times Beach, Missouri, the firing of Rita Lavelle, who administered EPA's Superfund and RCRA programs, and the refusal of Gorsuch to comply with Congress' demand that she turn over internal Agency documents dealing with Superfund enforcement. She resigned in March 1983 because, she said, she "had become an issue in the intense Congressional controversy about Administration policies."

Back on Track

President Reagan asked Ruckelshaus to serve again as Administrator. The caption on *EPA Journal's* cover called his return "the dawn of a new era." When Ruckelshaus talked to EPA's staff the first time, "it was like the liberation of Paris," says Eckert.

Al Alm returned as deputy and Phil Angell as chief of staff. Lee Thomas, who had headed the emergency response team at Times Beach, became assistant administrator for the sensitive hazardous waste program. "The landscape had changed completely," recalls Angell. "I didn't recognize the legislation—the Clean Air Act amendments, and RCRA and Superfund struggling to come into being. We faced a new generation of programs: toxic chemicals, acid rain, orphan dumps, and transboundary issues. It was remarkable and reassuring, however, to find that a number of people I knew were still there."

"I thought it was important to move quickly," Alm points out. "We needed to deliver. It was essential, and surprisingly difficult, after years of slower pace, to get the Agency back in a positive mode." Alm set up 10 task forces to deal with such issues as ground water, dioxin, acid rain, and risk assessment. Enforcement was reinvigorated. Civil penalties



Anne Gorsuch

President Reagan asked me to head the Environmental Protection Agency, I understood that he wanted me ... to get out better environmental results with fewer people and less money Excessive regulations, burdensome paperwork for industry and government, federal-state friction, and huge costs at a time of increasing economic stringency ... were clear signs that change was needed in the 1980s.

"One of the things I'm proudest of is my EPA management system," says Gorsuch. "I came to the EPA believing that the budget was *the* tool of

increased in number and size. And "we brought great new people in."

The role of the Science Advisory Board was strengthened. "When EPA was created, we had a large base of information about air and water built up over many years," says Erich Bretthauer, current head of Research and Development. "In the mid-1980s different problems surfaced—acid rain, climate change, sedimentation—that were much more complex and for which we lacked a research base."

"Ruckelshaus talked about integrated legislation to do away with the different standards in different statutes. The definitions of benefits and costs, and the extent to which they can be considered, for example, are inconsistent," observes Ed Johnson, who directed the pesticides program from 1974 to 1984. "Every Administrator has tried to deal with the multimedia question. This is evident in continual reorganization in response to changing views of the program. Pesticides, for example, had three major reorganizations. The emphasis was once on contamination in water, then in drinking water, and then [on pesticides] as a toxic substance."

By 1983, Ruckelshaus reflects, it had become evident that "environmental laws tend to be passed in periods of high emotion," resulting in a hodgepodge of deadlines and requirements, restrictions on the Administrator, and insufficient attention to technological feasibility or benefits in comparison to costs. "I felt that rather than argue frontally with Congress, it was important to gain a more precise understanding of comparative risks to public health and benefits associated with higher and higher expenditures." This is very difficult to do, he admits.

Lee Thomas, who was named Administrator following Ruckelshaus's resignation at the end of Reagan's first term, was the first career government official and first non-lawyer to serve in the post.

First among his accomplishments, Thomas unhesitatingly singles out the 1987 Montreal Protocol, an unprecedented international agreement. The Agency had banned CFCs, or chlorofluorocarbons, in aerosol cans in 1978 in response to reports about ozone depletion. The Protocol froze the level of CFC consumption and required steady reductions to achieve 50-percent



Lee M. Thomas

reduction by 1998. "The involvement of industry in the final agreement was a model for other environmental actions," says Thomas.

Another landmark was the reauthorization of Superfund in 1986. The Superfund Amendments and Reauthorization Act (SARA) was the culmination of an intense two years of Congressional debate, and a six-month process to get it out of an 82-member conference committee. "Picture this schizophrenic scenario," says Clem Rastatter, head of Superfund's program management office, "We were anticipating a shutdown. Congress gave us small amounts of money that we had to spend fast. There was a hiring freeze. At the same time we were looking at Congressional debates that anticipated raising Superfund from \$1.6 billion to \$8.5 billion."

Thomas asked an EPA task force to compare the Agency's budget priorities with experts' assessments of risks to public health, welfare, and natural systems posed by an array of environmental hazards. Their report, *Unfinished Business: A Comparative Assessment of Environmental Problems*, concluded that EPA's priorities appeared to be more closely aligned with public opinion, often expressed through Congressional mandates, than with estimated risk.

The continuing role of crisis and emergency response at EPA was amply demonstrated to William Reilly, who succeeded Thomas. A career conservationist, Reilly had been President of World Wildlife Fund and The Conservation Foundation. Soon after

his swearing-in in 1989, a popular TV program aired charges by the National Resources Defense Council that the pesticide Alar was a carcinogen. Wholesale apple prices dropped 50 percent. And a massive oil spill, the largest in U.S. history, riveted worldwide attention on Alaska's Prince William Sound.

One of Reilly's first actions was to ask the Science Advisory Board (SAB) to review *Unfinished Business* and to suggest ways to improve the comparative risk process. In releasing the Board's report at the National Press Club this past September, he said: "We have to find a better way of setting environmental priorities Risk is a common metric that lets us distinguish the environmental heart attacks and broken bones from indigestion or bruises."

He was not suggesting that conventional approaches to environmental problems such as hazardous waste be abandoned. EPA is firmly committed to continued, intensified enforcement of the environmental laws already on the books. Yet given growing environmental problems and growing clean-up costs, "we do need to think carefully about where our limited resources can most effectively be spent," said Reilly.

Based on the SAB's findings about high-risk problems most threatening to the future health of people and our planet, Reilly called for a broad, integrated review of the nation's environmental agenda and response mechanisms. From the review would emerge a new generation of priorities and programs to carry the nation into the 21st century. To supplement traditional command-and-control regulations, the vision includes research, public education and information, technical assistance, and market incentives to prevent as well as clean up pollution.

Changing the agenda would not be easy, and it wouldn't happen overnight, he observed. "The great and dramatic environmental battles are between 'white hats' and 'black hats,' and there are still a good many around. But the significant new progress we need is with ourselves—our lifestyles, our energy use, the goods we buy and use and the waste we generate." □

What Does EPA Mean to You? Employees Comment

by Roy Popkin

EPA employees are the people who must translate EPA policies and regulations into real-life, nationwide compliance. They are a diverse lot. Representing a wide range of disciplines and backgrounds, Agency staff include physical and social scientists, engineers, managers, administrators, health care specialists, communicators, accountants, contract and grant specialists, accountants, lawyers, criminal investigators, data-handling experts, human resource specialists, and support staff of all kinds. They come to EPA from academia, from business, from research organizations, and from other government agencies. Some come fresh from college or other training; some are career veterans.

What do EPA employees like about their jobs? To get an indication, the Journal asked a selection of them to comment on this question. Their responses follow:

Leo Alderman
Chief, Toxics and Pesticides Branch
Region 7, Kansas City, Kansas

Leo Alderman, a chemist and microbiologist by training, came to EPA in 1975. "When I got here, the Agency had its limitations. The pesticide program was limited in a fairly narrow sense to the specifications on pesticide product labels," he said. "Now the program encompasses concerns about ecology, ground water, wetlands, and health effects."

For Alderman, the most satisfying part of his job has been seeing EPA grow and being a part of that growth. He also likes the important role that EPA's regional offices play: "Other agencies are strictly top-down. At EPA, the action works both ways."

Kay Wischkaemper
Geologist
Groundwater Technology Support Group
Region 4, Atlanta, Georgia

Before joining EPA several months ago, Kay Wischkaemper worked as a geologist for a petroleum industry and civil engineering firms. She developed a deep concern about the pollution of ground water and ways to remedy it. "It became obvious that ground water must be protected for human health reasons," she said. She became a ground-water geologist in South Carolina, then moved to EPA.

"Because the Agency has a high profile, the public watches what we do. This means that EPA stresses the importance of quality work," she said.



Alderman



Wischkaemper



Satterwhite



Farrel

Mark Satterwhite
Environmental Protection Specialist
Superfund Program
Region 6, Dallas, Texas

Mark Satterwhite, a 14-year EPA veteran, finds that his most satisfying achievement to date has been negotiating and implementing a Superfund agreement with the Navajo nation that covers everything from pre-remedial work to future waste disposal methods. The lands affected by the agreement include parts of four states and three EPA regions. Another negotiated agreement with the Cherokee Indians in Oklahoma will go into effect soon.

Said Satterwhite: "I consider myself a bureaucrat who has become a specialist in finding ways to cut through bureaucratic red tape. Like the people I work with, I enjoy making something count." Because programs and processes developed in the course of negotiating these agreements can be used in the Resource Conservation and

Recovery Act (RCRA) and Leaky Underground Storage Tank programs, "EPA is getting a 300-percent return on its investment in what I'm doing."

David Farrel
Chief, Air and Toxic Operations
Idaho Operations Office
Region 10, Boise, Idaho

"I arrived with idealistic expectations based on the environmentalism of the mid-70s," David Farrel said. An environmental scientist, Farrel came to EPA last winter from other federal agencies and the Air Force. "I'm now more realistic and down-to-earth. I realize many environmental goals have to be negotiated."

Along with his other duties, Farrel is working on improving communications in the state of Idaho to give EPA a "realistic appreciation" of Idaho's concerns. A big plus "for me and many others is the inspiration of Administrator Reilly's ideas and philosophies I like to think of a long-term commitment to EPA."

(Popkin is a writer/editor with EPA's Office of Communications and Public Affairs.)



Cheatham



Meekins



© Jim Kalitt

Metzger



Lopez



Ward



Billy



Settle



Nurse



Collins



Sierszen



Cho



Windham



Garber



Drazan

Rosalinda Lopez
Accounting Technician
Region 9, San Francisco,
California

Rosalinda Lopez, educated in the Philippines, came to the United States 19 years ago. Her work has always been in accounting. A newcomer to EPA, she says, "I'm not a scientist or an enforcement person, but I see myself providing environmental professionals with support they need. By doing so, I am being of service to the nation and adding to the impact of our efforts to protect the environment."

Micheline Ward
Human Resources Development
Officer
Region 10, Seattle, Washington

Micheline Ward understands what Barbara Metzger experienced when Metzger left EPA's front lines, so to speak. Ward, whose service dates back to 1973, specializes in helping new supervisors and managers make the transition to leadership roles. "At non-supervisory levels," she said, "their jobs seemed more rewarding in terms of results. But EPA has grown so much it needs more supervisors and managers."

Reginald Cheatham
Environmental Engineer
Training and Technical
Assistance Division
RCRA Enforcement
EPA Headquarters
Washington, DC.

Reginald Cheatham, a young civil engineer, says, "I feel I'm where I belong." In his slightly more than a year with EPA, he has edited the RCRA (Resource Conservation and Recovery Act) inspectors' handbook, helped develop regulations, participated in on-site inspections, and, most importantly from his viewpoint, trained enforcement personnel. "I've been interested in the environment since my college days," Cheatham says. "As pollution problems grow, we're going to need well-trained, highly professional 'environmental cops.' Training them is an important part of what we do."

Tanya Meekins
Press Office Secretary
EPA Headquarters

Tanya Meekins has been with EPA for six years and is secretary for the Agency's headquarters press office. "The job is great," she says. "It is at a good pace. It certainly has its hectic moments, but I enjoy them." She adds that the people she works with are very courteous and thoughtful. Tanya was raised in the Washington, DC, area. How long is she going to stay in this job? "I'll go as far as I can here, and then we will see."

Barbara Metzger
Director, Environmental Services
Region 2, Edison, New Jersey

"In the beginning, in the early 70s, when I was directly involved in enforcement, laboratory supervision, and quality control, my work was extremely satisfying," Barbara Metzger said. When she became a supervisor, she missed "not being on the cutting edge It took a while to change perspective, but I do find my work as Environmental Services Director satisfying. If it weren't, I wouldn't be here."

Marcy Billy

Biologist
Marine and Estuarine Protection,
EPA Headquarters
Washington, DC

After college, biologist Marcy Billy worked with an audiovisual firm that produced an educational film on wetlands. It piqued her interest in environmentalism and led her to join EPA a year ago. "I wanted to do something more rewarding than making TV commercials," she said.

She is now involved in environmental education: "I'm glad to be part of an Agency that is moving positively towards pollution prevention because I believe preventive, protective actions are preferable to crisis reaction."

Mary Settle

Program Analyst
Office of Municipal Pollution Control
Office of Water,
EPA Headquarters

Mary Settle has found that her most satisfying assignment, one now in progress, is the Youth in Environment initiatives. These EPA pilot projects train inner-city youths to work in the waste-treatment area and to enter promotion ladder systems that enable them to work up to supervisory and managerial roles. According to Settle, the projects are now successful in Atlanta, Washington, DC, and Lowell, Massachusetts, with another planned for Kansas City.

Settle, a former school teacher who worked with the Federal Water Pollution Administration before joining EPA in 1971 (she left EPA briefly to work for the Federal Inspector's Office before returning to the Agency), said, "I found FWPA and EPA were looking for staff with educational backgrounds to set up training programs to teach people to operate waste-treatment plants and systems." In this work she oversaw grants to community colleges.

Leanne Nurse

Superfund Community Relations Coordinator
Region 3, Philadelphia,
Pennsylvania

Leanne Nurse, who joined EPA within the past year, has had experience in broadcasting, the arts, and policy-related community organization work. Her present work at EPA takes her to Superfund clean-up sites to inform and reassure people living near the sites: "My PR skills are tested to the fullest in situations the public sees as local crises."

She finds EPA "an extraordinarily progressive element of the federal government" and likes her job "more than anything I ever imagined possible."

Catherine Ann Collins

Environmental Engineer
Air and Toxics Branch
Region 8, Denver, Colorado

"I am looking forward to working with EPA under the new Clean Air Act," Catherine Ann Collins, an environmental engineer, said. A year with EPA in her first job since college, she works on stationary-source compliance and National Emissions Standards for Hazardous Air Pollutant Standards problems, especially those in North Dakota, Wyoming, and Utah. She believes that environmentalism is a life's work and "vastly preferable to working for someone who is polluting the environment."

Michael Sierszen

Research Ecologist
Environmental Research Laboratory
Duluth, Minnesota

As a research ecologist, Michael Sierszen studies the effects of toxics in aquatic systems. With a background in zoology, oceanography, and limnology (the study of the physical, chemical, meteorological, and historical aspects of fresh water),

Sierszen finds that his move to EPA within the past year was a logical step.

"EPA is a good place for a scientist to be, especially since very specific objectives are being addressed. You can see the effects of what you do while doing basic research at the same time."

Kwong Cho

Chemist
Environmental Compliance Coordinator
Facilities Management Section
Region 2, Edison, New Jersey

While working for various contract environmental laboratories, Kwong Cho started to wonder why the tests were made. He studied the regulations involved and decided to become a more direct part of environmental management by joining EPA. After joining EPA not long ago, he finds "what I'm doing now is far more satisfying." With approval, he observed that the Agency has become more proactive. He also wishes the public were "more supportive" and some day would like to help eradicate the Not-In-My-Backyard (NIMBY) syndrome.

Sam Windham

Deputy Director, Eastern
Environmental Radiation Facilities
Region 4, Montgomery, Alabama

Sam Windham, a physicist, came to EPA at its inception after serving with a predecessor component of the Agency in the Public Health Service. He has worked on radon surveys in the field and emergency response activities that involve nuclear power plants.

What satisfies him most at EPA is accomplishing something in terms of public health. "By working on clean air and radon guidelines, we are extending lives and improving the quality of those lives," he said.

Jonathan Garber

Chief, Ecosystems Branch
Environmental Research Laboratory
Region 1, Narragansett,
Rhode Island

Jonathan Garber, an oceanographer, said that his focus is on coastal marine ecology and how pollution impacts it. "If the same opportunity at EPA had been offered five years ago, I'd probably not have accepted, but now environmental action has a high profile." He hopes to be in a position to influence the translation of environmental research into environmental protection along the coasts. Garber's oceanographic research in academic settings includes work with the University of Maryland's Chesapeake Bay water-monitoring system.

Daniel Drazan

Attorney
Superfund Program, New York-Caribbean Areas
Region 2, New York City,
New York

In his first and present position as a full-fledged attorney, Daniel Drazan enforces Superfund laws. In one case, he noted, he had to work out a settlement involving 220 principal responsible parties. "Our job is aggressive enforcement, to speed the clean-up process," he said.

"One of the great things about EPA is that you get a lot of responsibility up front. You are expected to take positions that are best for the environment." Some day, Drazan hopes to help write environmental law. He started his career as an intern at EPA and at environmental consulting firms.

Appointments



Hoya



Wassersug



Seitz



Emison



Firestone



Alonzo

Thomas W. Hoya is EPA's newest Administrative Law Judge. Hoya worked for the U.S. Department of Commerce for 22 years, the last five as an Administrative Law Judge. He presided over cases to enforce U.S. export controls and over cases to enforce U.S. regulations protecting marine life. Previously within the Department, he served as the Hearing Commissioner of the International Trade Administration, and as the Chairman of the Operating Committee of the export control program.

Hoya, a Phi Beta Kappa graduate of Harvard, has a J.D. from Michigan Law School, an M.B.A. from Northwestern Graduate School of Management, and an LL.M. and a J.S.D. from Columbia Law School.

His publications include a book titled *East-West Trade* (Oceana, 1984) and many articles on international trade.

EPA's new Program Manager for the Regional Environmental Center for Central and Eastern Europe in Budapest, Hungary, is **Stephen R. Wassersug**.

Wassersug was the Director of the Hazardous Waste Management Division for Region 3 in Philadelphia, Pennsylvania, since 1985. Wassersug worked for the Department of Public Health and the Public Health Service from 1964 to 1970 before joining the Agency. He has worked in Philadelphia as Director of the Air and Waste Management Division, Director of Enforcement, Director of the Air and Water Division, and Regional Air Pollution Control Director.

Wassersug is currently a member of the Ground-Water Steering Committee, the Department of Justice Civil Judicial Enforcement Committee, and the Executive Resources Board. He is also the co-chairman of the Superfund Reauthorization Committee.

An alumnus of the University of Massachusetts, Wassersug graduated with a degree in the physical sciences. He earned a Master's degree in Public Health at George Washington University in 1969.

Gerald A. Emison is EPA's Deputy Regional Administrator for Region 10, which is located in Seattle, Washington. Since 1984, Emison was the Director of the Office of Air Quality Planning and Standards at EPA Headquarters.

Emison joined the Agency in 1974 as an Environmental Engineer. He then worked for the Montgomery County Council as a Planning Policy Coordinator and for the Roy F. Weston Company as a management consultant. Emison returned to the Agency in 1979 as an Environmental Protection Specialist.

Emison graduated from Vanderbilt University in 1968 with a degree in Civil Engineering. In 1981 he received a Master's degree in Engineering Management at Catholic University.

Emison has received two Silver Medals for Service and the meritorious SES award in 1988.

John S. Seitz is the new Director of the Office of Air Quality Planning and Standards (OAQPS) in the office of Air and Radiation. The OAQPS is located in Research Triangle Park, North Carolina. He joined the Agency in 1971 as a Case Development Officer after working as a pesticide inspector in New York. Seitz joined the OAQPS as the Director of the Stationary Source Compliance Division in 1987. He has also worked in the Office of Pesticides and Toxic Substances and the Office of Enforcement, and was involved in the 1976 passage and implementation of the Resource Conservation and Recovery Act.

Seitz is an alumnus of the University of Delaware. He has been awarded EPA's Gold and Silver Medals for exceptional service.

EPA's new Associate Deputy Administrator is **Nancy B. Firestone**. She was previously the Special Counsel to the EPA Deputy Administrator. Firestone has also served as Deputy Chief of the Environmental Enforcement Section for the Department of Justice.

Firestone is an alumnus of Washington University at St. Louis and the University of Missouri-Kansas City Law School. She is also an adjunct professor at Georgetown University Law Center, where she teaches environmental law.

Anne L. Alonzo has been selected as the first-ever environmental attache at a U.S. Embassy. The position is located in Mexico City. A career EPA senior attorney, Alonzo will assist in the coordination of cross-border cooperation between businesses and non-governmental groups to address environmental pollution problems and to further agreements between the United States and Mexico.

Alonzo worked for the past six years in the regional counsel's office of EPA's Region 5 in Chicago, specializing in hazardous and solid waste cases. She was on special assignment in Mexico from October 1988 to March 1989, counseling and assisting the Mexican Secretary of Urban Development and Ecology (SEDUE) and the U.S. Embassy regarding environmental issues and assisted in the dual publication by U.S. EPA and SEDUE of an environmental compliance handbook for U.S. and Mexican businesses.

Alonzo is an alumnus of the University of Illinois and the Illinois Institute of Technology-Kent College of Law. She has received the U.S. Office of Civil Rights Award of Excellence, the EPA Regional Administrator's Award of Excellence and the U.S. Border Trade Alliance/Mexican Maquiladora Association Special Award. □

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A clean, healthy environment:
EPA's goal as it prepares for
the future.

Back Cover: Flight in a
coastal marsh. The values
of natural resources such
as wetlands are receiving
a new emphasis at EPA. See
article on page 34.
Photo by Barry Kaplan for
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Mike Brisson photo