

EPA JOURNAL

MAY 1977
VOL. THREE, NO. FIVE

ENERGY AND THE ENVIRONMENT

U.S. ENVIRONMENTAL PROTECTION AGENCY

CONSERVATION



Conservation is the major theme in the excerpts from President Carter's landmark energy message carried in this issue of EPA Journal. So at long last conservation is receiving the high priority that environmentalists have urged.

This issue also reviews the role EPA's research program is playing in helping to develop knowledge about energy systems and the latest technology for controlling their harmful effects on the environment.

Another article in the energy-environment area is a report on an aerial survey EPA helped to sponsor in Minnesota to discover homes and businesses leaking heat.

The subject of another article is a poll revealing that despite the economic recession and the energy shortage Americans are still accepting environmental protection as one of their basic national goals.

The views of Dr. Barry Commoner and others on environmental cancer are reported in an article about a recent Washington conference that EPA helped sponsor.

Also included in this issue is a report on the massive permit program established to help control the discharges of cities and industries into the Nation's waterways. Another research article gives details on an artificial river developed at EPA's Environmental Research laboratory in Athens, Ga., for research on river ecology.

The number of enforcement actions taken by EPA in its more than six years of existence totals nearly 19,000, an article on the Agency's enforcement program reports.

Converting pollutants to useful ingredients for growing trout, shrimp and other aquatic life is the subject of the concluding article.

EPA JOURNAL

Printed on recycled paper.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Douglas M. Costle,
Administrator

Marlin Fitzwater,
Acting Director of
Public Affairs

Charles D. Pierce,
Editor

Van Trumbull, Ruth Hussey,
David Cohen,
Staff

*Cover: Towering transmission lines stalk
across landscape near Searchlight, Nev.
Documerica photo by Charles O'Rear.*

Photo Credits: John L. Alexandrowicz*,
Lyntha Scott Eiler*, Les Henig, PEPCO,
Don Emmerich, Ernest Bucci, Edison
Electric Institute, Lowell Georgia*, Public
Service Electric and Gas Company,
Newark, N.J.

* Documerica

Conservation illustration by John Heinly

The EPA Journal is published monthly,
with combined issues July-August and
November-December, by the U.S.
Environmental Protection Agency. Use
of funds for printing this periodical has
been approved by the Director of the
Office of Management and Budget.
Views expressed by authors do not
necessarily reflect EPA policy.
Contributions and inquiries should be
addressed to the Editor (A-107),
Waterside Mall, 401 M St., S.W.,
Washington, D.C. 20460. No permission
necessary to reproduce contents except
copyrighted photos and other materials.
Subscription: \$8.75 a year, \$.75 for
single copy, domestic; \$11.00 if mailed to
a foreign address. No charge to
employees. Send check or money order
to Superintendent of Documents, U.S.
Government Printing Office,
Washington, D.C. 20402.

ARTICLES

- WAR ON WASTE _____ PAGE 2
President stresses conservation
in his major message on energy.
- EPA'S ROLE IN ENERGY RESEARCH _____ PAGE 4
A two-day scientific conference on energy and the
environment is being sponsored by EPA June 6-7 in
Washington.
- AERIAL SURVEY FINDS WASTED HEAT _____ PAGE 6
Photographs taken from low-flying planes have helped
detect buildings leaking heat in Minnesota.
- NEW VIEWS _____ PAGE 8
Excerpts from speeches by Administrator Douglas M. Costle
and Deputy Administrator Barbara Blum.
- PROGRESS ON THE ENFORCEMENT FRONT _____ PAGE 10
- ENVIRONMENTAL CANCER _____ PAGE 12
A discussion of carcinogens at a
conference EPA helped sponsor.
- STATUS OF PERMIT GUIDELINES _____ PAGE 16
- POLL REAFFIRMS ENVIRONMENTAL SUPPORT _____ PAGE 18
- OUR INDOOR RIVER _____ PAGE 19
- EPA'S EYES IN THE SKY _____ PAGE 20
- UNDERWATER FARMS _____ BACK COVER
- ## DEPARTMENTS
- NATION _____ PAGE 14
- UPDATE _____ PAGE 22
- ALMANAC _____ PAGE 23
- PEOPLE _____ PAGE 24
- NEWS BRIEFS _____ PAGE 25

WAR ON WASTE

Protection of the environment is one of the fundamental principles on which President Carter has based his landmark national energy plan.

In his energy message to Congress on April 20, the President declared that "the heart of our energy problem is that our demand for fuel keeps rising more quickly than our production, and our primary means of solving this problem is to reduce waste and inefficiency . . ."

EPA Administrator Douglas M. Costle in urging strong support for the President's energy program noted that it "gives to conservation the priority which environmentalists have long urged. To the extent that we reduce our demand for energy we reduce the burden that energy production places on the environment."

In a televised address to the Nation on April 18, President Carter warned the Nation about the seriousness of the energy problem, and said development of his energy policy had been guided by these principles.

These principles are:

- . . . "we can have an effective and comprehensive energy policy only if the Government takes responsibility for it and if the people understand the seriousness of the challenge and are willing to make sacrifices.

- . . . "healthy economic growth must continue . . ."

- "The third principle is that we must protect the environment. Our energy problems have the same cause as our environmental problems—wasteful use of resources. Conservation helps us solve both at once."

Other principles spelled out by President Carter included: "reducing our vulnerability to potentially devastating embargoes," treating everyone fairly, reducing demand through conservation, ensuring that prices should generally reflect the true replacement costs of energy, providing Government policies that are predictable and certain, conserving fuels that are the scarcest and making the most of those that are more plentiful, and developing new and unconventional sources of energy.

The President said "With the exception of preventing war, this is the greatest challenge our country will face during our lifetimes. The energy crisis has not yet overwhelmed us, but it will if we do not act quickly.

"Ours is the most wasteful Nation on

Earth. We waste more energy than we import. With about the same standard of living, we use twice as much energy per person as do other countries like Germany, Japan, and Sweden."

Stating that the struggle for successful resolution of the energy problem "would be the moral equivalent of war," President Carter said "if successful, this effort will protect our jobs, our environment, our national independence, our standard of living and our future.

"Our energy policy will be innovative, but fair and predictable. It will not be easy. It will demand the best of us—our vision, our dedication, our courage, and our sense of common purpose.

"This is a carefully balanced program, depending for its fairness on all its major component parts. It will be a test of our basic political strength and ability.

"But we have met challenges before and our Nation has been the stronger for it. That is the responsibility that we face—you in the Congress, the members of my administration, and all the people of our country. I am confident that together we will succeed."

Mr. Costle said "It's clear from the President's energy message to Congress that EPA will be in the mainstream of his energy program. It will be largely our responsibility to make many aspects of his program work."

On the proposed greater use of coal, the Administrator said this program "will constitute an important challenge for EPA. It is critical that the best available control technology be employed and that air quality standards be maintained as the President requests."

Commenting on the emphasis on reducing gasoline consumption, Mr. Costle said "EPA will play a major role in supporting this program by measuring the fuel efficiency of new cars as part of the auto certification program."

The Administrator declared that President Carter's energy program "provides the leadership we have needed and merits the strong support of the American people."

Meanwhile, Joseph Kraft, a widely known syndicated columnist, expressed the opinion in a recent column that the energy drive has not sunk the environmental movement.

"Concern for the environment is probably

stronger in Carter than in any past President," Kraft said. "Clean-air standards are to be maintained at high levels. . . . Part of the argument for conservation has to do with preserving ecological balance. Clearly those who thought the energy crisis-cum-recession killed the environmental cause have got it wrong."

Earlier in April, Mr. Costle had announced at a White House press conference that the President had asked him to disclose the Administration's support for maintaining rigorous standards in the Clean Air Act.

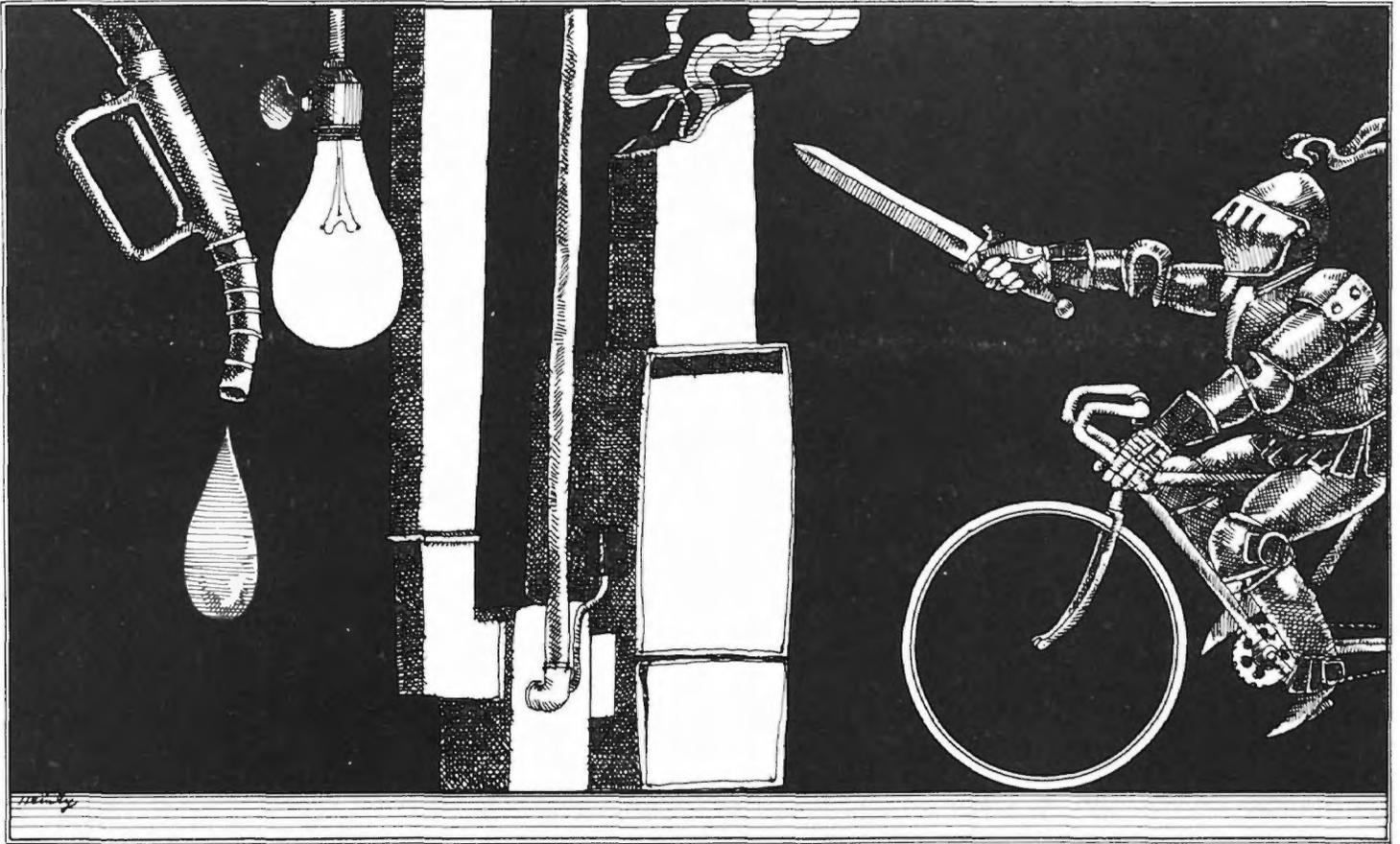
" . . . Senator Ed Muskie and Congressman Paul Rogers, and their respective subcommittees, have been working on clean air legislation over the last six weeks," Mr. Costle said in his April 18 statement. "The President and I share their commitment to achievement and maintenance of our clean air and public health goals, and appreciate the leadership they have provided on this legislation.

"Clean air is essential to the health and welfare of all Americans. Scientific studies show a direct relationship between exposure to polluted air and the incidence of heart disease, nervous system disorders, lung cancer, emphysema, asthma, and other respiratory diseases, especially among infants and the elderly. Air pollution is also costly to property, materials, and vegetation.

"We have made significant progress in cleaning up the air. Recent studies indicate that emissions of several pollutants from power plants, factories, and automobiles have begun to decline. The quality of our air has made a small but important reversal toward healthiness. Many millions of Americans, especially in large metropolitan areas, are beginning to see and feel the difference.

"There is still, however, much to be done before we can say we have fully achieved our clean air goals. Clean air is not an aesthetic luxury; it is a public health necessity. Many regions of the country have not yet met the health-based primary ambient air quality standards. The legislative recommendations the President has asked me to explain today will help provide the framework for attaining these standards.

"Environmental issues do not exist in a vacuum. Environmental requirements must be carefully examined and related to our economic and energy goals. The President and I are fully committed to the principle that our Nation must have a strong environ-



mental program as a necessary prerequisite to future progress in solving our energy and economic problems.

Auto Emissions

"We are committed to maintaining momentum in cleaning up pollution from automobiles. The standards we are recommending today are tough but fair. They are consistent with our fuel standards. They will help reduce urban smog and protect public health.

"The President and I are recommending that:

"—The statutory standard for hydrocarbons of .41 grams per mile be met beginning with the 1979 model year.

"—The standard for carbon monoxide should be set at 9.0 grams per mile in 1979, with the statutory standards of 3.4 grams per mile in effect beginning with the 1981 model year.

"—The standard for nitrogen oxides should be set at 2.0 grams per mile in 1979, and 1.0 grams per mile for 1981 and thereafter unless the Administrator decides by 1980, based on health impacts, that the 0.4 grams per mile statutory level is needed beginning in 1983.

Standards for New Facilities

"The President and I believe that new power plants and new industrial facilities should be required to use the best available control technology to limit emissions. Air

quality requirements should be met with stacks no taller than normally would be built under good engineering practice. The installation of the best available control technology for new facilities will provide a basis for orderly economic growth which will help us meet our air quality goals.

Prevention of Significant Deterioration

"Our effort to control air pollution must include protection of air that is already clean. We cannot afford policies which would create new problems in areas which are now meeting the ambient air quality standards. The President supports inclusion in the Act of a provision to limit additions of new pollutants in areas which are already clean to certain specified levels. We also support mandatory protection for National Parks and other significant national areas.

Growth in Non-Attainment Areas

"The Nation faces a difficult problem in deciding how to accommodate new industrial growth in areas that are now in violation of the health-based standards. We must find a fair and equitable way to further reduce emissions from existing sources so as to permit new growth while keeping on a path which will result in attainment of the health standards. Although EPA has adopted a policy requiring that emissions for new sources be more than offset by a reduction in emissions from existing sources within a non-attainment area, the President

has asked me to review this issue to recommend a strategy which will lead to the attainment of our national health standards. We will be asking the Congress to defer action in this area for one year, to permit full study of this complex issue, and the development of a fair and effective policy for the future.

Coal Conversion

"This Administration is committed to the achievement of our energy goals in a manner which will not compromise the attainment of our environmental objectives. The President has stressed the need to switch from scarce oil and gas to coal. Coal conversion can be accomplished without sacrificing environmental quality provided we have sound clean air requirements. The President is recommending amendments which would require a converting facility to attain all applicable Federal standards at the time of conversion, and to conform with applicable State air pollution regulations by January 1, 1980.

"In conclusion, let me say that these recommendations to the Congress are the result of an intense, cooperative re-examination of the Clean Air Act by the new Administration. They provide a solid environmental foundation for the energy policy which the President will propose to the Congress on Wednesday. They constitute a strong reaffirmation of our Nation's commitment to environmental protection." ■

EPA'S ROLE IN ENERGY RESEARCH

More than 1,500 persons representing both industry and government are expected to attend a two-day scientific conference on energy and the environment in Washington June 6 and 7.

It will be the second annual meeting on energy-environment research to be sponsored by EPA, with the cooperation of 11 other Federal agencies.

Stephen J. Gage, Deputy Assistant Administrator for Energy, Minerals, and Industry in the Office of Research and Development, said the conference will deal with the environmental effects of all kinds of energy systems and with the latest technology for controlling harmful

effects. It will focus, he said, on three major questions:

- * What are the major research accomplishments?
- * How has new information influenced decision making in energy systems?
- * What should be the emphasis of future research?

Discussion leaders for the first day's session on control technology will include Gage, Frank Princiotta, and Steven R. Reznick of the Office of Energy, Minerals, and Industry, and Dr. David G. Stephan of EPA's Industrial Environmen-

tal Research Laboratory in Cincinnati.

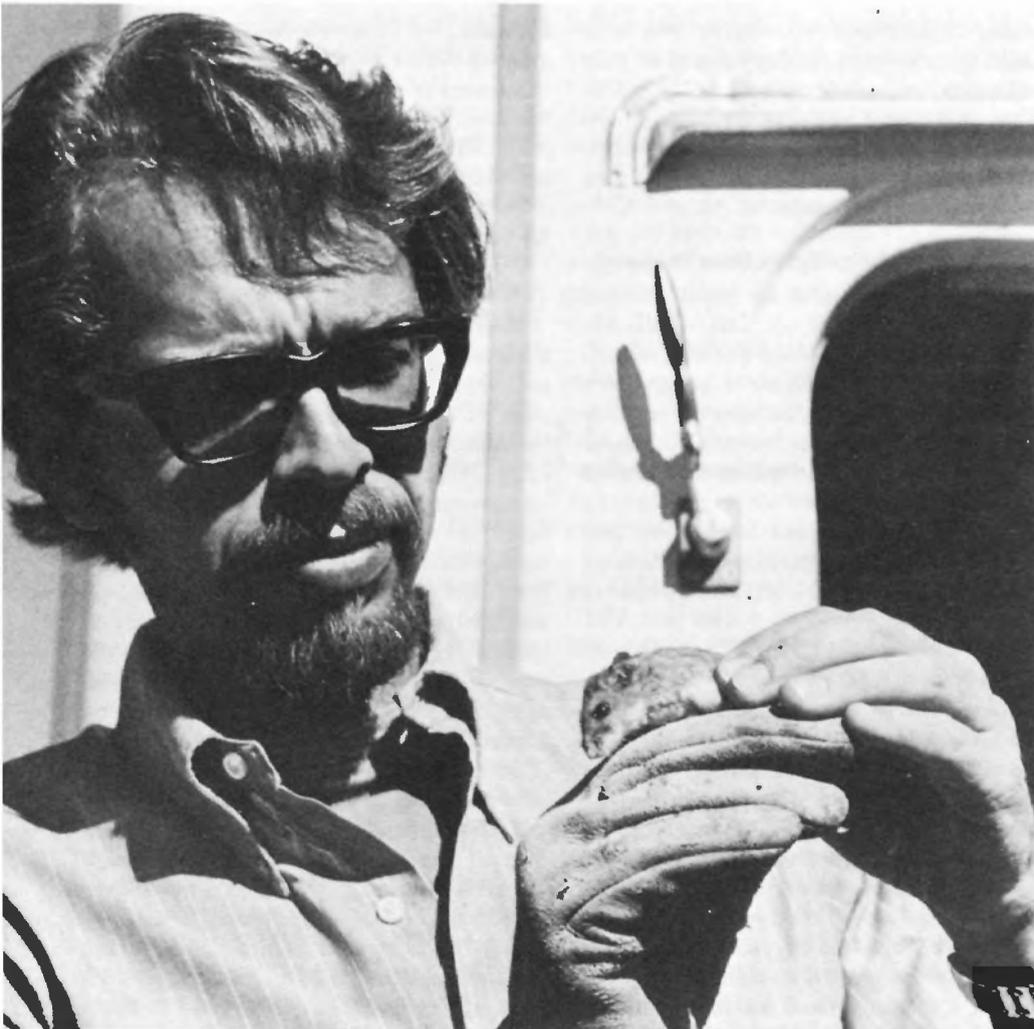
For the second day's discussions of health and environmental effects, the leaders will include Dr. Delbert S. Barth, Deputy Assistant Administrator for Health and Ecological Effects; George Morgan, Acting Director of the Environmental Monitoring and Support Laboratory at Las Vegas, Nev.; and Dr. A. P. Altshuler, Director of the Environmental Sciences Laboratory at Research Triangle Park, N.C.

Discussion leaders from other agencies will be Marvin Singer, Energy Research and Development Administration; Dr. John F. Finklea, National Institute of Occupational Safety and Health; and Dr. Alan Hirsch, Fish and Wildlife Service.

Other Federal agencies cooperating in the conference are the Bureau of Mines, National Aeronautics and Space Administration, National Bureau of Standards, National Institute of Environmental Health Sciences, National Oceanic and Atmospheric Administration, Tennessee Valley Authority, Department of Agriculture, and the Geological Survey.

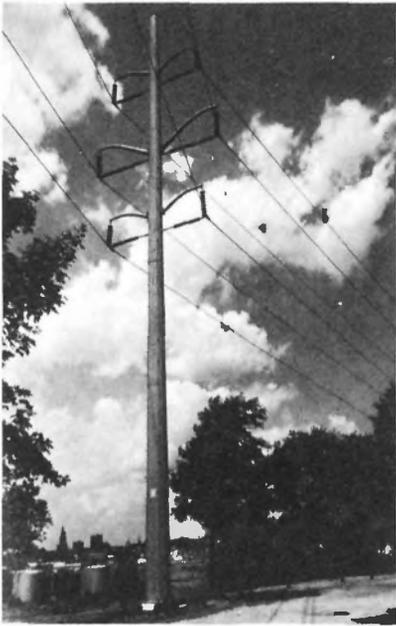
Conference proceedings will be published by EPA and are expected to be available from the Office of Research and Development in September.

EPA plans and coordinates a Federal interagency program of research and development on the production of energy and its environmental effects. This coop-



Dr. John Chilgren, physiologist at EPA's Environmental Research Laboratory at Corvallis, Ore., examines vole trapped at research site near Colstrip, Mont. EPA is conducting a major research project at this location to assess the impact of fumes from a coal-burning power plant.

Power lines cut across a cloud-streaked sky.



and Development Administration (ERDA). The Act called on the Administrators of EPA and ERDA to make agreements between themselves and with other Federal agencies that deal with energy development or the environment to cooperate in their research work. The resulting interagency program is designed to accomplish three things:

- * To permit existing research centers to concentrate on their specialties, helping assure efficient use of funds;
- * To assure that there are no gaps in the over-all program and that overlapping efforts are held to a minimum; and

erative program, under which 18 different departments and bureaus pool their resources and expertise, under the guidance of EPA, is now in its third year.

It was launched by Congress in the Energy Reorganization Act of 1974, which established the Energy Research

* Through central planning and coordination, to facilitate the prompt and full communication of results to the public and the research community.

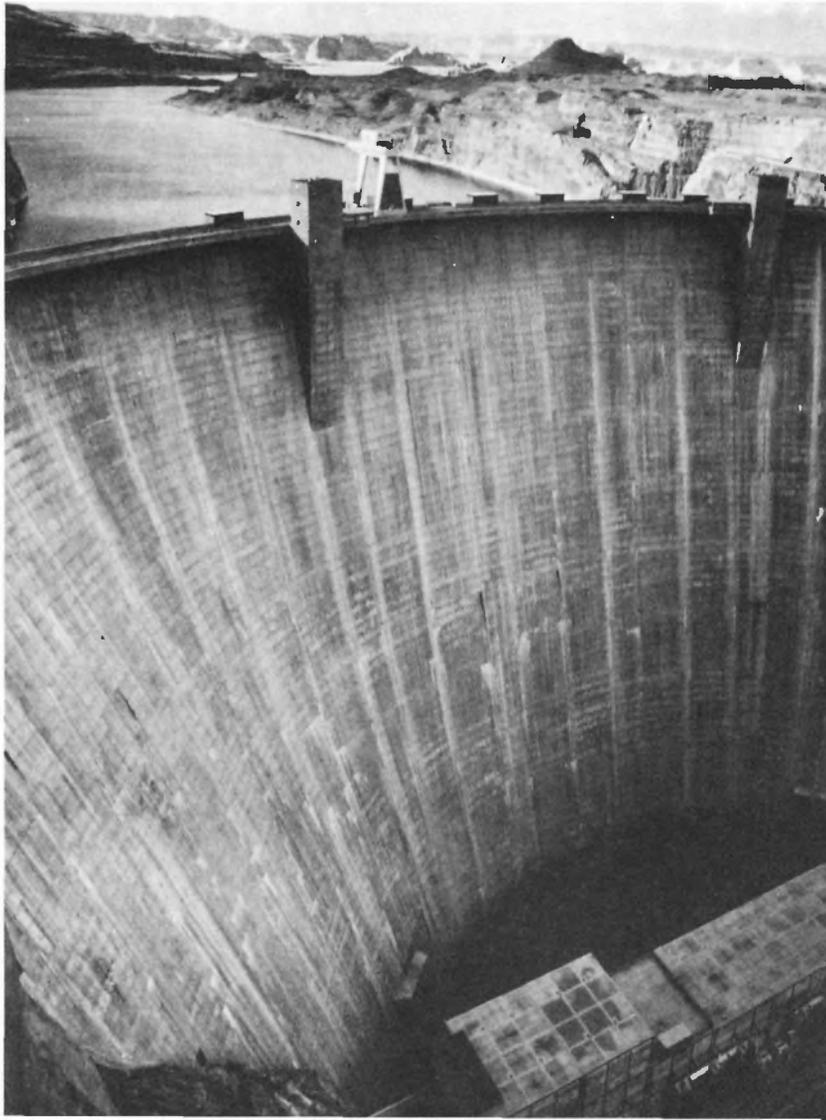
Over the last three years, EPA has spent more than \$100 million annually on energy research, and from 35 to 40 percent of this money has been to support work in other cooperating Federal agencies.

Coordination of the interagency program is the responsibility of the Office of Energy, Minerals, and Industry, headed by Gage, who said that EPA's role reflects the need for sound environmental protection to be given equal priority with the Nation's development of needed energy resources.

"Because of the pressure to develop new energy sources and technologies," he said, "ERDA cannot be expected to focus as intensely on the environmental aspects as it does on its primary energy development responsibilities.

"EPA's primary mission is environmental protection, and our objective in the energy area is to enable ERDA's efforts to progress as rapidly as possible while assuring that national environmental goals are maintained.

"Through this division of effort there develops a healthy, creative tension between the two agencies to ensure well-supported planning and strategy decisions." ■



Glen Canyon Dam in northern Arizona rises 583 feet above the Colorado River and creates Lake Powell, which extends 186 miles upstream into Utah. Lake's water is used for irrigation, recreation, and electric power.

AERIAL SURVEY FINDS WASTED HEAT

This spring residents of 26 Minnesota communities can consult aerial photographs to see whether their homes and businesses have been leaking heat.

The pictures, taken from a low-flying airplane on cold winter nights, make the lost heat visible in great detail. Houses with poor insulation can be distinguished from well-insulated ones. Heat escaping from exposed pipes and industrial equipment can be spotted. In parking lots, the cars that have been there long enough to cool off can be distinguished from newly-parked ones.

The aerial heat survey was a joint project of EPA, the Energy Research and Development Administration, and the Minnesota Energy Agency. The Project may well become a model for other cities and States as a key initial step in efforts to control energy waste.

The heat pictures were made with a thermographic scanner, originally developed by the Air Force for military purposes, and lent to EPA for experimental use in pollution spotting and control.

The scanner is sensitive to infrared radiation (heat) and not to light. The sensitive "eye" of the instrument sweeps rapidly across the field of view in much the same way a TV camera does, and the heat signals received are processed to form a TV-like picture of high resolution. In the pictures, cold areas are dark, hot areas light, with a wide range of gray tones in between.

After each flight, specialists at EPA's Environmental Photographic Interpretation Complex at Warrenton, Va., processed the pictures and compared them with conventional aerial photographs of the same areas to identify individual buildings and objects.

Sets of the heat-loss photos, with matching conventional photos, are being made available to the public in each of the surveyed communities. Local officials are being trained by EPA specialists to interpret the photos for their fellow citizens. These representatives will use the pictures to point out heat-loss problems, advise on insulation or other remedies, and answer general questions on fuel conservation. Any action taken is entirely voluntary.

Aerial scanning cannot be used to measure actual amounts of heat lost; this can be done only with ground-based instruments and a thorough knowledge of inside and outside temperatures, wall and roof materials, and other engineering data. Some of the scanning flights over St. Paul last winter were made while teams from the University of Minnesota took simultaneous measurements on the ground and on the roofs of University buildings. These measurements are being correlated with the aerial scanning data.

The survey flights started in November and did not end until mid-March. All flights were made at night from an altitude of about 2,000 feet. Not every night was suitable for a flyover; the weather had to be cold, with low humidity and clear skies. No flights were made soon after heavy snowfalls. Since snow acts as an insulation, accumulated snow on roofs could mask some of the heat-loss evidence sought.

To support the project Minnesota and ERDA each provided \$50,000. EPA's contribution was \$43,000, including personnel and equipment.

"Since escaping heat is invisible to the eye, consumers may not be aware that energy is being wasted in their build-

ings," said Dr. Maxine Savitz, Director of ERDA's Division of Buildings and Community Systems. The heat-scanner photos can warn consumers of possible problems, she pointed out, even though they cannot provide information on specific amounts of heat lost from buildings.

She said the project would help educate consumers on energy conservation as well as demonstrate the usefulness of aerial surveying to spot energy waste.

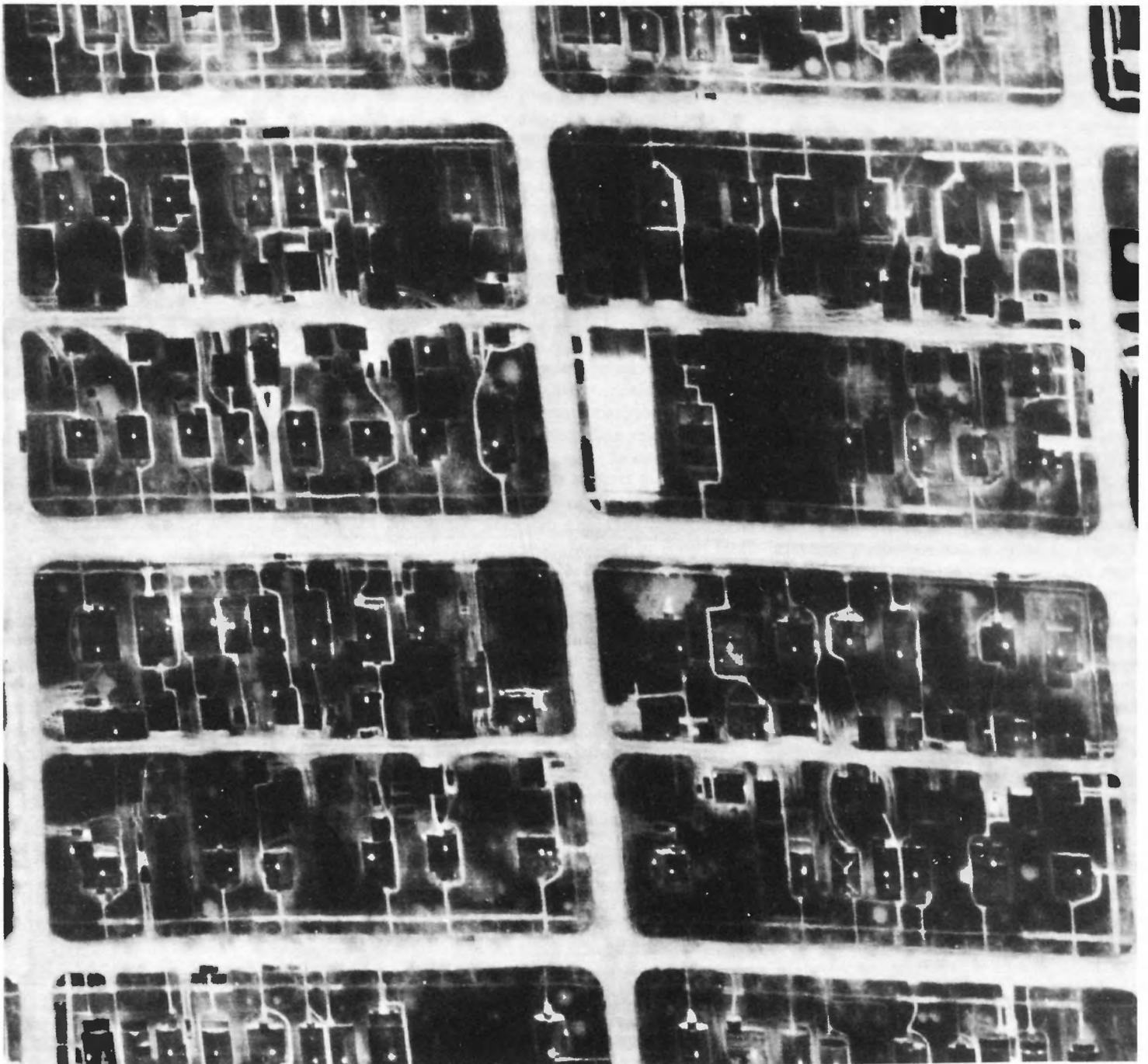
EPA researchers have high hopes that the heat-scanner technique will have other uses in environmental control. Many types of air and water pollution enter the environment in fluid "plumes" that are hotter than their surroundings. Oil spills, heated waste water, and combustion gases are obvious examples that show up in heat pictures. The technique has also been used experimentally to detect underground oil leaks and septic tank seepage. It is regarded as a promising new weapon in EPA's arsenal of long-range pollution detection equipment, which now includes many kinds of color photography, infrared photography, and absorbed and reflected laser beams.

More information on the thermographic scanner program may be obtained from Thomas Osbert at EPA's Environmental Photographic Interpretation Complex, Box 1587, Warrenton, Va. 22186.

The Minnesota communities surveyed were Minneapolis, St. Paul, South St. Paul, Duluth, Hibbing, Little Falls, St. Cloud, New Ulm, Sauk Rapids, Austin, Stillwater, Shakopee, Faribault, Litchfield, Hutchinson, Chisholm, Eveleth, Virginia, Cloquet, Albert Lea, Northfield, Winona, St. Peter, Grand Rapids, Hopkins, and St. Louis Park. ■

Thermograph of a four-block area in Hibbing, Minn., shows heat radiating from buildings and land. Dark areas are relatively cold, light areas hot. White rectangle near center is a greenhouse. Most buildings have well-insulated roofs and therefore appear dark. Bright dots mark chimneys, and

some buildings are outlined by heat leaking from walls and windows. Plowed streets and alleys and shoveled sidewalks show up warmer than snow-covered yards. Heat pictures like this one are available in 26 Minnesota communities to help residents determine how best to conserve fuel.



NEW VIEWS

“I pledge to you that EPA will be persistent and consistent in carrying out our environmental laws.” - Costle

Excerpts from remarks of Administrator Douglas M. Costle before the National Association of Manufacturers, Washington, D.C., March 25. Later that morning he gave the same speech to the National Wildlife Federation.

“During my tenure as Administrator, I intend to do all in my power to improve the performance of this agency. I want the agency’s work to be marked by balance and judgment, scrupulous credibility, thorough assessment, and tough but fair enforcement. Our decisions may not always please everyone, but no one will be able to say that we are arbitrary, that we discourage diversity of opinion, and that we do not do our homework. EPA’s existence is justified primarily on the basis of our protection and enhancement of life. I hope you will hold us accountable to that rigorous standard.

“As my predecessor, Russ Train, once said, ‘Environmental concern—the concern for the basic integrity of our natural life support system—is not something separate from all other concerns. It includes and encompasses them all.’

“In this context, then, I find it very appropriate that my first formal remarks as Administrator will be delivered—within the period of less than two hours—to two groups highly sensitive to the popular dichotomy which has been imposed on the issue of environmental protection. I am giving this same message to the National Wildlife Federation, and to the NAM which is also meeting

in Washington today. Each organization may look at the mission and impact of the EPA from a different perspective, but both, I am certain, would agree that environmental decision-making is emphatically not something separate from all its other concerns.

“During my confirmation hearing, one of the Senators referred to a bumper sticker which read, ‘Hungry and out of work? Eat an environmentalist.’ Bumper stickers and other graffiti are not to be dismissed lightly. With humor and irony, they often reflect some of our most deep-seated fears and frustrations. Anxiety that pollution control may cost jobs and undermine the economy is understandable. But it is also unfounded and hurtful to the consensus we need if we are to make progress in environmental protection, energy conservation, unemployment, or any of the complex and interrelated crises we are facing as a nation.

“The blunt truth is that if we do not put our environmental house in order, it is inevitably going to become a miserable habitation. And issues of jobs or economic growth will become academic.

“. . . I would like to give you . . . my own priorities for this Agency.

“I pledge to you that EPA will be persistent and consistent in carrying out our environmental laws.

“We will be thorough and fair.

“And we will vigorously pursue our mandate to protect the integrity and health of the biosphere upon which all human life, growth and activity depend.”

From a speech by Deputy Administrator Barbara Blum to the American Paper Institute and the National Forest Products Association, Washington, D.C., April 13:

“When the Environmental Protection Agency was created in 1970, the . . . degradation of our air, land, and water, which had been going on for decades, was clearly out of hand. Since then, we have enjoyed a good deal of success in bringing the belching smokestacks and grossly polluted waters under control. Airsheds that were once a disgrace to the senses and a hazard to health have seen remarkable improvement, and many waters that had been thought biologically dead are seeing the return of pollution-sensitive fish and other biota . . .

“We have also learned some sobering lessons. The dimensions of our commitment to clean up the environment are awesome. In water use alone—on which the paper industry is so heavily dependent—the nation must carefully husband its resources. We now use about 400 billion gallons of water each day, an amount which will double by the end of the century. The demand for drinkable water for municipalities is projected to increase from 30 billion gallons daily to 50 billion gallons.

“We are also learning of some unanticipated problems . . . our water supplies, even relatively deep aquifers, are vulnerable to contamination. We know now that some families of chemicals must be kept out of



“No one industry—or municipality,
or citizen—should be exempt from its
responsibilities to help toward the common goal.” - Blum

natural cycles to the greatest extent possible. This is because of their tendency to accumulate in the bodies of living creatures. We know now that some pollutants, once considered annoyances or inconveniences, are in fact threats to human and environmental well-being. Acid rains can spoil crops miles from the source of the original pollutant, and can lower the pH level of waters to the point that desirable forms of aquatic life perish . . .

“You should know that I come to EPA as someone who has been involved with many efforts to preserve and protect the integrity of our environmental heritage. Equally important, I have also had a good deal of experience as a businesswoman. I know about the realities of cash flow, amortization, and the borrowing market. I am now in the federal government, but both Doug Costle and I have been on the other end of Federal regulations. I know very well the impact laws and regulations—even the best intentioned—can have on the day-to-day business of getting things done. I have heard many complaints about an excess of red tape and regulations in many areas of federal involvement, and I can often sympathize with those complaints.

“Everyone here knows, however, that the tensions that sometimes exist between EPA and industries regulated by pollution-control laws go beyond red tape. Disagreements between the Environmental Protection Agency and the industries it is charged to regulate, and alternative interpretations of the same set of ‘facts,’ are perhaps

inevitable. What we at EPA can do, to the benefit of both industry and the agency, is to help ensure that disagreements are not based on misunderstandings or misperceptions on anyone’s part.

“For our part, we will try to understand as thoroughly as possible the realities that face you, and to implement regulations with an awareness of those realities. To a large extent, our success in this regard will depend not only on what EPA does, but on your continued active participation as we propose guidelines and institutional structures, and as we draft regulations . . .

“EPA’s continued effectiveness will depend on how well we do our homework. Part of that homework is to become intimately familiar with every aspect of your needs and practices as an industry . . . Another, perhaps more important, part of the homework . . . involves the way we model projected industry costs and needs as we try to set up realistic guidelines and goals. It should go without saying that EPA has been, and will continue to be, scrupulously careful to cost out the impact of its decisions on industry and on consumer prices . . .

“Lastly, I think it is of paramount importance that the cost of meeting our national environmental goals should be distributed fairly. No one industry, or portion of the economy, or class of citizens, or geographic region should have to assume an unfair proportion of the burden . . .

“I am sure that you understand that

meeting this goal of fairness is no simple matter. About half of one percent of the inflation we have experienced in recent years can be attributed to environmental controls. We know now that pollution abatement ultimately creates more jobs than it dislocates. These figures make it appear that pollution control can happen without significant dislocation.

“But we at EPA do not overlook the fact that a broad spectrum of industries have devoted, and must continue to devote, a substantial portion of their available capital to pollution abatement. Among others, these include power generating companies, smelters, organic chemical producers, automobile makers—and the pulp and paper industry. Nor are we overlooking the fact that pollution abatement will affect the cost of your products. Speaking as a businesswoman, I can understand the reluctance to commit large amounts of money in ways that do not immediately improve one’s market position.

“As I said, fairness is difficult to attain in an imperfect world. But it should be a touchstone for our decisions. I want to assure you that we will continue to act as fairly and impartially as possible in implementing the laws entrusted to us. This will mean that, just as we do our best not to give one company within an industry a competitive advantage by delaying or waiving its environmental responsibilities, no one industry—or municipality, or citizen—should be exempt from its responsibilities to help toward the common goal.”



PROGRESS ON THE ENFORCEMENT FRONT

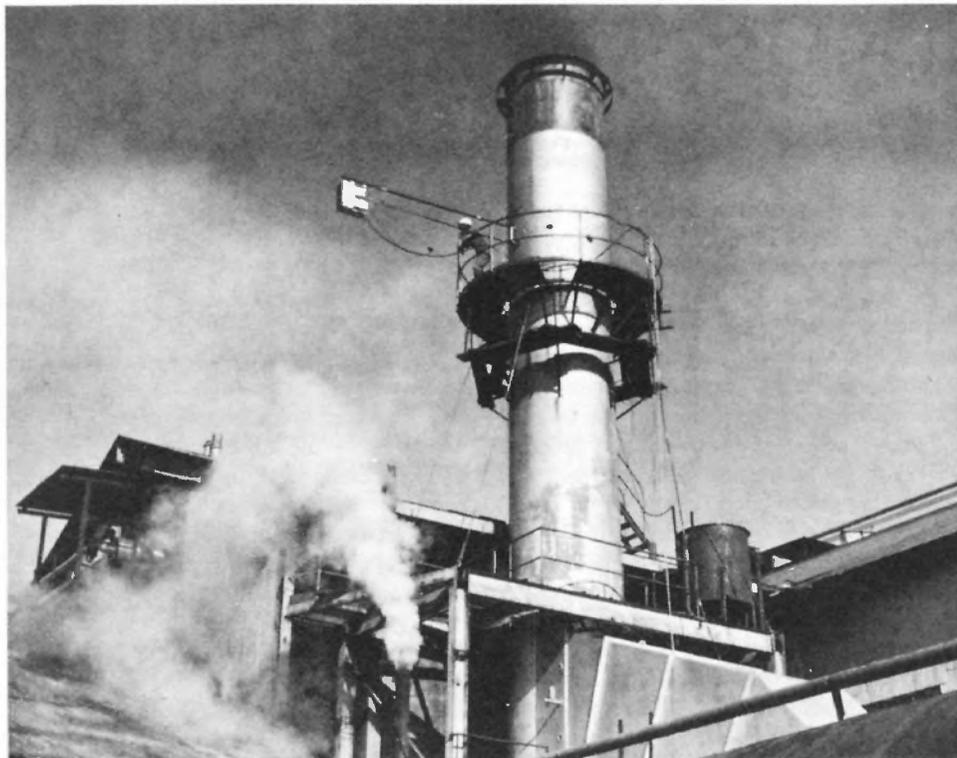
A total of 6,613 actions was taken by EPA during the first nine months of last year in enforcing the Nation's Federal environmental protection laws. These activities, which occurred in the pesticide, air, and water pollution control areas, are documented in a recently-published Progress Report by the Office of Enforcement. The report also includes updated information on the noise pollution enforcement program.

"The new report, which is the fourth in a series, outlines enforcement activities for 1976 over the January 1 through September 30 period to coincide with the recently modified Federal fiscal year," explained Stanley W. Legro, EPA Assistant Administrator for Enforcement. "This brings the total number of such actions taken in the Agency's six years of existence to nearly 19,000.

"The report documents enforcement activities carried out directly by EPA, and as such, it enumerates only the Federal portion of the environmental enforcement activities in this country. The enforcement of the Nation's environmental laws is a task shared by the Federal, State, and local governments. A continuation of that strong partnership remains one of the Agency's highest priorities in accomplishing the task of improving the quality of our Nation's environment," said Legro.

From EPA's beginnings in December 1970 to September 1976, over \$11.7 million in fines and penalties have been imposed, not including over \$1 million assessed on May 4, 1976 against the Reserve Mining Company, which is appealing that decision. Major enforcement actions which have occurred in the interval from September 1976 to present include criminal action against the Semet-Solvay coke plant at Ashland, Ky., for air pollution regulation violations, which led to a fine of \$925,000. U.S. Steel and EPA signed a consent order to control particulate pollution from the Clairton Coke works in Pennsylvania (the largest coke oven plant in the world), which will result in a particulate emission reduction to less than half of the present levels. Another consent order containing a plan worked out between the Agency and the FMC Corporation will halt further spills of carbon tetrachloride into the Kanawha River from FMC's chemical plant in South Charleston, W. Va.

A recent action against General Motors



Investigator from EPA's National Enforcement Investigations Center in Denver uses protruding measuring device to test emissions in this industrial smoke stack.

will result in the recall of 530,000 automobiles; another recall order recently issued to Chrysler Corporation involves 208,000 vehicles.

And on October 5, 1976, Allied Chemical Corporation was fined \$13.28 million for discharging the pesticide Kepone into Virginia's James River—the largest fine ever imposed for violation of environmental regulations (that fine was later reduced to \$5 million dollars in response to Allied's efforts to alleviate the effects that had occurred, including payment of \$8 million to a trust.)

AIR enforcement activities were addressed by the 1976 report under two categories: stationary sources, such as industrial and power plants; and mobile sources, such as motor vehicles.

The Progress Report states that "enforcement of standards for stationary sources is an immense task, viewing the fact that more

than 200,000 stationary sources are now subject to . . . emission limitations. Nearly 22,000 of these are . . . facilities individually capable of emitting more than 100 tons of a pollutant each year. . . . By September 1976, the States and EPA had brought 20,010 (92 percent) of these into final compliance, or had placed them on firm schedules leading to compliance in the very near future . . . The compliance level is expected to climb to about 95 percent by the end of Fiscal Year 1977."

The report estimates that air pollution control measures taken to abate stationary source emissions keep 22.4 million tons of particulate matter and 7.4 million tons of sulfur oxides out of the air annually.

The Progress Report also observes that "compliance in the steel industry still lags far behind most other stationary sources. In October 1976, 489 (49 percent) of the major steel air pollution sources had yet to achieve full compliance with emission limits. . . .

"However, major progress has occurred, especially in the last year. As an example, control of pushing operations (a major source of fugitive emissions at coke batteries) has increased steadily such that the number of



plants with at least one battery equipped with a pushing emission control device has risen from less than three in 1972 to nearly 20 at the present time."

Another area of attention in the stationary source category is power plants. The report states that about 59 percent of the Nation's coal- and oil-fired capacity now operates in full compliance with sulfur oxide limitations or meets Federally enforceable schedules.

Regarding mobile source enforcement, EPA secured the recall by automobile manufacturers of 620,000 vehicles to correct emission-related defects. Beside testing the emission levels of vehicle prototypes, a Selective Enforcement Audit Program designed to test emissions of vehicles coming off the assem-

George Stone (foreground) and Paul DePercin of EPA's National Enforcement Investigations Center in Denver operating a water sampling device.

bly line was conducted on a trial basis (since January 1, 1977, the audit program has been in full operation). In addition, some 23,400 inspections of service stations to ensure compliance with unleaded fuel regulations were conducted.

WATER—Over 2,400 enforcement actions were initiated by EPA during the time span covered in the new report, which states, "compliance of major industrial and municip-

pal facilities has been substantial." In addition, the Virgin Islands received permit program approval bringing the total of approved States to 28.

In other water areas, the Progress Report describes the interagency agreement on enforcement of the wetlands' protection section (Section 404) of the Federal Water Pollution Control Act entered into by EPA, the U.S. Army Corps of Engineers and the Department of Justice; activities taken under the Safe Drinking Water Act and the Marine Protection, Research, and Sanctuaries Act; and the work of the National Enforcement Investigations Center in Denver, Colo.

PESTICIDE enforcement activities revealed violations which resulted "in the issuance of 269 civil complaints, 257 stop sale, use, or removal orders, 225 recall requests and 717 notices of warning.

"The violations involved . . . include non-registration; false registration; misbranding . . . ; adulteration or contamination of contents; false claims as to effectiveness; and contents differing from those represented at the time of registration . . ."

The Progress Report also discusses the use surveillance program, which is a relatively new program implemented to focus on those areas where the opportunity for adverse effects from pesticide misuse are greatest. As a result of violations found under this program, 56 civil penalty warnings and 19 stop sale, use, or removal orders were issued.

Also, an enforcement strategy for the control of toxic substances was developed, and a cooperative State enforcement grant program was introduced.

NOISE enforcement regulations for new medium and heavy duty trucks and portable air compressors were promulgated during the first three quarters of 1976. Additional standards are presently being developed for motorcycles, buses, wheel and crawler tractors, truck refrigeration units and truck mounted solid waste compactors. Also, a new noise enforcement facility was opened in Sandusky, Ohio, in late October of 1976.

Copies of the 1976 Progress Report are available by writing: U.S. Environmental Protection Agency, Public Information Center (PM-215), 401 M Street, SW., Washington, D.C. 20460. ■

ENVIRONMENTAL CANCER

Because of "the unquestionable scientific evidence that most of the U.S. cancer incidence is due to environmental agents, the only possible prevention for the disease is to reduce contact with these agents," Dr. Barry Commoner emphasized at a recent two-day conference on cancer which EPA helped to fund.

Speaking at the meeting in Washington D.C., Dr. Commoner, Director of the Center for Biology of Natural Systems, Washington University, St. Louis, said, "Tests on laboratory animals, particularly rats and mice, have produced a list now approaching a thousand substances known to cause cancer in one or more species. What does this information tell us about the likelihood that a particular substance will cause cancer in people?"

"A basic fact about animal tests is this: Laboratory animals are strains which have been intentionally bred into highly uniform populations. Most laboratory animal strains are highly uniform in their sensitivity to carcinogens.

"One of the most important factors that determines the sensitivity of a species or strain of animals is the activity of the enzyme system which converts environmental carcinogens into active metabolic products that actually trigger the cancer. . . .

"Human populations are, of course, much more variable in their characteristics than inbred strains of laboratory animals. There is now specific evidence that this greater variability occurs in the enzymes that are involved in activating environmental carcinogens. . . .

"People then, are more variable than purebred strains of laboratory animals in their genetically determined level of enzyme activity (this may well explain why not all smokers develop cancer). In addition, people are exposed to a much more variable environment of substances (such as tobacco smoke) that can stimulate the carcinogen-activating enzymes.

"This very different range of variability among populations of laboratory animals and of people must be carefully considered in interpreting animal tests on carcinogens. In the absence of direct data on people, there is little point in comparing the entire human population to either a population of carcinogen-sensitive rats or to a population of carcinogen-resistant guinea pigs. Rather, be-

cause the human population is so variable, it will contain some individuals who react like one species, some who react like the other, and many who occupy the whole range in between. Once it is established that a substance is carcinogenic toward *any* species of laboratory animal, it is likely that it will cause cancer in *some* individuals in the human population. . . .

"The over-all annual incidence of cancer in the United States is about 0.3 percent; and at that rate cancer is the second highest cause of death. . . . In order to measure such a small statistical effect in a laboratory experiment, huge numbers of animals would be needed. Therefore much higher doses of carcinogen are used, so that the cancer incidence among the test animals is usually between 50 and 100 percent.

"The purpose of the animal test is not to determine whether people would get cancer from such high exposures, but only to decide in a feasible, statistically significant way, whether or not the substance will cause cancer in the test animal. Such tests can usually give an unequivocal answer, at the large doses that are customarily used. For example, animals fed large amounts of sugar, aspirin or sulfa drugs do not develop cancer. It is therefore scientific nonsense to assert, as some people have, that 'any chemical given in a sufficiently high dose will cause cancer'. . . .

"Animal tests tell us that the risk is *not* zero, but do not tell us the size of the risk. . . . Once the attempt is made to weigh the risks against the benefits of a food additive—or of any of the numerous synthetic chemicals introduced into the environment—very far-reaching economic, social, and even political questions are raised. In practical terms, a substance is designated as a 'carcinogen' by animal testing. . . . Once this information is in hand, a decision regarding whether and how human exposure to it is to be controlled becomes inescapable. Such a decision can be made in two alternative ways:

1. ABSOLUTE (i.e. the Delaney Amendment, which forbids the addition to food of any amount of a substance known to cause cancer in any species of animal): This approach involves the decision that, given the disastrous health effects of cancer, no benefit

from a particular substance is worth the risk, however small it may be. . . . Accordingly there is a scientific support for the scientific assumption inherent in the Delaney Amendment—that a positive animal test for carcinogenicity is evidence of a risk to people. In effect, then, this approach involves no further evaluation by society, other than the assertion that no risk of cancer to people is ever, under any circumstances, to be deliberately induced. . . .

"2. RELATIVE (i.e. risk/benefit evaluation): This approach is now being urged in opposition to the Delaney Amendment. . . . This method asserts that action should be based on the socially perceived balance between the carcinogenic risk of exposure to a substance, and the benefits to be derived from using the substance. . . .

"For example. . . the social benefit of an anti-leukemia drug which is itself carcinogenic may be quite high, whereas the social benefit of a carcinogenic food dye is very low. . . .

"In effect, then, if the risk/benefit approach is adopted, it means that society must undertake to determine on the basis of their *value to society*, what chemical substances are to be produced, and are to be permitted to come into contact with people. This will require social governance of decisions—about what chemicals to produce and for what purposes—which, in our present economic system, are governed not by social, but by private interests," Dr. Commoner concluded.

The following excerpts in this article—taken from an environmental cancer conference which EPA helped fund—were selected because they represent important areas of concern in the continuing debate surrounding the topic of environmental carcinogens. It must be noted, however, that these remarks do not refer to EPA's regulatory authorities for the control of suspected carcinogens, nor do they address the Agency's current approach in making rigorous assessments of health risk and economic impact in developing regulatory decisions where cancer risk is a key factor. The Agency's approach to regulatory action for suspect carcinogens will be reviewed in a future issue of the EPA Journal.



Dr. Barry Commoner

Over 20 leading authorities from government, industry, labor, and the scientific community participated in the environmental cancer conference. Dr. Lawrence Plumlee, EPA Medical Science Advisor, served as a panel moderator.

Along with EPA, the National Cancer Institute and the National Institute of Environmental Health Sciences helped fund the March meeting, which was sponsored by the Urban Environment Conference.

In another presentation, Dr. Robert Hoover of the National Cancer Institute, analyzed the occurrence of environmental cancer using maps he had helped to plot as one of the authors of the *Atlas of Cancer Mortality for U.S. Counties, 1950-1969*. The maps, which show levels of cancer death rates (deaths per 100,000 population) over the geographical United States, tend to suggest both general environmental factors and possible occupational factors for the prevalence of cancer.

"Melanoma [a rare skin cancer] deaths occurred predominantly in the southern United States. In areas of the Southwest bordering Mexico, rates were somewhat lower," an HEW report on the cancer atlas states. "Scientists have known for many years that sunlight is a major cause of skin cancer, and that darker-skinned persons are less susceptible.

"Cancers of the colon and rectum, believed to be related to diet, were found in both sexes at above average rates in the Northeast and in urban areas along the Great Lakes. Low rates were found in the southern and central parts of the U.S. Surprisingly, breast cancer showed a similar pattern, suggesting that this disease may have an environ-

mental factor in common with cancers of the large intestine.

"High rates in the Northeast for cancers of the esophagus, larynx, mouth, throat, and bladder were limited to males, suggesting the influence of occupational factors. In a correlation study, the National Cancer Institute identified high rates of cancers of lung, liver, and bladder in counties with significant employment in the chemical industry. Additional studies are needed to clarify any occupational risks."

It is nearly certain, according to the report, that "industrial exposures have produced the striking geographic concentrations of bladder cancer deaths in males in the East.

"National Cancer Institute scientists have also found above-average lung cancer death rates in counties where a significant percentage of the work force is engaged in smelting and refining of copper, lead, and zinc ores. Arsenic, a known human cancer-producing agent, is an airborne by-product of the smelting operation for these ores. Above-average rates were found for females as well as males in these counties, suggesting spread of an occupational risk to the surrounding community."

Dr. Hoover cautioned that such epidemiological studies should not be considered the final word. "We consider this material to gain clues," he said. "The chief value of the maps will be to stimulate scientists and other health professionals to conduct studies of intriguing cancer patterns in their own locales."

Dr. Hoover's paper notes that these statis-

tics apply only to the white population: "The smaller number of nonwhites in the U.S. make modification of the mapping technique necessary to ensure reliable results. Another mapping study now under way will examine geographical differences in cancer death rates for nonwhites." Since the writing of the paper, the *Atlas of Cancer Mortality Among U.S. Nonwhites 1950-1969* has been published.

Speaking on behalf of industry, Christian Hansen, Vice-Chairman, Chemical Industry Council of New Jersey, said, "The chemical industry would like to reiterate its interest and concern with all aspects of safety and health on the job and in the safety of surrounding communities. We want to determine as much as anyone the causes of cancer. At this point, we are not aware of any problems for which remedies have not already been set in motion. If new problems are found, prompt, effective action will be taken by industry in cooperation with government. We strongly support the idea of continuing studies to insure that there are no factors unknown to us and we pledge cooperation with any responsible groups and agencies. . . .

"The industry's most important asset is its employees and we want to protect them. The chemical industry has a fine safety record, among the best in American industry. . . .

"Chemical workers are healthier than the general populace. They have longer life expectancies, and lower rates of cancer than the population in general. . . .

"We believe that emissions from chemical industry operations are adequately controlled. Each vent, and all effluents from each plant must have permits from either State or Federal governments, or both. We don't think responsible operators in the chemical industry have any uncontrolled or unknown emissions which might be causing a problem.

"There are many other and different sources of emissions; from cars, from planes, from power plants, vaporization, painting, and on and on. These could be causing a problem since New Jersey is a highly urbanized State," Hansen said.

Copies of the full proceedings for the conference are available by writing the Urban Environment Conference, 1714 Massachusetts Ave., N.W., Washington, D.C. 20036. ■

AROUND THE NATION



discharge permits

Region I has approved a water discharge permit for Boston Edison's proposed Pilgrim nuclear power plant at Plymouth, Mass., although construction has not begun. The plant will use ocean water to cool its condensers and will release the warmed water into Plymouth Bay. The plans were judged sufficient to protect fish, shellfish, and wildlife.

Other recent discharge permits in the Region included three that will require capacitor manufacturers to restrict their output of polychlorinated biphenyls (PCBs). They were issued to Sprague Electric Co., North Adams, Mass., and Aerovox Corp. and Cornell-Dubilier, New Bedford, Mass.

recycling list

A directory of recycling centers in New England has been published by EPA's Region I Office. It lists where the centers are, what materials they recycle, hours of operation, etc. It also tells how to prepare various waste materials for salvage and gives tips on how to start a recycling center.



timetable set

The U.S. District Court has set deadlines for carrying out four controversial measures to reduce auto traffic (and air pollution) in New York City. By Sept. 14 this year, taxi cruising must be reduced at least 5 percent, by Feb. 14, 1978, ten percent, and by a year later 20 percent. The city must submit plans to EPA to reduce and manage parking in southern and midtown Manhattan so as to cut morning auto entries into the area by the same percentages and dates.

Also the city must submit to EPA by July 14 detailed schedules for at least two demonstration projects aimed at relieving congestion from delivery trucks. Finally, by August 31, 1978, the State and city must establish tolls at the presently free bridges across the Harlem and East Rivers and use the net earnings for mass transit subsidies.

dealer charged

At the request of EPA, the Justice Department recently filed a civil complaint against Stanley Motors, Irvington, N.J., for disconnecting a car's emission control system. Regional officials said the Chrysler dealer had knowingly rendered the control system inoperative while trying to correct a stalling tendency that had existed since the car was first sold by Stanley Motors. Maximum penalty for each proved violation is \$10,000.



vinyl chloride

Enforcement personnel have completed inspecting all facilities in Region III that produce vinyl chloride. None of the six plants in Pennsylvania, Delaware, Maryland, and West Virginia was found to pose an immediate public health hazard because of emissions of the toxic chemical. All plants, however, have been placed on compliance schedules designed to meet the EPA's emission standards to insure against long-term health effects. All six plants are expected to achieve compliance by Oct. 21, 1978.



variance for tva

Another court fight seems likely over attempts to let the Tennessee Valley Authority's coal-burning power plants emit more sulfur dioxide than air pollution regulations allow.

Region IV has issued draft administrative orders to the power agency to move toward compliance at seven big plants, four in Tennessee, two in Alabama, and one in Kentucky. The Tennessee legislature and various industry groups have asked the State's Air Pollution Control Board to grant TVA a variance. EPA had previously rejected a TVA request to use tall smokestacks to disperse the sulfur dioxide pollution.

Regional Administrator Jack Ravan has expressed concern to several State agencies over what he termed "delaying tactics" by TVA. In a telegram to Tennessee Gov. Ray Blanton, Ravan asked support for the Clean Air Act and its public health goals.



preplanning

Region V officials' advice was sought recently by planners of a new industrial complex proposed for Conneaut, Ohio, on the shore of Lake Erie in the northeast corner of the State. U.S. Steel, which is considering building the world's largest steel-making facility at Conneaut, met there with EPA, the Army Corps of Engineers, and Ohio and Pennsylvania officials to discuss environmental protection requirements before making their final site selection.

scientists on air

Researchers at EPA's laboratory in Duluth, Minn., were interviewed by explorer Philippe Cousteau for the first program of a television series, "Oasis in Space," to be shown soon on the Public Broadcasting System network. The laboratory workers at Duluth first found asbestos fibers in the mill waste discharged into Lake Superior by the

Reserve Mining Co. plant at Silver Bay, Minn. In the taped program Cousteau also talks to mining company officials, environmentalists, and Duluth citizens who are exposed to the mineral fibers in their drinking water.

phosphate ban

Legislators in two more States want to restrict the growth of algae in the Great Lakes by banning phosphates from household detergents.

The Michigan House of Representatives' Conservation Committee has held hearings on two bills to bar the sale of phosphate detergents, and a proposed ban in Ohio was discussed recently by the Water Quality Board of the International Joint Commission (IJC), the Canada-U.S. Great Lakes policy body. The Ohio EPA supports such a ban, as do the IJC and Region V officials. In Indiana, which already has a phosphate ban, an effort to repeal the law was defeated in February.



city cited

Region VI officials have formally charged Houston, Texas, with violating the Federal unleaded fuel regulations in the operation of police cars. The complaint served on Mayor Fred Hofheinz, alleges that leaded gas was used in vehicles that require unleaded fuel to protect their emission control systems, that small nozzles for unleaded fuel were attached to pumps dispensing leaded fuel, and that the city failed to post the required notices and labels at its pumps. Civil penalties totalling \$46,750 for ten violations were proposed by EPA. The city may request a hearing.

quality awards

Awards for outstanding environmental work in Region VI were recently awarded by Regional EPA officials as follows: State government, Dick Whittington, Deputy Director of the Texas Water Quality Board; local government, Henry Graeser, retired Director of the Dallas Water Department; educator, Dr. Earnest Gloyna, University of Texas College of Engineering; media, Harold Scarlett, Houston Post reporter; citizen group, the Aquifer Protection Association, San Antonio, Texas; youth group, Students Concerned Over Pollution of the Environment, Leonville High School, Opelousas, La.; institution, Corpus Christi Area Oil Spill Control Association; and special recognition, Cliff Harris of the Dallas Cowboys football team.



railroad fined

The Chicago, Rock Island and Pacific Railroad Co. recently pleaded guilty of failing to report an oil spill and was fined \$3,500 by Federal District Court Judge Edward McManus. The spill had occurred at Manly, Iowa, into Rose Creek, a tributary of the Shellrock River. Failure to report is a criminal offense under the Federal Water Pollution Control Act and carries a maximum fine of \$10,000. Charles V. Wright, Acting Regional Administrator, said, "The person in charge of any facility from which there is a discharge of oil in harmful quantities . . . must notify the Coast Guard . . . or an EPA Regional Office."



coping with drought

The Mountain States have had an unusually dry winter, resulting in lowered reservoirs, snowmelt, and groundwater levels. Some communities may have to restrict water use, starting this spring, and others may run completely out of water. Charles W. Murray, Water Division Director for Region VIII, heads a Drought Task Force that includes representatives named by the six governors of the Region's States to make plans for coping with the drought. Two major pressures are expected: to develop new water resources and to relax EPA requirements and discharge permit conditions. Drought increases the potential for severe public health problems. Murray pointed out, and States and communities are likely to seek more technical assistance than usual from EPA. Regional officials are also studying how best to implement EPA's proposed regulations for "general" discharge permits. These rules, proposed in February, would primarily affect irrigation farming. The Region has more than 10 million acres of irrigated land. General permits may be required for each irrigated farm's return flow outlet.



las vegas jackpot

All industrial process wastes formerly discharged into the Las Vegas Wash have been completely eliminated. Nine companies near Las Vegas and Henderson, Nev., have eliminated their discharges by recycling, evaporation or other treatment, and by in-plant process changes. The Wash drains into Las Vegas Bay, a heavily used arm of Lake Mead.

Cleanup by municipalities in the area is progressing, aided by \$34 million in EPA construction grants to the Clark County Sanitation District.

In December 1971 EPA started its enforcement actions to clean up the Wash. The elimination of the industrial discharges completes a major portion of the program.



pulp mills cited

Region X officials have started enforcement actions against six pulp mills in western Washington: Boise-Cascade Corp., Steilacoom; Crown Zellerbach, Port Angeles and Port Townsend; Georgia-Pacific, Beltingham; ITT Rayonier, Port Angeles; and Scott Paper, Everett. The mills were cited either for operating without a valid discharge permit or for failure to comply with schedules for installing secondary wastewater treatment equipment.

Regional Administrator Donald P. Dubois said the State Department of Ecology had issued the mills' discharge permits between August 1974 and May 1975 and that the plants were from nine to 14 months behind in their compliance schedules. Apparently, Dubois said, they cannot now meet the July 1 deadline set in the Federal Water Pollution Control Act for applying the "best practicable" pollution control techniques. Dubois said the six cases have been referred to the U.S. Attorney's office in Seattle for possible civil action. He noted that 28 other pulp mills in the Region are complying with their discharge limitations and schedules.

STATUS OF PERMIT GUIDELINES

Five years ago Congress decreed that every known polluter of the Nation's waterways must have a permit. The permits would set limits on each kind of pollutant discharged, and the limits would grow progressively stricter to achieve the goal of no man-made water pollution by 1985. All this was spelled out in the Federal Water Pollution Control Act of 1972.

Known polluters, called "point sources," include every facility that has a definite outlet where pollution-bearing waste water can enter a stream, a lake, or coastal ocean water. About 20,000 of them are municipal sewage systems, but the big majority—more than 40,000—are industries that use water in their operations and discharge it, with added pollutants from their processing, directly into a waterway.

Pollution from sewage is being reduced by building new treatment works and upgrading old ones with massive subsidies from the Federal Government. These construction grants will total about \$4.5 billion annually, or five times the Environmental Protection Agency's operating budget.

Industrial point sources, the law says, must pay for their own pollution control. There is no EPA subsidy. The Agency's role is limited to technical assistance, guidelines and standards, plus research and demonstration of new control techniques.

By July 1 this year, according to the Act, all industries must achieve the "best practicable pollution control technology available."

By July 1983 all industries must improve their pollution control performance to the "best available" methods "economically achievable."

By setting two target dates, the second stricter than the first, Congress recognized that there would be advances in the technology of pollution control, and the law was framed to anticipate them. Congress also recognized that the costs required of industry should not be excessive; benefits should be worth the money spent for them.

To carry out the Act's requirements for curbing industrial pollution EPA undertook two big tasks simultaneously: issuing more than 40,000 discharge permits (at the start no one knew how many industrial dischargers there were) and writing "effluent guidelines" for each type of industry.

Discharge permits are difficult to frame without knowing what pollutants and how much of each kind are in the plant's waste water. There was, of course, some general knowledge: paper mills discard a lot of cellulosic material; cannery wastewaters contain a lot of organic material, peelings, hulls, etc.; petroleum refineries are heavy on phenols and sulfides, steel rolling mills on acids for cleaning the finished metal.

But without detailed knowledge of an industry's operations, not only at one plant but at similar plants throughout the country, it was difficult to decide what pollutant levels reflected the best practicable control methods to be reached by July 1977. Even more knowledge of research advancements and trends in technical development was needed to set the discharge levels that would represent the best available methods that would be economically achievable in that industry six years later.

EPA officials in all ten Regions set about the gigantic task of listing all point sources and issuing permits as fast as sensible specifications could be made. They also encouraged States to set up the legal and regulatory mechanisms to qualify them to take over administration of the permit program within their own boundaries. Twenty-eight States and territories have now assumed this function, and EPA issues permits only in the remaining 26 jurisdictions.

At the outset the permit program concentrated on the largest polluters, industries known to contribute heavily to water pollution, and the largest plants in those industries. Only when the big offenders were gathered in did the regulators turn to mopping up the little ones.

The hard, nuts-and-bolts work of analyzing particular industries and deciding what was good pollution control practice for each fell to the Effluent Guidelines Division in the Office of Water Planning and Standards in Washington, now headed by Robert Schaffer.

"During the first round of issuing permits EPA people often had to guess what the best practicable technology was and set the discharge levels accordingly," said Schaffer. "This was before much work had been done on industry effluent guidelines. Neverthe-

less, not many of those permits had to be changed later.

"Even the industries being regulated tended to agree with us on what the best technology was. Most responsible industries promptly began the construction work and the process changes needed to comply with their permits."

Effluent guidelines are supported by detailed technical manuals that survey an industry and its processes with particular attention to controlling and reducing water pollution. They are compiled in draft form by independent engineering firms under EPA contract. Each document undergoes extensive review and revision before it is adopted by EPA. Copies are sent to State environmental agencies, other Federal departments, public interest and environmental groups, and industrial and trade groups for comment and criticism. EPA staff members and a scientific advisory committee established under the Act also review the proposed guidelines. They are made available to the public at EPA's Regional Offices and libraries and through publication in the Federal Register.

The Act itself named 28 categories of industry, ranging from asbestos manufacturing to timber products, for which EPA was required to develop effluent guidelines. And it ordered EPA to add other categories when it felt that was desirable. Twenty-four have been so added: petroleum extraction as well as petroleum refining, concrete products as well as cement manufacturing. Almost all of the 52 broad categories have been divided into subcategories. For example, nonferrous metal manufacturing now includes seven different sections, each with its own set of effluent guidelines: bauxite (aluminum ore) refining, primary and secondary aluminum smelting, primary and secondary copper smelting, zinc, and lead.

Altogether EPA has developed more than 500 subcategories, because each one differs from the others in the types of pollutants produced and in the best methods of control.

Each guidelines document is based on a thorough engineering study of a particular type of industry, its processes, its typical waste products, and the methods available to control or treat these wastes, including new technology that is still in the development or pilot stage.



Permits to discharge waste water into rivers must be monitored regularly to insure compliance. Here a Pennsylvania State employee samples the water from an industrial outfall on the Monongahela River at West Mifflin, near Pittsburgh.

The analysis also considers costs. How much new investment is needed for different methods of control? How much expenditure for operation and maintenance? How much energy? What will happen to product costs and business profits?

For most of the industrial categories and subcategories, EPA publishes a separate economic analysis document, which is also given an exhaustive review both inside and outside the Agency and is available for public inspection and criticism before publication.

The effluent guidelines furnish a sound technical base for the discharge permits. They also provide guidance to the permit-issuing authority, either a State government or EPA Regional officials, for judging the degree of pollution control the plant is able to achieve at a reasonable cost.

The 500-odd guidelines documents already published cover an estimated 95 percent of American industry. For the small minority of industries remaining, the permit-issuing authorities still have to "wing it." For example, a buggy-whip manufacturer applying for a permit would get one with pollutant limits

based on common sense, a survey of the plant's wastewater, and perhaps some techniques borrowed from the guidelines for the leather tanning and finishing industry.

Have effluent guidelines and discharge permits helped improve the quality of our waterways?

"Of course they have," said Schaffer, "though I cannot tell you how much. We in the Effluent Guidelines Division know that where the guidelines are applied and permits are in force, there is much less pollution pouring out of industrial outfalls into the rivers. Thousands of industrial plants will soon be required to 'pretreat' wastewater that they discharge into public sewer systems. Such wastes are often incompatible with normal sewage and can disable or spoil the purification processes in the treatment plants. In this way, the guidelines for industrial pollution control can help improve municipal pollution control."

EPA's whole approach to water pollution control was changed by the 1972 Act, Schaffer pointed out. The quality of the water in a river or lake used to be the base on which EPA and its predecessor agencies worked.

"How much pollution can be tolerated in this waterway?" was the basic question. Now it's "What are the specific pollutant sources and how can we curb them before they reach the river?"

"This approach puts the job of monitoring progress on the polluter. An industry with guidelines and a permit must keep track of its discharges and report periodically to the State or EPA.

"The desired water quality in a particular lake or river is still important, however. Permits for discharging into the Finger Lakes in upstate New York would be a lot more stringent than for the Hudson River to protect established quality standards."

Schaffer thinks a significant long-run benefit will come also from the "new source performance standards" that are included in the guidelines. These describe the pollution controls required of all polluting facilities on which construction begins after publication of the proposed standards. In some cases the new source standard may be more stringent than either the 1977 or 1983 limitations on existing sources, because better systems for reducing or treating wastes, or both, can be built right into new plants.

The level of control for new sources is described in the Act in different words from the 1977 and 1983 limitations: "the best available demonstrated control technology, processes, operating methods or other alternatives including, where practicable, a standard permitting no discharge of pollutants."

"Many industry representatives have worked with us on developing the effluent guidelines. The more progressive and environmentally conscious have been helpful to EPA and its contractors in drafting the standards," said Schaffer. "We hope this will continue as we work to revise the 1983 standards to focus on the most noxious pollutants."

"Most industries are going to meet this year's goal of 'best practicable technology.' Those that lag are under pressure to catch up, and this pressure comes from their competitors as well as from EPA and State regulators. I think this is a very healthy situation, which will continue through the six-year drive to meet the 1983 goals and through the constant, natural process of building new production facilities." ■

POLL REAFFIRMS ENVIRONMENTAL SUPPORT

Americans have accepted environmental protection as one of their basic national goals, and even the combined pressure of an economic recession and energy shortage over the 1974-76 period has not shaken that commitment.

This is the conclusion of a newly released study—"Protecting the Environment: Progress, Prospects, and the Public View"—prepared by Potomac Associates, a Washington, D.C.-based policy research organization. The study involves public opinion findings obtained from a May 1976 survey of 1,071 Americans.

The study was prepared and published with the support of the Rockefeller Foundation, the Charles F. Kettering Foundation, the Institute for International Social Research, and other organizations.

Similar surveys were conducted by Potomac Associates in 1972 and 1974, enabling the authors to define trends in public perception of environmental issues over the past few years. The following table shows how respondents viewed the progress the Nation has made in reducing water and air pollution:

OPINION	WATER			AIR		
	1972	1974	1976	1972	1974	1976
Made much progress	4%	6%	5%	3%	7%	5%
Made some progress	45	49	54	46	50	54
Stood still	23	19	21	25	21	22
Lost some ground	12	10	9	11	9	8
Lost much ground	8	7	3	7	5	3
Don't know	8	9	8	8	8	8

"Americans in general feel that the Nation has taken some worthwhile steps toward eventual solution of the problems of water and air pollution," the study states.

"Despite a distinct sense of environmental progress, however, responses to other questions in our survey show that Americans are far from convinced that all of our problems are solved. Indeed, they continue to demonstrate an extremely high level of concern about the task of cleaning up our environment."

The following table from the study shows the level of concern among the respondents about water, air, and solid waste pollution:

CONCERN	AIR			WATER			SOLID WASTE		
	1972	1974	1976	1972	1974	1976	1972	1974	1976
A great deal	61%	51%	57%	60%	46%	55%	53%	46%	48%
A fair amount	29	35	32	28	36	32	34	33	32
Not very much	7	10	7	9	12	8	10	16	14
Not at all	1	2	2	1	3	3	1	3	5
Don't know	2	2	2	2	3	2	2	2	1

"Corroboration of this strong public concern about environmental problems was provided by the November 1976 Harris Survey . . . which reported that the number of Americans who are now worried about water and air pollution has reached record peaks.

In a third measure of the American public's attitudes toward environmental issues, public willingness to devote tax dollars to programs designed to curb water and air pollution was tested. These are the results:

ATTITUDE	WATER			AIR		
	1972	1974	1976	1972	1974	1976
Favors increased spending	64%	56%	59%	61%	47%	52%
Keep at present level	26	36	30	28	42	34
Reduce	4	2	6	4	4	8
End altogether	1	1	1	1	2	2
Don't know	5	5	4	6	5	4

Noting a downward shift in the intensity of public support for government spending on the environment from 1972 to 1976, the authors point out that in both cases—water and air pollution—such changes took place from 1972 to 1974. From 1974 to 1976, support for government spending on the environment remained relatively stable. Also, such shifts were consonant with the majority of other government spending programs similarly rated.

"The over-all decline here does not mean that Americans are no longer interested in paying for government actions aimed at improving the environment," the authors contend, stating that their analysis indicates "unmistakable public support for increased spending to reduce water and air pollution.

"To sum up . . . U.S. public attitudes toward reducing water and air pollution display a distinct pattern. Most Americans tend to believe that progress has been made recently in both areas, but nevertheless remain deeply concerned about environmental problems and are strongly in favor of increased government spending to help move quickly toward their solution. Our citizens, in short, see cleaning up the environment as a national task of first priority, and they show no interest in easing up on abatement programs now," the study states.

However, on the environmentally-related topics of limiting population and economic growth, the results indicate a greater disparity of opinion. When asked if world population and economic growth will have to be regulated to avoid serious shortages of national resources, the results were as follows:

	1974	1976
Yes	64%	67%
No	29	25
Don't know	7	8

But when asked "Do you, yourself, feel that population and industrial growth in this area where you live should or should not be regulated?" the results were:

	1974	1976
Growth should be regulated	54%	44%
Should not be	37	44
Don't know	9	12

" . . . the conclusion most worthy of note here may not be that there has been a drop of 10 percentage points between 1974 and 1976 in the proportion of Americans who believe that growth should be controlled, but that even in 1976—as the Nation continues to struggle out of a painful recession—half of those who expressed any opinion on this question continued to feel that the interests of environmental protection and preservation of the quality of life require some curbs on population and economic growth," the study states.

The study also found that 69% of all those asked favored trying to reduce the growth of the national population through encouraging birth control. This figure was two percentage points lower than the one obtained in the 1974 sampling.

Authors of the study were Gladwin Hill of *The New York Times*, Lloyd A. Free of the Institute for International Social Research, and Donald R. Lesh of Potomac Associates. ■

OUR INDOOR RIVER

When rain washes pollutants from large areas of land into the Nation's rivers, what becomes of them? Do they harm the river water and its plant and animal life? What changes are worked by the river ecosystem on the pollutants themselves, the silt, the nutrient chemicals, the pesticides?

To help answer such questions, EPA has a small, indoor river at its Environmental Research Laboratory at Athens, Ga., that can duplicate most of the conditions found in natural rivers.

It is called the Aquatic Ecosystem Simulator, and it cost about \$1 million when it was built four years ago.

The heart of this system is a narrow tank about 20 meters (64 ft.) long in which the simulated river flows under carefully controlled conditions. Pure water containing artificially introduced chemicals is generally used, or natural water from a particular river or lake can be brought to the laboratory in tank trucks.

Microscopic water plants and animals, algae, bacteria, zooplankton, etc., are placed in the tank by the scientists if pure water is used for an experiment, or water containing natural populations of organisms can be taken from a lake or stream. In either case the tank will contain a balanced ecosystem that can be maintained throughout the studies.

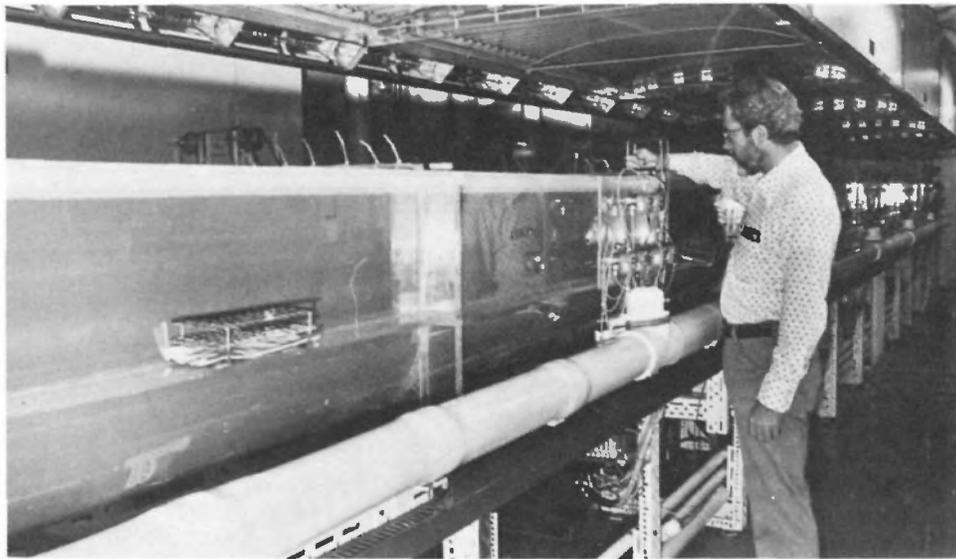
Controlled amounts of pollutants are introduced along the stream. Water samples are drawn off at nine stations along its length and given a variety of tests to measure the interactions of pollutants and the river ecosystem.

A wide range of environmental conditions can be maintained. The temperature of the water, and the air above it, can be varied from 0 to 40 degrees C (32 to 104 degrees F). Relative humidity of the air in the laboratory can range from 20 to 80 percent.

An overhead bank of 833 fluorescent lamps of different colors and 100 infrared lamps simulates the sunlight necessary for the natural growth of water plants.

The maximum flow rate is 7,570 liters (2,000 gallons) per day, taking about 12 hours for water to travel the length of the channel. This short residence time is somewhat offset by submerged paddle wheels that can stir the channel up to white-water turbulence if desired.

The simulated river is now being used in a one-year study of what happens to plant nutrients in a river. Such nutrients are a principal cause of algal growth and the premature aging of lakes and rivers. Runoff from cultivated land is believed to be one of the



The effects of nutrients and other pollutants on aquatic life are studied in this 64-foot-long artificial river at EPA's laboratory in Athens, Ga. Researcher Heinz Kollig is checking the instruments that automatically sample water quality.

major nonpoint sources of nutrient pollution.

The studies are concentrating on how nutrient nitrogen compounds entering a river ecosystem undergo chemical changes and affect the river's microscopic life, according to Dr. Ray R. Lassiter, Chief of the laboratory's Environmental Systems Branch.

Ammonia is the nitrogen compound introduced. It is widely used in chemical fertilizers.

In the river simulator, EPA scientists are tracing the conversion of ammonia to nitrates by bacteria in the water under various environmental conditions.

The bacteria float in the water and form colonies on the walls and paddle wheels. They carry out two processes in the nitrogen cycle: first they convert the ammonia to nitrites (compounds with two oxygen atoms) then to nitrates (three oxygen atoms).

"Both processes are called nitrification, and both tend to take free dissolved oxygen from the water," said Dr. Lassiter. "They can cause localized water pollution problems when an overload of nitrogen-rich organic materials from farm fields, for example, enters a stream. Bacterial action on this material can deplete the oxygen balance in the stream, often killing fish and other organisms."

The studies are part of a continuing effort to characterize the complete nitrogen cycles and the effects of different kinds of nitrogen

compounds on the oxygen balance of streams.

In an earlier project, the simulator was used to investigate what happens to the pesticide malathion in rivers.

Knowing how pollutants are transported in streams and what happens to them along the way can help State and local officials make the right decisions on water quality management.

The laboratory river project was conceived in the mid-1960's by Dr. Walter M. Sanders III, who is now the laboratory's Associate Director for Water Quality Research. It was dedicated in March 1973.

"Knowledge of how these pollutants behave in rivers is essential for intelligent control," he said.

"This kind of research produces complicated and apparently conflicting conclusions that are best cast into 'models'—mathematical formulas that describe what can happen under various conditions," said Dr. Sanders. "We have already modeled pesticide and fertilizer transport in particular watersheds in the Midwest Corn Belt and the Southeast Piedmont sections of the country."

"The artificial river is used to check and refine the mathematical models," said Dr. David W. Duttweiler, laboratory Director. It bridges the gap between small-scale laboratory experiments, which can be carefully controlled but may not be realistic, and studies in the field where the problems are real but little experimental control is possible.

"Although this system cannot reproduce all conditions found in the natural environment, it gives EPA aquatic research capability that, to our knowledge, is not duplicated anywhere in the world." ■

EPA'S EYES IN THE SKY

The white chopper hovers low over a bayou backwater and gently settles its pontoons into a secluded stretch of the river. A side panel bearing the blue and green EPA symbol slides back, and several scientists lean over the side with technical equipment and clipboards. Here in the Atchafalaya River Basin EPA is monitoring water quality to assess the environmental impact of water management measures used on the river.

The UH-1H (Huey) helicopter used to reach this rural Louisiana area is part of what is often referred to as the EPA "air force." The Agency currently operates eight aircraft through the Environmental Monitoring and Support Laboratory at Las Vegas. The fleet of five helicopters and three fixed-wing aircraft is based at McCarran Field there.

At times EPA has had as many as 11 aircraft, but the size of the fleet changes to meet program needs. The aircraft serve as an arm of the Lab's research mission by collecting data that could not be gathered effectively any other way. A plane or helicopter that cannot be modified to gather the necessary information is phased out of the fleet. EPA-owned aircraft are turned over to the General Services Administration for surplus, and those on loan from the military are returned. When no other means can be found to complete the mission the Agency sometimes leases aircraft for short periods of time.

"In each mission the aircraft provide some unique service," says Dr. David McNelis of the Las Vegas Lab. "Although some photographic missions are contracted, most air and water monitoring missions are performed by Agency aircraft. This is not like having a car and a driver on call. The people and aircraft are part of an integrated system that depends on a mission-trained pilot, an aircraft that provides an instrumented platform for necessary research, and a mix of scientists on board to complete the work."

McNelis, the Deputy Director of the Monitoring Operations Division at Las Vegas, continued, "The aircraft provide a highly cost-effective method of collecting information or performing analyses over a large area. They give us access to areas that would otherwise be difficult, if not impossible, to reach."

The Agency now owns a Volpar Turboliner, a converted Air Force C-45 with two turboprop engines; a second C-45 equipped with two piston engines, which serves as

backup for the other fixed-wing aircraft; and a Douglas Monarch, a converted B-26 that carries the heaviest payload, flies the fastest, and has the longest range of all EPA's aircraft. EPA also owns two Sikorsky S-58 helicopters and is using three Huey helicopters on loan from the Department of Defense.

The Las Vegas Lab has a staff of 11 pilots and technicians who fly and maintain the planes. These people spend as much time away as they do at home, according to Dr. McNelis, because their missions take them all over the country from New England, to Florida, to the Pacific Northwest.

They are part of an organization of over 200 scientists, technicians, and support personnel who work in the five buildings the Lab occupies at the University of Nevada. The laboratory staff analyzes and interprets the information collected by their high-flying colleagues, making the data available to environmental specialists throughout the Agency.

The planes and helicopters serve as "platforms" for technical devices or instruments that identify and measure pollutants and other indicators of environmental quality. They also carry a wide variety of photographic equipment to record visual aspects of the landscape for later interpretation.

With the bird's eye view provided from the air, EPA scientists can document the impact of industrial air emissions on the surrounding countryside, locate oil storage facilities that must be checked for compliance with oil spill prevention regulations, aid in the assessment and cleanup of oil spills, outline thermal mixing zones in water bodies, and check rivers for sources of municipal or industrial pollution.

EPA inherited some aircraft when the Southwestern Radiological Health Laboratory came into the Agency from the Department of Health, Education, and Welfare in 1970. Small airplanes had been used in connection with nuclear testing, to collect air samples and locate and track radioactive clouds.

This work is still being carried on by the Volpar. The plane is used almost exclusively on work accomplished under a memorandum of understanding between EPA and the Energy Research and Development Administration. The plane is in the air whenever underground testing takes place at the Nevada Test Site. It is equipped with a scintillator, Geiger counter, and other more sensitive radiation instruments.

Over the last seven years the nucleus represented by those first planes has expanded into an important tool that gives the Agency the means to find the source of pollutants, track their movements, and document their evolution over periods of time and through changing conditions. Many of EPA's major research projects depend on the air force to collect the data they need.

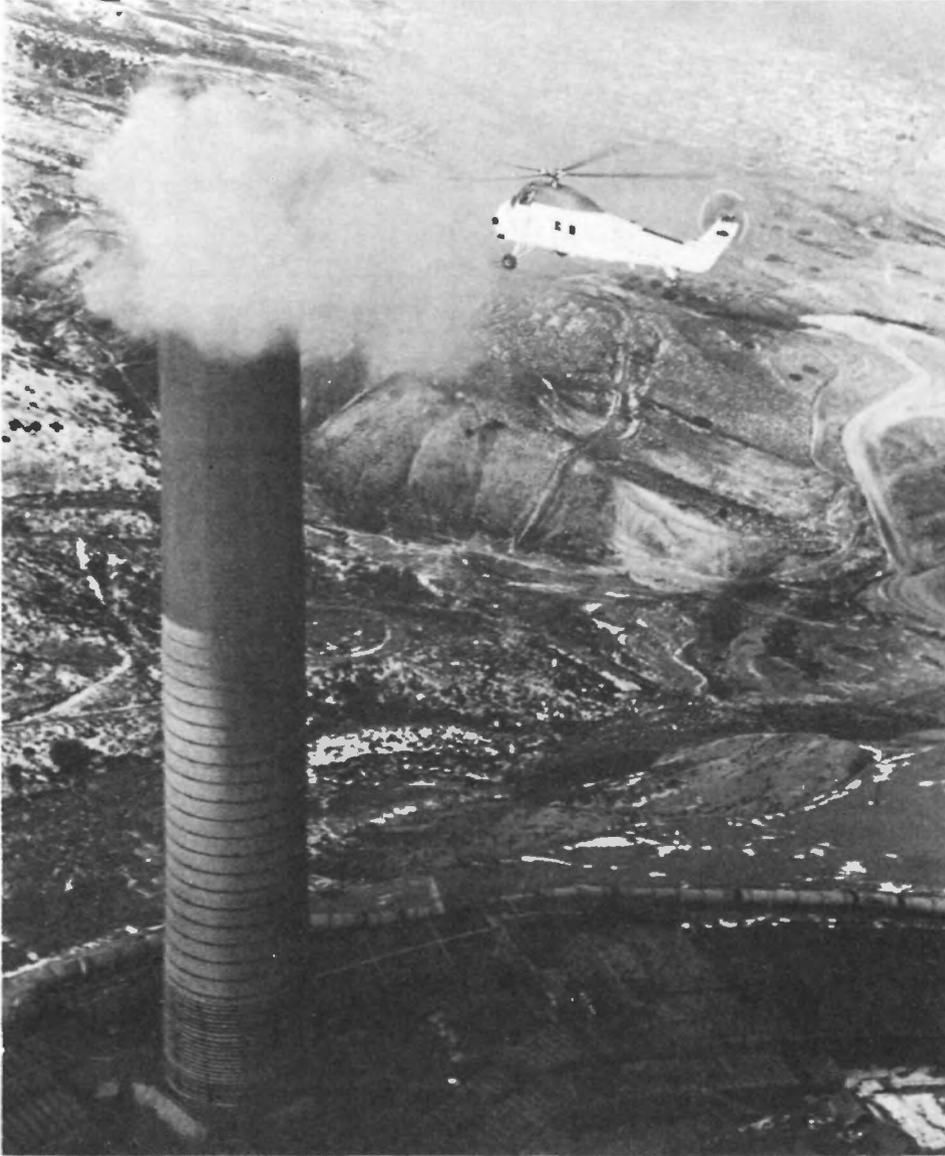
The Regional Air Pollution Study that was conducted in St. Louis, Mo., from 1972 to 1977 used the Laboratory's Sikorsky S-58 helicopters to collect information on the processes that determine the concentrations of air pollutants so that they can be described in a system of mathematical models. The aircraft were fitted with instruments that measured ozone, oxides of nitrogen, non-methane hydrocarbons, carbon monoxide, sulfur dioxide, and particulates. They also had equipment to measure temperature, dew point, and altitude. Special air samples were collected in large plastic bags at various altitudes.

The information collected by these instruments will be converted into data to validate the computer models EPA is using to predict the behavior of air pollutants in the atmosphere.

The Agency's three Huey helicopters have been used extensively over the last four years to sample lake water as part of the National Eutrophication Survey. Helicopter teams of a pilot, a limnologist, and a technician visited some 820 lakes all over the country. The helicopter landed at preselected sites and members of the team measured the temperature, conductivity, turbidity, acidity, and dissolved oxygen content of the water with an electronic sensor package. The sensor also took water samples at selected depths for later laboratory analysis. The information assembled from those samples is being interpreted now by the Las Vegas laboratory staff.

Not all Las Vegas aircraft monitoring is by direct sampling. The fixed-wing aircraft are also involved in remote sensing research. The Douglas Monarch carries an infrared scanner that measures temperature differences in daylight or darkness. It can be used to detect and map heated water discharges or oil spills.

The Monarch also carries two aerial photography devices. One is a mapping camera that photographs large areas without distortion in color, black and white, or infrared false-color. The other is a reconnaissance camera that compensates for the speed of the plane, giving clear detailed photos. These



A specially-equipped EPA Sikorsky H-34 helicopter measuring sulfur dioxide in a plume from a 600-ft. high smokestack at a copper smelter in Anaconda, Montana. The data will be used by Region VIII to assess the smelter's impact on air quality in the area.

pictures are valuable since they can be used for evidence in legal proceedings.

Infrared scans collected and analyzed by EPA experts were key evidence in a Chicago water pollution trial in 1974. The State of Illinois sued Inland Steel Company on charges that the industry polluted Lake Michigan, the source of Chicago's drinking water. At the Region's request the Las Vegas aerial surveillance team flew over the Lake Michigan shoreline where Illinois and Indiana meet and obtained infrared scanning imagery. The scan showed heated water discharged from the Indiana Ship Canal in East Chicago where Inland Steel has a big mill, drifting north into Illinois waters. This heated water made it possible to track the "plume" of pollution, which was shown moving northwest toward Chicago's water intake when winds were from the southeast. Illinois' Attorney General considered the infrared pictures provided by EPA to be "a cornerstone for liability in this complex environmental litigation."

The aerial photographs taken by the crew of the Monarch offer a wealth of information to the expert interpreter. The photointerpreter can pinpoint and inventory waste

outfalls, industrial facilities, solid waste dumps, feedlots, and water pollution sources in mining and lumbering areas. Photographs of oil storage facilities are used to assess spill prevention needs and aid enforcement efforts. When an oil spill does occur, whether on land or at sea, aerial reconnaissance helps map the spread of the contaminant, locates access routes for cleanup crews, and aids in the assessment of the long-term ecological effects. The plane carries closed-circuit television equipment that can record the scene for live transmission to ground-based viewers for rapid assessment of oil and hazardous materials spills that could involve danger to the public.

Much work still needs to be done on the technique of coping with oil spills. Information garnered by the Las Vegas research staff is shaping this growing technology. After a 3.2-million-gallon fuel oil tank burst near Jersey City, N.J. on May 26, 1976, the retaining wall around the oil company compound broke. This released oil into surrounding marshlands and the Hackensack River. A common assumption would be that

oil flows downstream with the river thereby endangering the lower part of the stream and Newark Bay.

Lab personnel took aerial photographs over a 50-square-mile area along the Hackensack that showed the effects of wind and tidal action in the spread of water pollution. In addition to local site damage and the expected downstream impact, the photographs showed that strong tidal flows from the Atlantic, aided by the wind, had pushed the oil upstream on the Hackensack River and the Passaic River. The oil also backwashed into the Hackensack Meadowlands between Jersey City and Secaucus upriver from the site of the break.

Another attempt to meet the emergency needs raised by spill disasters is the Enviro-Pod, a compact, low-cost unit that will enable pollution officials to take clear photos from medium or low altitudes. The pod was developed by the U.S. Air Force Avionics Laboratory at the request of EPA. The program is being supervised by a field station of the Las Vegas Lab, at Warrenton, Va.

The Enviro-Pod is a light portable unit that can be temporarily attached to a light airplane such as a Cessna 172 and take high resolution photos from medium altitudes or low level close ups. Dr. Wilson Talley, EPA Assistant Administrator for Research and Development, anticipates that the Enviro-Pod will provide the best means yet for photographing such environmental disasters as oil spills, forest fires, and water pollution.

Talley said, "Environmental officials need this kind of flexibility and quick reaction to ecological disasters. The pod could also be used for urban area studies, monitoring agricultural runoff, and collecting evidence of violations of existing regulations."

The problems of measuring pollutant discharges and assessing their effects goes well beyond the outfall pipe and the smokestack. Air and water pollutants can travel long distances over vast areas, sometimes in a short time. ■

UPDATE

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

GENERAL PUBLICATIONS

Single copies available from the Public Information Center, Printing, (PM-215), US EPA, Washington, D.C. 20460.

Now Is The Time To Speak Up (April 1977) A 12-page pamphlet explaining the 208 process for water quality management planning with suggestions on how the public can get involved through each step of the planning process.

Your Drinking Water (April 1977) A 10-page reprint from the EPA Journal that reviews some of the problems and opportunities for providing better drinking water in the United States and abroad.

EPA Enforcement, A Progress Report 1976 (January 1977) This 210-page document is the fourth report on enforcement actions. It covers air, noise, water, and pesticide actions initiated by EPA.

Oil Spills and Spills of Hazardous Substances (March 1977) An illustrated 100-page booklet that describes spill effects, prevention, response, legislation, and several spill incidents.

Pesticides Safety Tips (Reprinted March 1977) A handy 4 x 9 card that lists important things to remember when using, storing, and disposing of pesticides.

The Clean Water Report to Congress, 1975-76. This 75-page book is the third annual report describing measures taken to implement the Federal Water Pollution Control Act. Among the topics it covers are water quality monitoring, municipal construction, the nonpoint source program, and public participation.

Wastewater: Is Muskegon's Solution Your Solution? (MCD 34) A 50-page book prepared by EPA's Region V that looks at wastewater utilization and renovation through land treatment. It shows a cost-effective way to

clean wastewater and then use it to irrigate and fertilize previously unproductive land.

Corvallis Environmental Research Laboratory (March 1977) An 18-page illustrated booklet about the research mission of the laboratory. It describes various laboratory projects including wetlands studies, marine and estuarine research, investigation into chemical substitutes for hazardous pesticides, and energy-related research.

FEDERAL REGISTER NOTICES

For copies of Federal Register Notices, write Office of the Federal Register, National Archives and Records Service, Washington, D.C. 20408.

Medium and Heavy Trucks. EPA adopts noise emission standards, effective 5-31-77. Tuesday, March 1.

Phosphate Fertilizer Plants. EPA announces availability of final guidelines for the control of atmospheric fluoride emissions. Tuesday, March 1.

Toxic Substances. EPA proposes inventory reporting requirements as prescribed by the Toxic Substances Control Act. Wednesday, March 9.

Pesticide Products. EPA issues national list of priority needs for minor use registration. Thursday, March 10.

Pesticides. EPA establishes tolerances for thiophanate-methyl in or on raw agricultural commodities, effective 3-17-77. Thursday, March 17.

Pesticides. EPA changes effective date to 4-15-77 for labeling statement on aerosol products regarding chlorofluorocarbons. Monday, March 21.

Pesticides. EPA establishes tolerances for aldicarb in or on raw agricultural commodities. Monday, March 21.

COMING EVENTS

More information about these events and EPA participation in them is available from Sue Sladek. Phone 202 426-4188.

EPA National Conference on 208 Planning and Implementation, St. Louis, MO., May 24-26.

The Second National Conference on the Interagency Energy/Environment Research and Development Program, June 6-7, Washington, D.C.

Environmental Research Information Center Seminar—Small Wastewater Treatment Systems, San Francisco, CA., May 24-26; Denver, CO., June 7-9.

Environmental Research Information Center Seminar—Sludge Treatment and Disposal, Atlanta, GA., May 11-12; Boston, MA., June 14-15.

Environmental Research Information Center Seminar—Water Treatment, Portland, OR., May 25-26; Washington, D.C., June 1-2.

MOVIES

Speak Up. This 10-minute, 16-mm color film is designed to alert people to the issues which may be considered during 208 planning and how these issues may affect their lives. To be used as an introduction to programs that discuss specific local issues and local planning processes. (Single copies of this film may be borrowed from: EPA, Office of Public Affairs (A-107), Washington, D.C. 20460.)

Can We Fish Again? A little boy and his father go fishing on the Great Lakes and later find out that certain fish are contaminated by hazardous chemicals. This 14-minute, 16-mm color film looks at the effects of toxic substances and describes the need for regulation. (Single copies of this film can be borrowed from: Film-Comm, 208 South LaSalle Drive, Chicago, IL., 60604.)

ENVIRONMENTAL ALMANAC

A GLIMPSE OF THE NATURAL WORLD WE HELP PROTECT

MAY

BLOSSOMS IN THE TREES

Early May is often the time when orchards in the major apple-growing areas of the Shenandoah Valley in Virginia, Washington State, and the New York-New England area reach full bloom.

Hillsides and ridges are decked with aromatic white and pinkish blossoms. Although the exact timing of the blooming is controlled by weather conditions, the apple blossoming is the last of the season for the major fruit trees. The peach, pear, and cherry trees have all bloomed earlier in clouds of white and pink flowers.

Leading the world in the production of apples is the United States. The success of each multi-million dollar apple crop is of major importance to the agricultural economy.

Yet, as in most farm crops, the fate of the apples depends on the vagaries of the weather and the grower's success in enlisting the cooperation of some insects and in fighting off others.

The key factor in the production of the apples is the development of the blossoms. If there are no flowers, there will be no seeds. Flowers are the reproductive organs of a plant and their function is to produce, nurture and distribute the seeds of their species.

Each spring a good-sized apple tree produces from 50,000 to 100,000 blossoms whose fragrance and color attract bees, which are often rented from apiarists and placed in the orchards during the pollination period. A bee lands on a petal and while sipping the nectar from the flower cup transfers the pollen picked up on its body from the last drinking stop.

After receiving the pollen, the

ovary at the base of the blossom grows into the seed-bearing apple. In nature's plan the apple is merely a lure to help spread the seeds within and thus continue the species.

Most blossoms end up in the dust because this system of pollination is complicated and not very efficient. Only 2 to 5 percent of the apple blossoms develop into fruit, providing a yield of 15 to 30 bushels of apples from a mature tree. If all the blossoms produced apples, the trees could not supply them with the necessary nutrients or bear their weight.

The apple and most of our northern fruit trees are members of the rose family, which also includes the ornamental rose plants. The libertine mating behavior of this family has long been a scandal in botanical circles.

Much more sedate, far less colorful, and rarely noticed is the early



Apple blossoms

spring flowering of such trees as oak, elm, and maple. The aerial display of these trees is rarely seen because their wind-pollinated flowers hanging high in the bare branches are so tiny.

Some of these trees such as the elm have undressed flowers with no petals, leaving bare the essential stamens that manufacture the pollen and the pistil that produces the seed after it is fertilized.

Showy petals could hinder the breezes from delivering the pollen which is distributed in great clouds from the elm's dangling anthers or the swaying catkins of the oak, poplar or walnut.

Wind-pollinated trees far outnumber insect-pollinated kinds, but because their masses of blossoms are inconspicuous they are not usually thought of as flowering trees.

The petals of insect-pollinated flowers are often marked with lines or spots that point the path to the nectar. The tulip poplar's green tulip-shaped blossoms, for example, carry an orange target circle near the inner flower base.

Insect-flower trees which will bloom this summer include the basswood whose creamy and fragrant blossoms attract swarms of bees. The flowers of horse chestnut and catalpa will stand erect against masses of foliage. The Franklinia will wait until late summer or early autumn and barely has time to ripen its fruits before the onset of cold weather.

Last of all comes the flashing yellow of the witch hazel whose little yellow ribbon-like flowers—easily seen in the bare November woods—offer the final provisions for late-working bees.—C.D.P.



Harold P. Cahill Jr., Director of the Municipal Construction Division, has been chosen as one of the "top ten men-of-the-year" in the public works field. The awards are given each year by the American Public Works Association in recognition of outstanding service by public works officials in all levels of government, according to John J. Roark, Association president. Cahill's award will be presented later this month at a ceremony to be held in Washington in conjunction with National Public Works Week, May 22-28. John T. Rhett, Deputy Assistant Administrator for Water Program operations, said Cahill was first recommended for the APWA award by the Management Advisory Group of EPA's Construction Grants Program particularly for his "outstanding record of managing EPA's construction grants program" and for his notable ability "in bringing together all the groups, private and public, to jointly work out equitable solutions" to the technical and managerial problems of this multi-billion-dollar effort to clean up pollution from municipal sewage.

Dr. A. F. Bartsch, Director of EPA's Corvallis (Ore.) Environmental Research Laboratory, spent two weeks in South Africa recently surveying water resources and recommending a work program for the South African Water Research Commission. He then visited Nairobi, Kenya, to confer with Dr. Mostafa Tolba, Executive Director of United Nations Environmental Program, which has its headquarters in Nairobi.

PEOPLE



Mary K. McCarthy has been appointed Headquarters Training Officer, replacing James E. Guy, who has been moved to the Personnel Management Divi-

sion's national training staff. McCarthy has been with the Civil Service Commission for two years, working with commission teams that give advice and assistance to selected agencies on their employee training problems. Before that she worked with the President's Commission on Personnel Interchange. She is 35 years old, a native of New York City and a graduate of the State University of New York. She earned a master's degree at Manhattan College, Riverdale, N. Y., and has done graduate work at Columbia and George Washington Universities.



John M. Ropes was recently appointed Director of State and Local Programs in the Office of Noise Abatement and Control. He previously had been assigned to the Office of Federal Activities where he headed EPA's manpower development and training programs in water pollution control for the last three years.

He joined the Federal service in 1968 as Chief, State and Local Manpower Development, in the Federal Water Quality Administration, an EPA predecessor agency. Before that he served three years as assistant to the governor of Iowa and director of the executive staff of the Iowa Manpower Development Council.

Mr. Ropes, 52, is a native of Onawa, Iowa, and earned a B.A. in sociology and political science and an M.S. in sociology and secondary education from Drake University, Chicago. He and his wife, the former Mary Lou Gardow, have one son, Dr. Milton B. Ropes.

Donald A. Townley, Acting Deputy Administrator in Region VII, Kansas City, has retired. Townley had previously headed the Region's Surveillance and Analysis Division and its Air and Hazardous Materials Division. A Public Health Service officer, he had also served as enforcement chief for Kansas City's Division of Water Supply and Pollution Control and as Supervisor of Environmental Sanitation for the Missouri Division of Health. He and his wife will continue to live in Liberty, Mo.



These 10 EPA women at the Jefferson Memorial comprised EPA's first women's running team which participated in the Interagency Jogging Meet held in Washington recently. They are (from left) **Carol Dennis, Paula Bass, Jo-ann Bassi, Claire Gesalman, Merie Clark, Anne "Sam" Marvin, Barbara Mayo, Jana Scott, Marie Perez, and Claire Matassoni**. In competition with

other women from EPA and other Federal agencies, Dennis finished in first place overall and was also first in the category for women 30 to 39 years old, Matassoni was second overall and first in the race for those 20 to 29, and Marvin, who is holding the trophy given the first women's team in the meet, was first for those between 40 and 49.

news briefs

LEAD STANDARD BEING PREPARED

EPA officials are reviewing comments received at a public hearing held last month to assist in developing information for a national ambient air quality standard for lead. Under a court order EPA must propose a lead standard by Aug. 10 and promulgate a final standard by Nov. 10.

FLUOROCARBON MEETING

EPA, the Food and Drug Administration and the Consumer Product Safety Commission hosted an international meeting on fluorocarbon regulations April 26-28 at the State Department in Washington. Purpose of the meeting attended by major fluorocarbon producers and international organization representatives was to share information on the global problem of ozone depletion resulting from fluorocarbon emissions. Chairman of the meeting was Administrator Douglas M. Costle.

PAPERWORK CUT ORDERED

EPA Deputy Administrator Barbara Blum has ordered a 30 percent cut in paperwork related to Agency reporting requirements. Blum has convened a special task force of EPA and State officials to develop recommendations for reducing reporting requirements involving EPA regulations. The cuts will be ordered as part of the Agency's Fiscal Year 1978 operating guidance to regional offices.

ROUSH NAMED EPA STAFF DIRECTOR

J. Edward Roush, a former U.S. Congressman from Indiana, has been named by Administrator Douglas M. Costle as Director of EPA's Office of Regional and Intergovernmental Operations. Roush, who succeeds Peter L. Cashman in this EPA post, served eight terms in Congress. Costle said "Ed Roush brings a wealth of experience in local and Federal government to this key position."



Return this page if you do NOT wish to receive this publication (), or if change of address is needed (), list change, including zip code.

UNDERWATER FARMS

The use of polluted wastes to help grow trout, shrimp, and other fish on underwater farms is covered by new regulations issued by EPA.

Under the Agency's rules, permits will be issued by EPA Regional Administrators to insure that safe levels of usable pollutants are not exceeded.

The main sources of pollution used for fish farms and other aquaculture projects are heated industrial waste water, waste water from food processing activities, and treated municipal sewage which has high levels of such nutrients as nitrogen and phosphorus.

EPA's regulations will apply only to those projects where pollutants are being discharged into U.S. inland and coastal waters to help grow catfish, clams, oysters and other marine animals.

Permit applications must be made jointly by the operators of both the aquaculture project and the facility supplying the waste water to be used. To prevent the discharge of excessive pollutants, applicants must provide information on the kinds and amounts of pollutants to be used.

The use of waste water in aquaculture projects may be an effective way to turn certain pollutants into useful products, EPA believes. Using waste water to grow fish and other marine animals could prolong the growing season for certain fish or provide needed nutrients inexpensively.

There are only a few projects now using such methods, although EPA believes that interest in these techniques may increase. In Hamilton, New Jersey, a township near Trenton, the warm water from a power generating station has been used since 1973 to cultivate rainbow trout and a freshwater species of edible shrimp with considerable success. The plant is owned by Public Service Electric and Gas, and with help from a National Science Foundation grant and biologists from Trenton State College and Rutgers University, the company has established a commercial-scale fish farm on its acreage at

the power plant.

The warm water used at the plant is diverted in a constant flow to artificial ponds and raceways where its warm temperature (40°-96° F) stimulates rapid growth in the trout and shrimp.

The trout are raised in the cooler winter months, from November to April, and tolerate a temperature range of 34°-79° F, with the fastest growth occurring at 57° F.

In the warmer months, when the water is too warm for optimum trout breeding, the company switches to the shrimp which are a tropical species and thrive in the warmer water, in temperatures up to 98° F.

The trout reach a length of ten inches in about four months, and the shrimp reach a harvest size of three inches in nine months (compared to 1½ years naturally). Both the trout and shrimp have passed health and taste tests. The trout have been donated to the State of New Jersey for trout stocking. The

Marine biologists harvest trout raised in the warm water discharged by a Public Service Electric & Gas Company power plant in Hamilton, New Jersey.

shrimp have so far been used for research needs at nearby institutions and for marketing evaluations by restaurants and project personnel.

The practice of aquatic husbandry dates from ancient times in the Middle East. Interest in this form of protein production has been increasing in recent years due to such factors as the global food shortage that has resulted from a greatly expanding world population.

Many aquatic animals can be efficiently produced as sources of protein, since they can use a higher percentage of their energy intake for growth than is possible with terrestrial animals. They can do this because their body density closely approximates that of the surrounding water, meaning that they have to use less energy to maintain supportive structures, such as a skeleton. Also, since most aquatic animals are coldblooded they do not have to expend additional energy to maintain a high body temperature.

EPA's regulations were originally proposed in July 1974, under authority of the 1972 Federal Water Pollution Control Act. They will appear soon in the Federal Register and become effective 30 days thereafter. ■

