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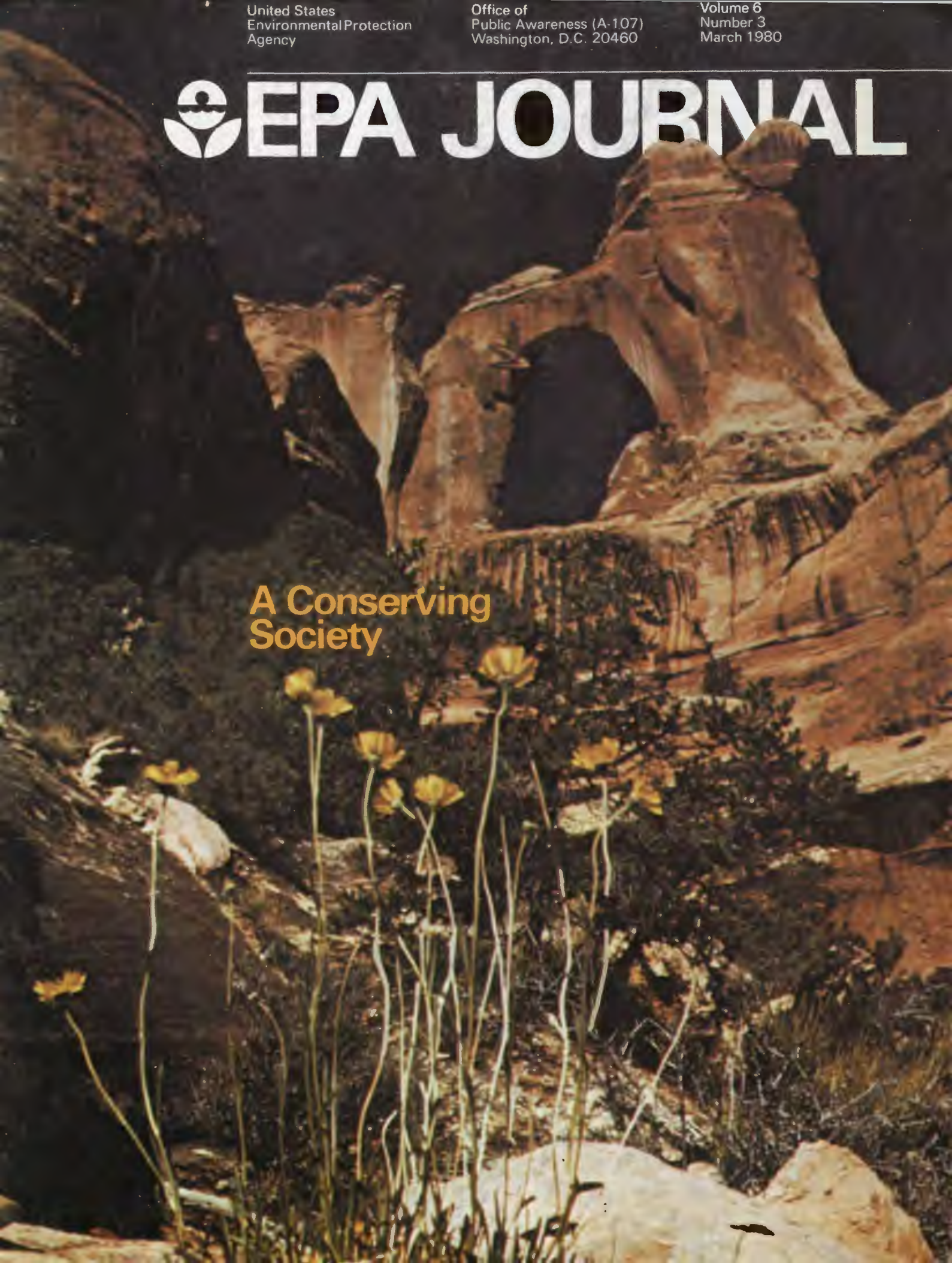
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EPA JOURNAL

**A Conserving
Society**



Conservation Priorities

In this issue EPA Journal takes a look at the staggering waste of energy and natural resources that results in pollution.

The critical need for protecting such natural systems as air and water supplies is emphasized in articles by EPA's leadership. Preservation of natural and man-made treasures from the effects of waste pollution is also stressed.

One article is a report on what is being done in the Rocky Mountain-Great Plains region to ensure that vast energy sources in this part of the country are developed without unnecessary sacrifice of the environment.

The special efforts being made to protect the natural wonders in our parks such as the Angel Arch on the cover of this issue of EPA Journal and the man-made Parthenon in Athens, Greece, from pollution are the subject of other articles.

A little known aspect of EPA's activities is the care taken to preserve artifacts lying in the path of sewer projects built with financial aid from this Agency. An article describes how relics of a Revolutionary era community in New Jersey have been saved in an EPA project.

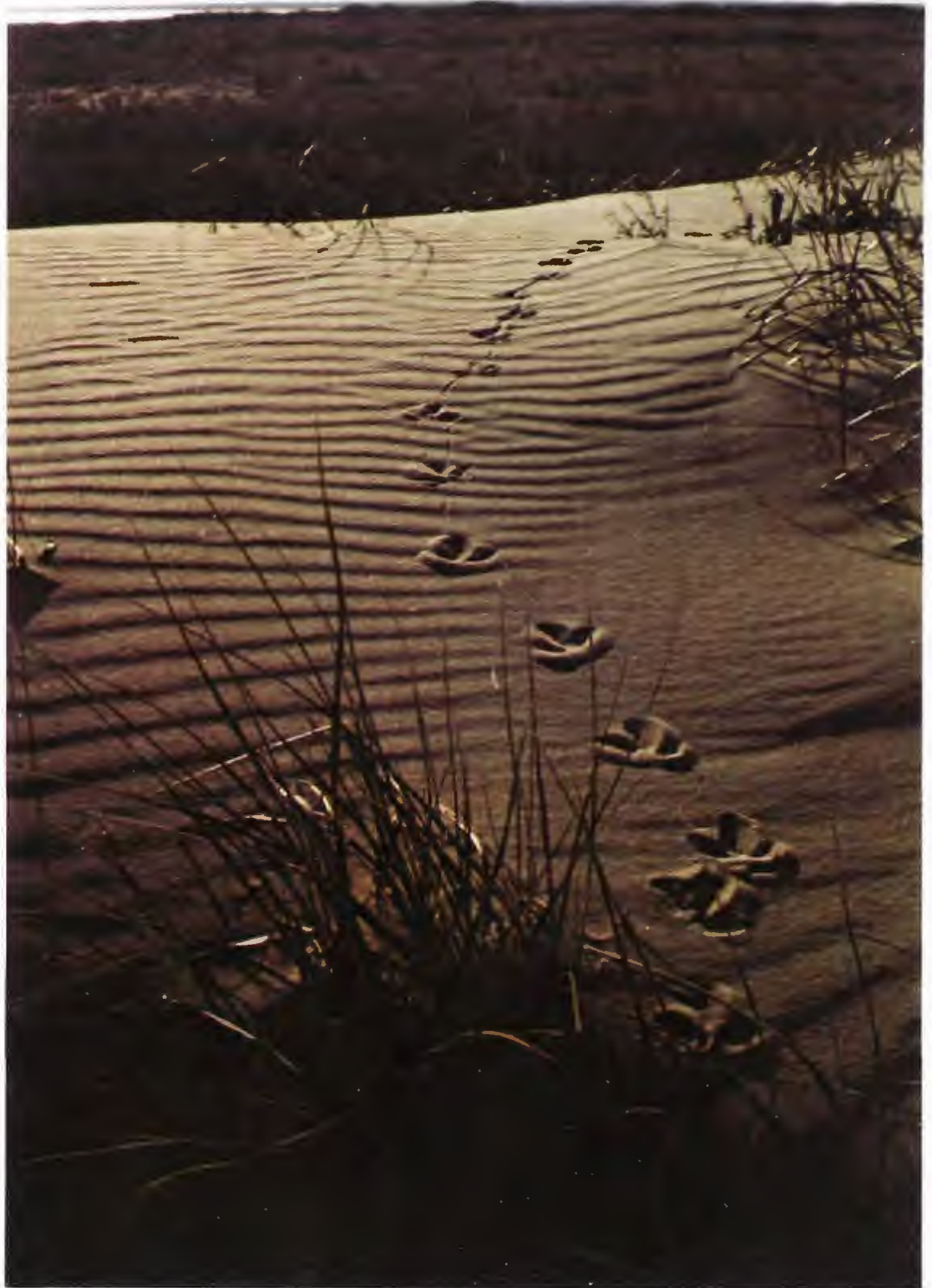
How to make efficient use of fossil fuels while at the same time reducing pollution is described in articles on Amtrak's passenger train service and on a Florida power plant that uses trash, coal, and sewage to produce energy.

In a continuing series on major American rivers, Chris Perham writes about pollution progress and problems in the

Connecticut, New England's longest river. In "A Tale of Two Rivers," Truman Temple reviews what is being done abroad to clean up two major rivers—the Thames and the Rhine.

The extraordinary effort being made by the Nature Conservancy to save endangered living creatures and their habitat is the subject of another article.

This issue also takes note of the 10th anniversary of Earth Day on April 22 and the new drive that will begin on that date to ensure that we act in the future as responsible stewards for the Earth. □



EPA JOURNAL

Douglas M. Costle, Administrator
Joan Martin Nicholson, Director, Office of Public Awareness
Charles D. Pierce, Editor
Truman Temple, Associate Editor
John Heritage, Chris Perham, Assistant Editors

Articles

EPA is charged by Congress to protect the Nation's land, air and water systems. Under a mandate of national environmental laws focused on air and water quality, solid waste management and the control of toxic substances, pesticides, noise and radiation, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

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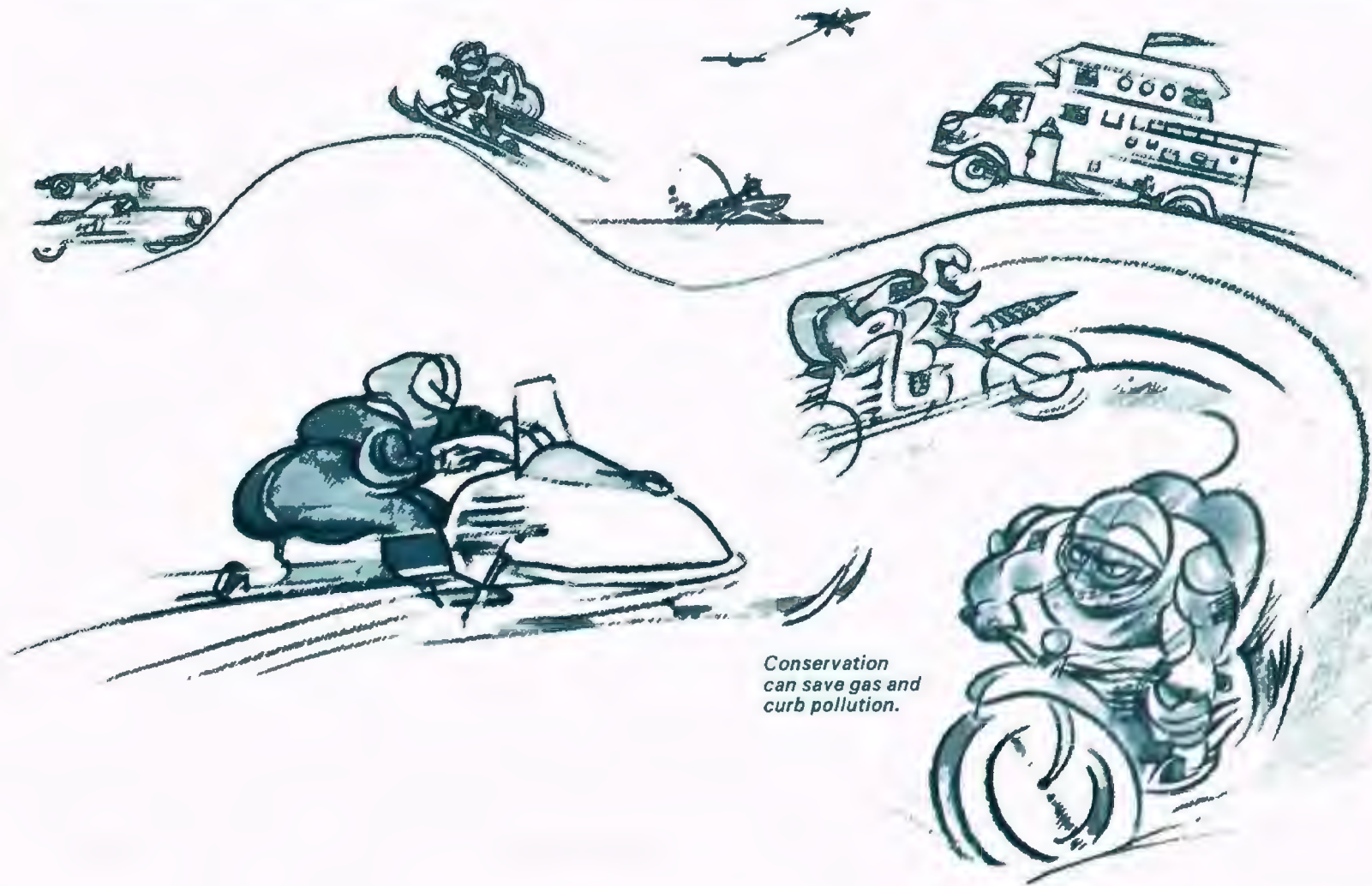
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Front Cover This huge sandstone span known as Angel Arch is located in Canyonlands National Park near Moab, Utah. Special efforts are being made now to protect the exceptionally clean air in parks like this one. (Story on P. 6).

Opposite: Animal tracks mark a sand dune on Cedar Island, part of the Virginia Coast Reserve. (See story on P. 21)



Conservation can save gas and curb pollution.

A Conserving Society

By Douglas M. Costle
EPA Administrator

Long before the current energy shortages were making themselves painfully apparent, EPA in cooperation with State and local governments was encouraging energy conservation in numerous ways. For years we have pursued research and development in cogeneration of electricity in burning refuse. We have shared costs to help build an innovative wastewater treatment plant that uses solar energy. We are helping to educate the public in ways to conserve water in the home, and have provided many millions of dollars in research and development grants to help industry find new processes under the Federal Water Pollution Control Act to conserve water as well as abate pollution and

recover useful by-products. Since purifying water uses substantial energy in every city across the Nation, the conservation of water in homes and factories also can make a contribution to the national effort.

It has become increasingly evident that research and development coupled with efforts in energy conservation by all Americans is our only hope for ultimate energy self-reliance. No matter how much domestic oil and gas remains to be discovered, we know that the supply of those fuels is finite, that the Earth is being tapped dry. According to Central Intelligence

Agency figures, the U.S. oil industry has been drilling more holes and deeper holes every year since 1970. Yet the "finding rate"—the number of barrels of oil discovered for each foot of drilling—has dropped steadily since 1970, from 37 barrels per foot ten years ago to 14 barrels per foot.

Vanishing Oil Reserves

Further, with the single exception of 1970—the year the Alaskan oil field at Prudhoe Bay was proved—additions to U.S. oil reserves have dropped in almost a straight line: from 2.5 billion barrels in 1960 to 1.5 billion in 1978. In the intervening years, except for Prudhoe, there have been minor blips up and down, but the prevailing tendency is clear: the amount of new oil and gas in the much-drilled U.S.—despite an increase in total drilling—is tapering off. We are sucking harder on the straws we stick into our ground . . . but we seem to be coming up with less and less.

It is virtually impossible to discuss any environmental issue these days without encountering an energy problem in some form or other. In the last few months the issues I've had to deal with included State Implementation Plans for clean air—the vast majority of which involve methods to reduce emissions from automobile exhausts; standards for emissions from new factories burning coal; and rules for the restoration of land after strip-mining. In the offing, as we search for new sources of energy, is the problem of balancing oil-shale development against the need for agricultural water. Further ahead of us, we can see other potential conflicts between environmental necessities and energy practices, such as the build-up of carbon dioxide in the atmosphere and the already troublesome problem of acid rain.

And there is no question in my mind that—in view of continuing inflation, the constant erosion of the dollar, and the prospect of repeated price-increases from the OPEC countries—energy development is *the* dominant issue facing the country. Not only our own economic well-being but that of future generations of Americans depends upon the success of our efforts to achieve energy self-reliance—and conservation must necessarily play a paramount role in this.

Global Protection

When I speak of conservation, it, of course, is in a broader sense than simply making a gallon of gas go further. There is a growing recognition among all nations of the

need to reverse the environmental damage being done to the natural systems of this planet, and to preserve their healthy functioning. If we do not practice conservation in its widest applications to protect these systems, then the price of oil and gold and every other commodity will become irrelevant, for our every existence will be at stake.

Environmental damage is of course not new. Over the course of human history, the gradual destruction of common property by the pressures of over-use has been a familiar story.

Before the Industrial Revolution, the phenomenon typically involved land. A village would set aside a pasture for grazing. As long as the number of sheep or cattle were limited, the pasture would serve all of its users well. If the numbers grew, however, eventually the land's capacity would be surpassed. The grasses would be consumed or killed, the land would erode—and a resource that had once been of tremendous value to many villagers would be rendered useless to all.

With the coming of a technology-based way of life, we had to extend the concept of the commons.

Resources like clean air and water—once so plentiful they were simply taken for granted—began to deteriorate under the pressures of technological advance and population growth.

Cumulative Damage

Yet the same basic reality that underlay the destruction of the village pasture still applied: No one individual could be blamed. A single automobile emits very small quantities of air pollutants—but when millions of citizens have individually decided to purchase automobiles, the cumulative effect is to create dangerous levels of pollution.

In recent years, we have been obliged to extend the concept of the commons still further. Increasingly we have begun to see the entire planet as a common property—and one that is seriously threatened by the cumulative impact of actions by individual nations.

A decade ago, the international contours of the pollution problem were just beginning to come into focus. Since then, the continued buildup of environmental contaminants—combined with advances in our scientific knowledge—have cast the nature of the threats to our global commons in much sharper relief. Thus, for example:

- A scientific consensus is now emerging that a doubling of fossil-fuel combustion will increase carbon dioxide levels in the atmosphere enough to raise global temperatures by 2 to 3 degrees centigrade. We also know that a doubling in fossil-fuel use is likely sometime fairly early in the next century. What we do *not* know is how a two to three-degree change would affect patterns of rainfall, wind, and seasonal temperature in particular parts of the globe.
- A study by the United States' National Academy of Sciences suggests that the potential for damage to the stratospheric ozone layer by chlorofluorocarbon emissions may be much greater than previously suspected. The study found that if emissions continue at the current rate, ozone levels could be reduced more than 16 percent by the middle of the next century—which in turn could increase the worldwide incidence of skin cancer as much as 65 percent. If emissions rise by 7 percent between now and the year 2000, more than half the ozone in the stratosphere could eventually be eliminated.
- And finally, of course, we are beginning to understand the dimensions of the harm being done to our lakes, plant life, soils, and structures by acid rain—an understanding that has led the Economic Commission for Europe to make acid rain and the long-range transport of air pollution its first order of environmental business.

Such environmental concerns—taken together with many others that I might have cited—confront us with a challenge that is without historical precedent. We must, somehow, find the means to carry international cooperation to a new plane. We must learn to act quickly and forcefully on matters where action by a single country—or even a handful of countries—will not be sufficient to protect our global commons.

A decade ago, the idea that a group of nations—with clear differences of interest and ideology—could unite to protect the environment would have seemed doubtful at best. Indeed, many would have said it was impossible.

Yet we have made a significant start. And that should be a source of pride for us all.

Even so, the question remains, are we acting rapidly enough?

We humans share a myopia, a common defect of vision. We look back on the four million years of our existence, and we conclude that—in spite of disaster, in spite of thoughtless or deliberate folly—life will go on. The long history of our species com-

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Preserving A Colonial Discovery

By John Vetter and
Richard Coleates

The surveying teams had completed their work, the engineers had designed the plant, and the massive eight-foot diameter concrete pipes were ready for installation into the ground. But what planners had not realized was that just three feet below the ground in the pipe corridor along the Raritan River in central New Jersey near New Brunswick were the well-preserved remains of a flourishing commercial settlement dating from the 1700's.

The Middlesex County Sewerage Authority, aided by a construction grant from EPA, was installing new facilities to

allow the secondary treatment of sewage collected from around the county. This was not the first time EPA has run into such a problem. In carrying out its mission to conserve and upgrade water quality, the Agency often finds itself in potentially conflicting situations with respect to preserving the integrity of other environmental values. The very nature of waste water treatment systems requires that workers

The conservator in the foreground is exposing foundation stones excavated during study of the historical port of Raritan Landing.



must disturb the land to lay miles of pipe. Ecologists then examine the short and long-range impact of this construction on land and aquatic environments.

But the endangered areas along the Raritan were different. They were cultural remains usually studied by archaeologists and historians and were only recently given adequate legal protection from the impact of federally-sponsored projects. These artifacts of our past reveal the knowledge, lifeways, and aspirations of the early residents.

The importance and need for conservation of our environment is illustrated by the history of the repeated use by humanity of the same hospitable portions of our planet. Archaeological studies often have concluded that environmental features, such as water supply, fertile land, and transportation corridors, provide the basis for successive occupations of an area. As a result, we find that land areas we value now were also used by historic and prehistoric occupants.

Raritan Landing

This pattern of land use is exactly the situation that confronted present day planners in Johnson Park along the Raritan River. Research carried out in the 1920's and 1930's by Cornelius Vermule, a Rutgers University geologist and cartographer, had produced a series of map reconstructions that noted the importance of a colonial and revolutionary period port community, Raritan Landing, at this location. This regional trade center flourished between 1720 and 1830 and led to the erection of two clusters of warehouses and other commercial buildings. One grouping was located on the river at the south end of Landing Lane; the other was located back from the river at the intersection of River Road (running parallel to the Raritan) and Landing Lane. As the settlement grew in size and economic importance, the land between the two clusters was filled with additional buildings and residences. This is the way Vermule described the scene in 1924:

About the wharves and warehouses was great activity. They were loading four or five sloops every day with outgoing freight. Flat boats were still coming down the river, but down the Raritan Road came hundreds of great covered wagons drawn by from four to eight horses. Often wagons, waiting to be unloaded, stretched in a compact line one mile up the river road. On some days five hundred vehicles passed Bound Brook on the Raritan Road, the larger part of these being large covered wagons bound to or from the Landing or New Brunswick.

The community survived great periods of political and technological development

in the country. The center was able to come back after the widespread burning and looting during the Revolutionary War. It was also able to continue functioning productively after the opening of the Delaware and Raritan Canal, but ultimately fell victim to the needs of the steamboats and the freedom of the railroads.

The archaeological site containing the remains of all this activity was, during the years after abandonment, slowly covered over by flood-deposited silts and more recently by landfill. This material obscured the presence of the site to an initial archaeological team and at the same time acted to preserve many of the materials as if they were in a time capsule. Thus, over 200 years later in 1978, unknown to the project directors, the pipeline construction was about to damage the Landing area.

However, the New Jersey State Historic Preservation Officer reported to EPA that an archaeological survey by the New Jersey Department of Transportation had located underground cultural materials near the proposed pipeline. EPA was required by the National Environmental Policy Act, Executive Order 11593, and the procedures of the Advisory Council on Historic Preservation to conduct additional investigation and evaluation before construction.

Subsurface Testing

During the winter of 1978, Dr. Joel Grossman of the Rutgers Archaeological Survey Office, Cook College, Rutgers University, was therefore retained by the Middlesex County Sewage Authority community to carry out subsurface testing along the line of the proposed pipe. The heavy fill and frozen ground conditions required unusual excavation procedures. A backhoe was brought in to strip off the shale overburden and expose, after many years, a small section of one of the Landing Lane's warehouse building foundation walls.

Deposited within the remains of the walls was a rich collection of artifacts dating from the era of occupation—metal, well-preserved organic material such as bone and fiber, ceramics, and two coins dating from 1753 and 1788. Here was the hard evidence that together with the recently discovered maps from Vermule provided the necessary information to assess the significance of the site. After consulting with the New Jersey State Historic Preservation Officer, EPA contacted the Heritage Conservation and Recreation Service of the Department of the Interior and asked if the site could be included as the Landing Lane Archeological District in the National Register of Historic Places. On March 29, 1978 it was determined eligible, and in response to a request from EPA, the Middlesex County Sewage Authority halted all construction work on

this small portion of the \$100 million sewer project.

Alternatives Planning

Since these historic materials were in the path of a much-needed water quality improvement system, officials examined alternatives to the existing plan to minimize the potential impact to the site. Very little leeway existed, however, due to the large size of the pipe and the relatively small corridor of land located between the Raritan River and the rock outcrops of the first terrace above the floodplain. Further research suggested the possibility of a gap in the line of commercial and residential buildings that once ran parallel to Landing Lane, but this hope soon faded. Planners then considered another approach. Earlier a small sewer line installed in the 1950's had disturbed part of the site. Why not, using a complex box culvert construction system, use as much of this original trench as possible in installing the new pipe? This would require only about 10 feet added to the original trench width but would cost approximately \$600,000 more.

Radar Research

At this time it became apparent that more accurate information was needed about the distribution and concentration of the historic remains. Because of the size of the area it was impossible to conduct additional test excavations. In fact, the testing itself could well have had a major adverse impact on the archaeological district. Instead, Dr. Grossman suggested the use of a ground penetrating radar system. The results of this survey might help to select the most satisfactory corridor for crossing the site.

The use of subsurface radar in archaeology was quite new and often generated as many questions as it did answers. But its potential to "look under the ground" was tremendous and might allow quicker and more thorough evaluations of buried features.

The system uses these major components: a radar antenna; a radar electronics unit; a mobile memory bank; a highspeed tape system; and a graphic recorder. During the survey the antenna is moved along the ground according to a premarked grid system. The equipment generates a series of brief pulses (a few billionths of a second) which are transmitted downward as a radiated signal with a wavelength of approximately 300 megahertz. As the signals are reflected by the material underground—much as light beams are reflected—they are stored in the memory bank and on tape to be printed later as a graphic readout. The radar operates some-

Continued on page 1



Protecting Clean Air In National Parks

Back in 1967 when a labor strike shut down copper smelters in several States in the Southwestern United States for nine months, scientists noticed an atmospheric phenomenon: visibility increased markedly at a number of scenic locations and sulfur oxide concentrations showed a sharp drop.

Not only did the decrease in sulfates occur near the idle copper smelters, but they dropped some 60 percent at Grand Canyon and Mesa Verde National Parks, which are located between 200 and 300 miles from the main smelter area in Southeast Arizona.

Sulfur oxides are produced in metal processing, fuel combustion, and chemical plants. This pollutant can cut down light from the sun, limit visibility, and in combination with moisture and oxygen can attack plants, iron and steel structures, and even dissolve marble.

EPA is now moving to protect the scenic beauty of more than 29 million acres of national parks and wilderness areas from encroaching air pollution.

"For most Americans, scenic beauty is an important reason for visiting our Nation's precious park and wilderness regions, yet increasing air pollution is endangering these vistas," declared EPA Administrator Douglas M. Costle in announcing the action. "Visibility impairment is usually seen as atmospheric discoloration, smokestack plumes, or a haze that reduces the clarity and detail of surrounding landscapes. EPA is now preparing regulations aimed at reducing causes of visibility reduction, such as urban smog and other industrial pollution, that can mar natural beauty. Our rules will protect nearly 45,000 square miles of essentially pristine areas in 37 States and territories."

EPA has published a final list of 156 mandatory visibility protection areas, and an Advance Notice of Proposed Rulemaking discussing key parts of the regulations now being developed. The final regulations will serve as guidelines for the States in developing their own laws, since EPA intends that visibility protection be a State-run program.

The Clean Air Act names 28 major industries that will be subject to visibility regulation if their emissions can reasonably be expected to impair visibility in these areas, although States will have flexibility

in drawing up their own rules. Existing pollution sources will have to install best available retrofit control technology, and new sources must, at a minimum, put on best available control technology.

In developing the regulations, EPA has been working with both the Department of Agriculture and the Department of Interior, including the National Park Service. The Park Service has begun monitoring for air quality and visibility with a number of instruments. The most important element of the monitoring strategy, according to Barbara Brown, Chief of the NPS Air Quality Program, is establishment of a visibility monitoring network, primarily in pristine Class I areas in western States that could be affected by energy development. EPA's Environmental Monitoring and Support Laboratory in Las Vegas is participating in the work with the Park Service, using telephotometers, a visibility measuring device.

When the 1977 Clean Air Act Amendments were debated in Congress, the air quality of National Parks, Wilderness Areas, and other unique and scenic preserves was the subject of major concern. Witnesses at hearings reported deteriorated visibility in some of the Nation's most cherished environmental treasures, including Grand Canyon and Bryce Canyon. Emissions from the Navajo Power Plant near Page, Ariz., for example, sometimes filled the Grand Canyon with a layer of haze that reduced visibility to less than 15 miles and obscured the opposite canyon rim.

After extensive study and hearings, Congress directed in the Amendments that air quality must remain virtually pristine in all international parks, National Wilderness Areas and National Memorial Parks larger than 5,000 acres, and all National Parks larger than 6,000 acres. In addition, the Amendments required EPA, after consulting with the Interior Department, to publish a list of these areas where visibility was important, and then issue regulations preventing and remedying the impairment of visibility in these locations.

Visibility degradation is one of the few effects of air pollution that is well-understood and can be measured directly with instruments. Because visual air quality is sensitive to very small concentrations of pollutants in the form of fine particles, the question of stringent controls and planning to meet the visibility protection require-

ments of the Clean Air Act has become the subject of widespread study by several Federal agencies.

The National Park Service has developed policy statements to preserve, protect, and enhance the public's enjoyment of the parks' air quality in cooperation with EPA's review of new pollution sources, its pollution control standards for coal-fired power plants, and its visibility program. The NPS is making use of documentary photos at 15 areas that have visibility impairment from specific industries or from urban pollution. The photos will be part of a future report to Congress.

The Park Service is also conducting a joint study with EPA to define at what level visibility impairment affects park visitors. The two agencies are using photographers, artists, behavioral psychologists, and voluntary participation in surveys by park visitors. The study focused on Canyonlands National Park last summer and will expand its research to other parks this year.

EPA also is working with the Park Service in a study of power plant plumes in the southwest and their impact on the environment. The study, known as Visibility Impairment due to Sulfur Transformation and Transport in the Atmosphere (VISTTA), is examining the impact of plumes on both local visibility and on regional haze. To date the study has focused on the Navajo Power Plant using visibility data from several parks in the vicinity.

Visibility impairment is generally caused by either plumes of air pollution or general haze. The naked eye frequently can trace the plume to a single source, such as a smokestack. Haze is a more widespread reduction in visibility and is caused by polluted air masses that can stretch hundreds of miles and hang over a landscape for a long time. Haze may discolor the air and degrade the scenic value of a landscape by causing objects to appear flattened and horizon sky whitened, so that textures and colors are no longer discernible.

Last November EPA published an Advanced Notice of Proposed Rulemaking for the protection of visibility. After a written comment period, EPA held public workshops in Denver, Colo., Seattle, Wash., and Salem, Ore., to help inform the public on the visibility regulation issues and to solicit comments on the program. The actual regulations are expected to be issued later this year. □

Riders look down into the Grand Canyon from the Bright Angel Trail.

Saving Historic Treasures

By Richard Livingston

The Environmental Protection Agency is working with Greece to protect the ancient buildings and statues on the Acropolis, the most visible symbols of that country's contribution to Western civilization.

The request was made by Dr. George Dontas, Curator of the Acropolis, in October, 1978. At that time, workers were already beginning to dismantle the Erechtheion, one of the ancient temples, in order to move indoors the famous sculptures of maidens, known as the Caryatids.

These had been so severely attacked by air pollution that it was feared they would completely lose their features if they remained outdoors on the Acropolis any longer. At the same time, the inhabitants of Athens were feeling the economic effects of recent legislation which had banned the use of high-sulfur heating oil and required the use of costlier low-sulfur fuel, as part of a national plan to protect the monuments.

The Greek request for cooperation was made to EPA Administrator Douglas Costle when he visited the Acropolis while reviewing environmental problems in Greece.

Partly as a result of Dr. Dontas's request, EPA proposed on May 4, 1979, that the problem of erosion by air pollution on works of art made of stone and other building materials be studied by NATO's Committee on the Challenges of Modern Society (CCMS). This request for a pilot study recognized that much of the research on the problem had been conducted in Europe. The member nations of CCMS responded with strong support for this proposal.

The damage to Greek treasures dramatizes a long-standing air pollution problem. Although stone appears impervious to

attack, in reality air pollution can dissolve it at an alarming rate. This usually occurs when acid rain or sulfur oxides react with stone containing calcium carbonate. The reaction leaves a surface layer of calcium sulfate, or gypsum, which is mechanically weak and readily blown away by wind or washed off by rain. This exposes a fresh layer of calcium carbonate to be attacked and the process continues.

Marble and limestone, being essentially pure calcium carbonate, are quite vulnerable, but the effect also takes place with other materials. Some sandstones are composed of grains of quartz, cemented together by calcium carbonate. Thus although the quartz resists attack, the binder can be dissolved, and the stone will crumble. Even some granites can be affected because the feldspar particles they contain are soluble in acid. This is also true for such composites as concrete. Bricks may be less directly vulnerable, but the mortar, which contains lime, will deteriorate.

Although some weathering due to natural causes has always occurred, the process has been greatly accelerated in the last century by industrialization. Old photographs show that ancient statues in excellent condition 100 years ago are now essentially featureless. However, many aspects of the deterioration process remain unclear. Stone varies widely in its ability to resist attack, depending upon its chemical composition, mineralogical nature, and the presence of trace elements.

Up to now, the primary defense against such attack has been the application of some type of clear, plastic-type coating to the stone, such as methacrylates or epoxies, to act as a shield. However, the results have ranged from ineffective to disastrous. All organic materials will deteriorate over time, so that after a few years a clear coating will often degrade and lose its effectiveness. In other cases, the coating, by creating an impervious surface layer, traps salts and moisture in the stone. The resulting stresses may cause the treated surface of the stone to break away from the underlying structure. Finally, some coatings have actually accelerated attack by participating in the sulfur oxide-stone reactions.

Consequently, many art conservators feel that the only safe and available methods to deal with the problem are either to reduce the sources of air pollution, or to remove the works of art to indoor locations. Either strategy is expensive, so that all factors involved must be clearly known before a decision can be made.

Greece is leading the CCMS study of this pollution problem, with strong participation from France, Germany, the Netherlands, and the U.S. Several activities are already underway. France is leading work on a data base which will identify and

document case histories of different treatments of stone. Germany has developed a simple monitoring device for use in assessing the effect of a given environment on stone. Several will be constructed and deployed in a network around Europe to evaluate the effectiveness of this type of monitoring.

In addition, a set of special, uniform stones will be developed which can be exchanged among countries as a means of standardizing experiments related to the stone deterioration. Finally, the Netherlands will prepare a set of specifications for testing treatment techniques. The U.S. is participating actively in all these projects.

The U.S. has responded by organizing its own national program. Several agencies are involved including EPA, the Department of the Interior, the Smithsonian Institution, the Department of Transportation, the General Services Administration (GSA), and others.

EPA is working on several projects. Under the Acid Rain Program, a grant has been awarded to the Institute of Fine Arts at New York University to measure the deterioration of marble tombstones in National Cemeteries across the country. There are over 100 National Cemeteries, some of which have been in existence since the Civil War. Because the tombstones have been cut to rigid specifications and come from only three quarries, they constitute an excellent set of exposure samples. The NYU team will conduct statistical analyses to attempt to find correlations between deterioration and a number of factors, including air pollution and climate.

Personnel from EPA's Region 2 Surveillance and Analysis Laboratory at Edison, N.J., will be working with GSA, which has offered the Bowling Green Custom House in New York City as a prototype for the documentation of the conservation of stone buildings. Air pollution monitors will be set up at the Custom House to gain more insight on how the deterioration occurs.

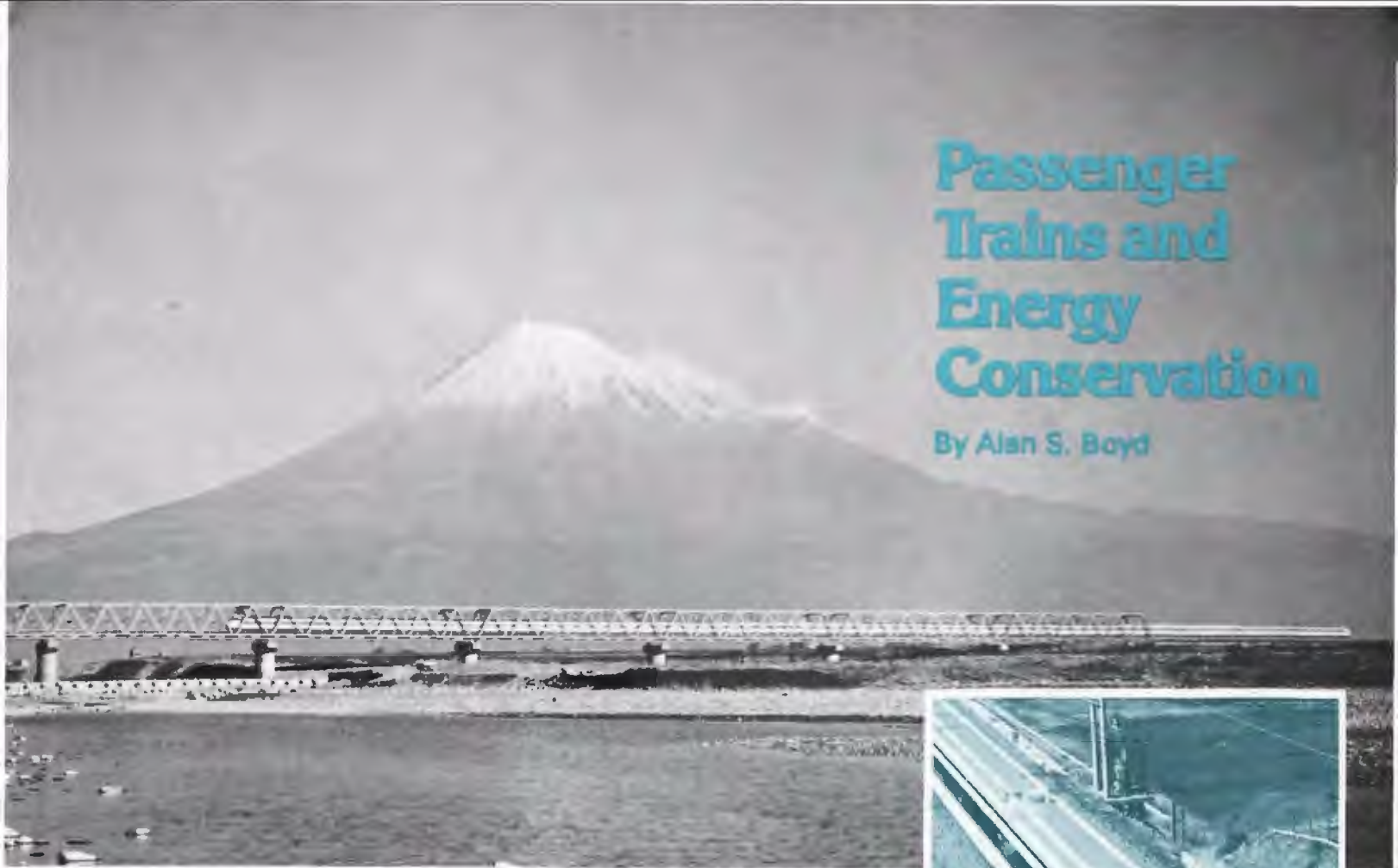
The project will also take advantage of experiments sponsored by EPA's Industrial Environmental Research Laboratory which are designed to identify the most suitable limestones for flue gas desulfurization scrubbers. This study will examine the reactivity of more than one hundred different limestones with sulfur dioxide. Since this reaction forms the basis of stone decay, the study will help to identify which intrinsic factors are most important in determining a stone's resistance to attack.

EPA's primary concern has been the protection of human health from pollution. However, the Agency also is aware that not just people but trees, animals, and even stones must also be protected if we are to preserve our quality of life. □

Richard Livingston is Acting US NATO/CCMS Coordinator.

Passenger Trains and Energy Conservation

By Alan S. Boyd



Trains on the Shinkansen high speed line in Japan hurtle past Mt. Fuji at speeds up to 100 mph.

The future of rail passenger service in this country and in the world has emerged as a major transportation issue, since we are being literally forced to take a new look at the role of the automobile in our society in the light of energy developments. Having done so, I would like to present a case for rail passenger service.

More people are turning to rail passenger travel than at any time in the past decade. There are several reasons for this swing and the most obvious one is that since Energy Crunch II, the cost of gasoline has been an important factor in any automobile travel.

Transportation dominates the energy situation. Transportation uses about 25 percent of the gross national energy consumption and it consumes more than half of our petroleum stock. Almost all (96 percent) of the movement of people and goods runs on liquid petroleum fuel. And when these broad totals are further analyzed, we find that the automobile is really at the root of the big problem. The automobile consumes more than fifty percent of all the petroleum consumed by transportation. It follows then, that any reasonable transition from the consumption of petroleum by automobiles to more efficient means of travel will pay big dividends in the long run. Let me give a specific example of what I mean about saving crude oil.

I recently visited Japan where I observed the operation of the Shinkansen High Speed

Corridor passenger trains. This single corridor, 663 miles through a population area much like our own Northeast Corridor, carried 124 million passengers in 1977 in electrically-powered trains which consumed the equivalent of 4.4 million barrels of crude oil. If those passengers had traveled by automobile in average numbers in average cars, they would have consumed 20.6 million barrels of gasoline. Since gasoline is a highly refined distillate of crude oil, these 20.6 million barrels required the refining of 46 million barrels of crude oil. In other words, this one set of trains on one corridor saved the Japanese government 40 million barrels of crude oil in one year. As this example demonstrates, the passenger train can be many times more fuel efficient than the automobile, and it is much safer.

As soon as we begin to draw comparisons with the Shinkansen system, we begin to see the significant differences which exist between that system and ours. We do not have the equipment. We do not have the speed. We do not have the frequency. We do not have an industry turning out the latest state-of-the-art rolling stock. And perhaps the most important asset of all, we do not have the right-of-way, the all-new roadbed, and the skillfully designed track which is the true hallmark of superior rail passenger service. Let's look at some of these fundamentals.

First of all, we must do everything possible to upgrade what we do have, and we

do have some valuable assets. I have created a Passenger Services Department in Amtrak and we are doing everything possible to provide better service with our current fleet. I have likewise put considerable emphasis on maintenance. We are already beginning to see improvements in both of these important areas.

Next, we have got to concentrate on upgrading our rolling stock. More than one-half of our fleet of revenue passenger cars is very old. These cars are unreliable; we can't get spare parts for them and they cost far too much to maintain for the amount of service we get from them. We must complete the modernization of our fleet—not just for the passenger's benefit, but to reduce the flow of dollars through maintenance expenditures.

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The Long Tidal River

By Chris Perham

"In the summer of 1976 we started running canoe trips on the Connecticut for local officials, the public, and members of the press. After the outings it would take two and a half hours of scrubbing with steel wool and cleanser to get the goo—oily residue—off the bottoms of the canoes. This past summer the canoes came out of the water clean and the river was clear enough to see the tip of your fully submerged paddle."

*Terry Blunt, Executive Director,
Connecticut River Watershed Council, Inc.*

Some have called it the world's most beautifully landscaped cesspool. Certainly three hundred years of use and abuse by people have left their mark on the Connecticut River. But after three decades of cleanup activity by Federal, State, and local agencies, water quality is improving along much of the river.

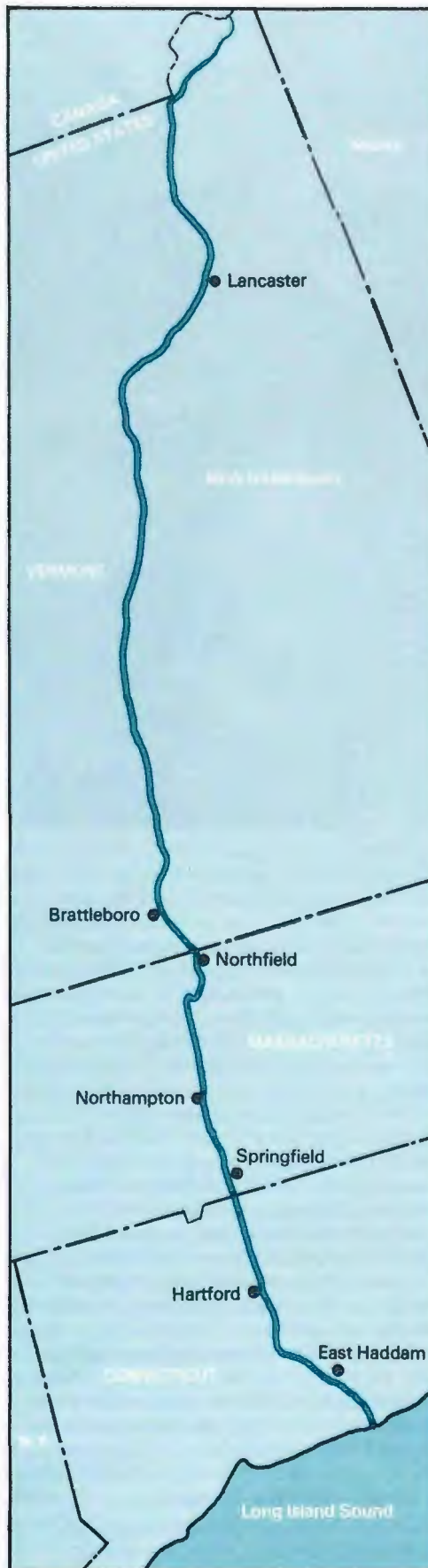
This river, called the Quinnehtikut or 'Long Tidal River' by local Indians, has served as highway, playground, food source, dynamo, sewer, and valuable natural resource for much of New England. It has been dammed, diverted, heated, and dirtied. The renewal of the river is the result of cooperation by industry, municipalities, and the government under the Federal Clean Water Act.

When Adriaen Block discovered the Connecticut in 1614 he named it the "Freshe Water Rivers" and claimed it for the Netherlands. While parts of the river have not been "freshe" for decades, the Connecticut River is recovering and EPA scientists say it can be reclaimed for people to enjoy.

Says EPA Assistant Administrator for Water and Waste Management, Chris Beck:

"Having served at various times and in many capacities as an environmental official in the Eastern United States, I've been able to carefully observe the plight of the Connecticut River from a unique perspective.

"Its environmental resurgence can be regarded as an object lesson for meeting the challenges inherent in our national clean-water goals. The story of the Connecticut River clearly demonstrates that clean water demands full cooperation among all levels of government. It demands recognition of the fact that water pollution springs from diversified sources, and therefore demands comprehensive, well-integrated answers. And most importantly,



it demands the involvement of a concerned public.

"With these ingredients, pipe-dreams become realities, cocktail party chatter becomes action. This is a dictum you might give some thought to, if you are ever lucky enough to spend an afternoon boating or fishing on the Connecticut."

EPA Region 1 Administrator William R. Adams reports, "Progress on the Connecticut has been slow and steady, not as dramatic as in the early days of the Agency. All the major industrial dischargers in the region have installed best practicable control technology or are on enforceable schedules to do so. Municipalities do not have an impressive compliance record but we will continue to make grants to municipalities for sewage treatment facilities and as those currently under construction come on line, we will be seeing more and more improvement to our region's waterways."

Compare this to the Federal assessment in 1951, when the Public Health Service reported that any benefits gained by sewage treatment were obscured by other pollution sources. Only 87 treatment facilities were operating on the Connecticut for 567 significant sources of pollution, and 27 of the plants were inadequate. The report stated, "None of the regulatory agencies responsible for water pollution control has sufficient funds to effectively administer a definitive pollution abatement program."

Help From Many Sources

The negative assessment did not pass unnoticed. In 1952 concerned businessmen and conservationists banded together to form the Connecticut River Watershed Council, a conservation organization with headquarters in Easthampton, Mass., dedicated "to assure the wise use of the land and water resources of the valley." The Council has been involved in cleanup and protection of the Connecticut River and has worked with regional planners, State engineers, and Federal commissions as well as local conservationists to forestall threats to the river and expedite pollution control.

Help for the embattled Connecticut was making its way through the bureaucracies at the National and State level. Another conference on the status of the river was held in 1963. At that time Senator Abraham Ribicoff of Connecticut said that the price of progress over three centuries had been the desecration of the river. He continued, "Stretches of this once proud river now bear as the official classification, 'Suitable for transportation of industrial wastes without nuisance, and for power, navigation, and for certain industrial uses'."

The headwaters of the Connecticut River are in northern New Hampshire.

A discussion of the esthetic considerations of water pollution in the conference proceedings included this description of the Connecticut: "Below Holyoke, before the sewage and other wastes are mixed with the full flow of the river, the visible effects of pollution are ever-changing. The fibers and fillers from paper plants impart a turbid appearance to the water at times. At other times various colors appear below the points where canals and sewers discharge, presumably caused by dyes used in colored papers. The raw sewage causes the dull slate grey appearance typical of sewage everywhere. Bits of human excreta and small grease balls float on the surface of the water, and streaks of oil film appear from time to time."

It was a terrible fate for the body of water that was a favorite haunt of Mark Twain during the years when he wrote *Life on the Mississippi* and *A Connecticut Yankee in King Arthur's Court*.

A 411-Mile Trip

The longest river in New England, the Connecticut rises in the Connecticut Lakes, four small bodies of water on the Canadian border, and cuts through four States, forming the border between Vermont and New Hampshire before wandering into Massachusetts and Connecticut on its 411-mile trip into Long Island Sound. The watershed of the Connecticut River basin drains a total area of more than 11,000 square miles, including some land in the Province of Quebec.

There are 23 principal tributaries to the river, which drops one-third of a mile in elevation from its source to the sea. Much of the riverbed is rocky and steep in the northern reaches with numerous rapids and falls. At 15-mile Falls near Barnet, Vt., the Connecticut drops 375 feet.

A rivulet at its headwaters, the river widens to some 5,000 feet near its mouth where it discharges into the swamps and marshes of the Connecticut Estuary.

Christopher Percy, president of the Connecticut River Watershed Council, says, "The river has an extraordinary ability to cleanse itself naturally, if it's not getting constant slugs of pollution. Some parts are quite clean and you can see the results in the wildlife. Osprey are returning. At the base of the river fish are returning. We have striped bass, blue crab, and oysters flourishing."

The Salmon 'Miracle'

While acknowledging that it is vastly improved in quality over recent years, EPA scientists emphasize pollution control efforts on the Connecticut are far from completed. In pre-colonial days the Indians living along its valley held religious ceremonies to bless the salmon and ensure



Scientists at the Connecticut Department of Environmental Protection strip the eggs from a female Atlantic salmon. The salmon is one of 59 captured in the Connecticut River in 1979 as part of a 13-year restoration program. The fertilized eggs will be cultured into fish in pools located near the river to encourage the adult fish to return to the river to spawn.

their return the following year. They saw the annual salmon runs as mystical events. When the first Atlantic salmon returned to the Connecticut River in the mid-1970's after an absence of nearly 175 years, the event was hailed by many as nearly mystical, a sign that the much-maligned river had been saved. That may not be the case, yet.

EPA officials in the Agency's Boston office who monitor the river closely, also see the returning salmon as a sort of miracle, but for different reasons. "You could say it's a miracle that those fish made it up the river alive," quipped Dick Kotelly, Deputy Director of the Water Division in Region 1. "Some sections of the river, especially in the central stretch, are still very polluted."

Getting and keeping pollution out of the river have been a prime concern of EPA for the last decade. In some respects there has been remarkable progress, considering the history of the river.

A Work-Horse River

The Connecticut has provided power and wash-water for industry since the mid-1700's. In the earliest days, grist mills, sawmills, and tanneries lined its banks. Soon textile mills followed, with pulp and

paper factories, and munitions manufacturing. Now food and allied commodities, furniture, metal fabrication, stone and glass works, chemicals, and leather all rely on the Connecticut for part of their production process.

Enforcement personnel in Region 1 say the major industrial pollution problems are under control. There are no industries on the severe priority list of the basin plan prepared for the Connecticut River. This is a major achievement, given the wide range of industry found in the valley. The plan, required by Section 303 of the Clean Water Act, sets up procedures to manage water quality in the area drained by a river and its tributaries. It lists the type and amount of pollutants found in the water and sets limits on discharges. States also use basin plans to set priorities for building wastewater treatment plants.

Some manufacturers along the Connecticut have installed their own treatment

facilities. A larger number of companies are using local municipal wastewater treatment plants to clean their discharges. In some cases the industries are waiting for sewage plants to come on line so that they can hook into the system. For example, the canals of Holyoke, Mass., have been a dumping ground for industrial wastes since the 1800's. When the city's secondary wastewater treatment plant is completed in 1981, the sewage and other wastes will be routed there and this source of pollution to the Connecticut River will be eliminated.

A Dirty Lower Stretch

The biggest problems on the Connecticut River now and for the next decade, according to Agency staff, stem from the cities that line the river from southern Massachusetts into the tidewater area of Connecticut. The Connecticut River is quite clean above the Holyoke Dam, states a 1979 report by the New England Interstate Water Pollution Control Commission. The Commission notes that above the dam the river is at or near Class B standards: suitable for bathing, recreation, and irrigation, and offering good fish habitat. There are some coliform bacteria violations in the upper reaches of the river because of sewage discharges into tributaries. However, the impact of these discharges is absorbed by dilution in the mainstream and the self-cleansing action of the river.

Below the Holyoke Dam the river continues to receive waste loads from combined sewers, storm drains, and partially treated domestic sewage. The Commission notes that below Holyoke, Mass., the Connecticut River is grossly polluted and violates most of the criteria for even Class C waters. According to the Commission, Class C waters are suitable for boating, industrial uses, and irrigation of crops not used for consumption without cooking. In this stretch of the river pour discharges from the Holyoke and Chicopee combined sewers and treatment plants, as well as a number of industrial sources. The Chicopee River contributes chemical and organic wastes, nutrients, coliform bacteria, and treated effluents with low amounts of dissolved oxygen. Next the river receives wastes from combined sewers and treatment plants in Springfield, in addition to hot water from a power plant.

Before the river can recover from the low levels of dissolved oxygen, floating solids, and oils, it hits the populated areas of Connecticut. There the river absorbs the industrial effluents and the combined sewer overflows of Enfield, Hartford, Portland, and Middletown. The tributaries that enter the river in this stretch are also soiled. They carry industrial wastes, sewage treatment effluent, and, in the case of the Park River, the contents of 57 combined sewer overflow outlets.

Of all the problems facing the Connecticut River, the combined sewer overflows concern EPA officials the most. Deputy Director Kotelly says, "We've come a long way in getting communities to implement secondary treatment. The next major step is dealing with the combined sewer overflows. It's expensive but well worth the effort."

Outdated Sewers

Most of the 22 communities in the problem stretch of the river have built or are building plants for secondary treatment of sewage wastes, chlorination of sewage effluent, and biological treatment of sludge. But many of the cities are older and have outdated combined sewage collection systems. Combined sewers collect and carry both domestic sewage and stormwater. The systems generally cause no problems in fair weather. However, after a heavy downpour or extended period of rain, flows exceed the capacity of the sewers and the local treatment plant. The overflow from the combined sewers then discharges directly into the river. When this happens, sewage, litter, sediment, and urban street runoff containing metals, toxics, gas, and oil contaminate the water in the Connecticut River.

Says Kotelly, "Every time it rains, river water quality drops. In summer the sewage sitting in the pipes becomes anaerobic (where bacteria grow without oxygen) and concentrated. With the first rainfall these septic materials are swept into the river and then the dissolved oxygen level plummets."

The problem cannot be solved easily. Some municipalities have multiple overflow outlets scattered over a wide area. The cost of treating wastes at each of these sites would be astronomical. One solution would be a separate system to hook up combined sewer outflow pipes to their own treatment center, also an expensive alternative.

Because of the established nature of the communities, any change in sewer collection would mean tearing up streets to replace old construction—a solution that is both costly and inconvenient. Some cities, like Hartford, are attempting to replace combined sewers a little at a time during other activities such as road repair to minimize cost and disruption, but that solution is very slow.

EPA officials note that since the passage of the Clean Water Act in 1972, the Federal Government has spent over \$300 million in the States bordering the Connecticut River for sewage treatment construction grants. They estimate that it could cost twice as much again to complete the clean-up of the river from Holyoke to Haddam and take as long as ten years to implement

due to the pollution added by combined sewers.

The Loss of Free Flow

The health of the Connecticut is complicated further by the number of dams that people have built across the river and its tributaries for power and flood control. The first dam on the main-stem was a 16-foot structure built at Turner's Falls, Mass., in 1798, which blocked the returning salmon from their spawning grounds and led to their decline and disappearance from the river.

Historically New England has made intensive use of its hydropower resources, and the Connecticut River was well-suited to the task. There are 16 dams across the main stem of the river, all hydropower structures. Additional flood-control structures span tributaries. Because of these dams many now see the Connecticut River as a series of pools rather than a unified ecosystem, and the river's once-powerful ability to renew itself is impaired by the loss of free flow.

The dams have had other adverse effects on river basin ecology. They act as barriers to solids; sludges and sediment accumulate and use up available oxygen content in the water. The color, turbidity, chemical make-up, and temperature of water in the impoundments may be affected also, according to Agency experts.

In the months when the flow of the river is naturally low, water quality can suffer further because of the variations in power generation. Some people claim sections of the river are at a standstill on weekends because the companies that use the water to make electricity are not operating and close the sluice gates on their dams.

At Northfield Mountain, Massachusetts, a power company has built a conduit that funnels millions of gallons of water from the Connecticut River to a reservoir at the top of the mountain during off-peak hours. At other times, when power demand is heavier, the water is released to produce electricity. The project was very controversial in the early 1970's when some said that the pumps would actually reverse the flow of the river for several miles during summer months. Conservationists maintain that the flushing action of the facility now causes severe erosion along parts of the riverbed.

Water For Boston?

The storage facility opened the door to another threat to the Connecticut. The thirsty city of Boston, looking for another source of drinking water, has proposed tapping the Connecticut River. The Metropolitan District Commission, which serves 34 communities in the metropolitan Boston area, wants to make up its drinking water shortfall by drawing off 375 millions gallons a

day from the river during the 70-80 days annually when it is at flood stage. The water would be pumped into the Northeast Utilities Company reservoir at Northfield Mountain and carried through a tunnel almost 10 miles to the existing Quabbin Reservoir, which serves Boston now.

The proposal is a matter of deep concern to environmentalists and residents of the Connecticut Valley towns below the intake, who say that the State has no right to make a decision that will affect their environment without first consulting them. Work on the project is halted at the present while the Metropolitan District Commission develops an Environmental Impact Study, expected to be completed in 1981, with oversight by the Northfield Citizens Advisory Committee.

The New England River Basins Commission, which originally supported the diversion if combined with a water conservation program for the city of Boston, has changed its position and now opposes the project, except as a solution of last resort. The Connecticut River Watershed Council also opposes the diversion. Says Executive Director Terry Blunt, "We're worried about contamination of the reservoir, among many other things. The Swift River watershed, which supplies the water now, is very pure. Water from the Connecticut could lower the quality of the Quabbin Reservoir by bringing in pollutants."

The district office of the Army Corps of Engineers, which was involved in the diversion, had said that the amount of water to be taken from the Connecticut would be inconsequential, reducing the flood-stage flow of the river by about an inch at Montague City (Mass.). Some environmentalists maintain that this is misleading because an inch of water at flood stage has an exponential effect as it fans out over the wide, flat flood-plain, and loss of the water could have tremendous effect.

Further, adds Blunt, "Once all the mechanisms for diversion are in place, we have no guarantee that the Metropolitan District Commission, through legislation, won't try to expand the amount of time for diverting the flow."

Last December the Corps withdrew support for the diversion plan, citing a lack of local interest and disagreement by Massachusetts and Connecticut as key reasons. The decision makes the Metropolitan District Commission ineligible for Federal funds to implement or to continue studying the diversion project; any future actions must be supported entirely with State funds.

The diversion question is turning into a classic struggle between the populous eastern half of Massachusetts and the more rural western part of the State. None of the towns along the Connecticut draw their drinking water from the river at present.

Many use wells, and those that rely on surface water have reservoirs upstream on the various tributaries of the river. But as groundwater contamination becomes a bigger threat across New England, especially as a result of winter road-salting activities, there is a growing concern that at some point people might have to resort to the river for their water.

Dams Opposed

With all the concern about maintaining water levels in the river, it may seem ironic to turn to the question of flood protection, but periodically heavy rains and snowmelt contribute to flooding along the Connecticut. In the 1930's two major floods caused many deaths and over \$100 million worth of damage. Floods continue to be a matter of concern to Valley residents.

After the disaster in the 1930's Congress designated the Army Corps of Engineers to set a plan that would minimize flood damage potential. The approved plan called for 20 dams on tributaries of the Connecticut, of which 16 have been built, along with dikes and other flood control projects at a cost of \$300 million. While the authorization to build the remaining dams still exists, many people are no longer enthusiastic about dam-building and alternative measures are being considered.

The New England River Basins Commission made a study of flood plain management options in the Connecticut Valley. The Commission's report, entitled *The River's Reach*, outlines a flood protection program that includes non-structural solutions. Says Jamie Smith of NERBC, "Dams keep the water away from people, our aim is also to keep people away from the water."

These alternatives include discouraging location of businesses and homes in the floodplain, improving flood warning systems, government acquisition of open space, keeping land in agricultural

use, and preserving upstream natural flood storage, such as swamps and fields in the floodplain. These measures could also influence the health of the riverine ecosystem as well by keeping potentially harmful development out of close proximity with the river where it could adversely affect water quality.

The notion of land use planning does not win raves among independent Yankees, but many are giving serious thought to the future of the Connecticut Valley. Over the years, the river has had an effect on nearby land, mostly by default. Studies made by the State of Connecticut before 1950 noted the impact created by pollution. They found that it affected real estate values, and stated "a polluted waterway almost always results in a slum or substandard neighborhood."

The Cleansing Tides

At its mouth the Connecticut River runs fresh again. The river is wide and there is little development on its banks. The river has a chance to refresh itself with some help from the flushing action of the tides from Long Island Sound. People can swim at beaches in East Haddam, and the renewed interest in the river has encouraged the growth of small-scale river-based businesses like marinas. The Connecticut River Estuary Planning Agency attributes the improvement of river quality in that section to the influence of Connecticut's salt water marsh and inland wetlands acts, which restrict development in sensitive tidewater areas. The Agency also reports that two towns in the vicinity have issued standards for zoning that require a 50 foot setback from the river for septic systems, and preclude large industrial concerns from locating right on the river. Local residents note the pronounced difference between the lower reaches of the Connecticut and the nearby Thames, which is lined with heavy industry.

The Nature Conservancy, a conservation group that assists in the protection of sensitive ecosystems, recently has acquired Griswold Point, the sandy spit that stretches three-quarters of the way across the mouth of the Connecticut River. Griswold Point forms a barrier beach, blocking large ships from entering the river, and is one of the main reasons why there is no deep water port on the Connecticut River.

Further up the river protection of the land resource is localized and spotty according to Terry Blunt. "The number of people using the river is increasing due to water cleanup efforts and the results. That in itself is causing problems with litter and erosion." He continues, "Some land owners have sublet riverside parcels as small as 20 feet by 30 feet to motorized campers with ensuing damage to natural vegetation

The changes occurring on the Connecticut River are documented in "Return to the River," a recent film produced under the auspices of the Connecticut River Watershed Council. The documentary is a follow-up to the Council's 1965 film "The Long Tidal River," which depicted conditions on the river before comprehensive pollution control legislation was enacted. "Return to the River" is a 22-minute 16-mm. film available from the Council for a loan fee of \$15. For more information about leasing or purchasing copies of the film, write: Connecticut River Watershed Council, Inc., 125 Combs Road, Easthampton, Mass. 01027.



Sailing on the Connecticut near East Haddam.

and the riverbanks due to constant traffic and the installation of numerous docks. Some powerboat operators churn up the waters by gunning their engines, causing erosion on the banks and undermining trees."

The Federal Government has had little involvement in the protection of land in the Connecticut Valley. With the help of groups like the Nature Conservancy and the Connecticut River Watershed Council the natives have chosen, in typical Yankee fashion, to take care of their own.

In the early 1970's Senator Ribicoff proposed a 3-part Historic Riverway for the

Connecticut River. The park would have protected 23,500 acres at the mouth of the river, another parcel in the vicinity of Mount Holyoke, Mass., and lands in northern Vermont and New Hampshire near the source of the river. While Ribicoff's plan never was formally enacted, the lands at the mouth of the river have since achieved a protected status due to the Federal and State wetlands legislation.

Heading Off The Developers

In the Holyoke vicinity, much of the land that was proposed in Ribicoff's plan is now publicly owned. The Commonwealth of Massachusetts passed a \$3 million bond

issue to purchase over 4,000 acres of land in what is called the Holyoke Range, a string of mountains that runs perpendicular to the river in central Massachusetts.

With the help of a local advisory committee the State bought up as much land above the 400 foot elevation as possible without going into condemnation proceedings. Additional lands in lower elevations are being purchased or set aside from development with the help of the Watershed Council.

The Council has "saved" more than 4,500 acres strategically located in the

continued to inside back cover

Water Conservation: A National Priority

An Interview with Eckardt C. Beck, Assistant Administrator for Water and Waste Management

Q Since EPA's primary job is environmental protection, why are you concerned about water conservation?

A Conservation of resources, especially something as precious as water, is environmental protection. And it is increasingly apparent that the need for water conservation is a national problem.

There are several reasons for this. The growing U.S. population is placing stress on existing water reserves, as is our water-thirsty industrial base. Conservation not only reduces the volume of polluted water being discharged from our cities, but also reduces the size of sewage treatment plants required. It helps to extend the available dollars for environmental clean-up by deferring the need for construction of new treatment capacity. It reduces the mining of ground water, a very serious problem in some western desert regions. And of course it defers construction of future dams and reservoirs. So the whole philosophy of water conservation is a public acknowledgement of the true value of clean water as a national resource.

Q What is EPA doing to encourage water conservation?

A We are doing a number of things both in public education and in pricing and regulations. The Clean Water Act of 1977 and our present water policy emphasize water conservation. Also, the construction grant regulations for municipal wastewater treatment works require analysis of cost-effectiveness in flow reduction measures.

A facilities plan for such a plant must estimate those reductions in flow that can be achieved and will be cost effective at the time of operation as well as 10 and 20 years later. Municipalities must also consider installation of water meters, retrofit of toilet "dams" to reduce the volume of water used, and low-flow showers, and changes in plumbing and building codes to require water-saving devices in new homes and buildings.

Communities must also estimate energy as well as water savings. And finally, a community must develop and provide for carrying out the recommended cost-effective flow reduction program as part of its facility plan. Incidentally, 75 percent of this implementation is provided by Federal funding. These requirements apply to all construction grant applicants of more than 10,000 population where the average daily per capita consumption of water exceeds 70 gallons.

Q People in the southwestern U.S. understand the need to conserve water, but is it necessary in other areas with abundant rainfall?

A Definitely. What you have to bear in mind is that wasted water down your sink is water polluted unnecessarily, since it immediately mixes with sewage en route to a treatment plant. Water conservation reduces the volume of wastewater flows that need to be treated. This can help to reduce the size of a future treatment plant, cutting its cost and the amount of energy it consumes in operation.

So if by active and passive water conservation we can build smaller plants, we can make our limited funding go further—and thus protect more of our water resources.

Even in water-rich regions, population pressures are severely straining the carrying capacity of water bodies. Demand increases are resulting in expensive inter-basin transfers and new storage facilities. Treatment costs of wastewater as well as drinking water are inflating rapidly.

Q As former Administrator of EPA Region 2, which includes New York State, did you experience water shortages in this area?

A Yes. In some drought periods people even in Manhattan had to observe restrictions on washing cars and so on. Let me tell you a curious story from my own childhood. I grew up in Rockville Center, Long Island. When I was a little boy I used to take my sailboat out to a nice little pond that was Hempstead Lake State Park. When I came back to Rockville Center as Regional Administrator a few years ago I thought I'd make a tour of my old neighborhood. I drove by Hempstead Lake and it was dry. So I went to the Regional Office and told the people to find out what happened. I found out that they had sewered Rockville Center in the 20 years it had taken me to leave and come back. As a result they had lowered the groundwater level and thus dried up the park. I was absolutely dumbfounded. There was nothing but grass in a depression. That was a very graphic example of what was happening with regard to hydrologic changes. And this was in an area with around 42 inches of precipitation a year, roughly ten times what they get in some parts of Arizona.

Q Are there problems in other parts of New York State?

A Sure. One of the things considered for years has been a major set of diversion projects

and dams that would be way up in the Adirondacks hundreds of miles north of New York City, which would guarantee a secure water supply to different parts of the State.

The other thing is that during periods of drought there's a lot of hydroelectric power that needs to be supported. Thus you begin to get energy problems or have to go to more costly energy alternatives. Also you need water support during droughts for the canal systems in New York State. All of these things play off on each other and there are parts of the State where there can be substantial water resource problems.

Q Your anecdote about the drop in the ground water level in Long Island suggests this is another area of concern.

A Yes. Let me give you an example. In New England people depend not only on surface water but on groundwater, and in some areas it has become contaminated. This can be quite serious where a community is not hooked into a larger water supply network.

Q Would you say groundwater is going to become one of the major conservation issues?

A Absolutely, and not only in conservation but in water quality. Unlike surface water, groundwater doesn't have the same opportunities to cleanse itself. Surface water starts in the mountains, with snow melt or rain fall, and finds its way to the sea. Groundwater percolates through the ground, often has very little movement, and when it becomes contaminated, that can last—depending on the chemicals—for centuries. I think we're going to find over time that from a water resource quality and also quantity standpoint that it has been under-protected. One of the things we're doing in the water program now is to make a strategic decision on how to attack it more aggressively. We have a major public health problem in some areas because people have been exposed to contami-



nation. I think one of the things that the Resource Conservation and Recovery program is going to start showing through monitoring and other approaches is that our landfills and other disposal practices have jeopardized a lot of groundwater in this country.

Q What emerges in this whole picture then is that water quality, water shortages, and the need for water conservation are not a regional but a national problem.

A That's right. You can pick out examples in dry, arid locations but also in other areas.

The reasons why it may become a problem may be very different, of course. With the Colorado River, it becomes a problem of salinity and has a relationship with irrigation and other matters. On the East Coast, salt water intrusion or contamination from chemicals in groundwater are problems. In the Southwest it's a function of contaminating recharge areas, as in the Prince Edward aquifer where it was a question of developing over a recharge area. The "mining" of waters for agricultural purposes can be a problem. Some of the aquifers in Arizona, for example, drop ten feet a year and are replenished at the rate of about a quarter of an inch a year.

Q What kind of aid can we offer a community that wants to develop a water conservation program?

A Both financial and technical aid. Cost-effective conservation measures in publicly owned water systems are eligible for 75 percent Federal funding, if they are part of the facilities plan I mentioned earlier. There are also a number of technical aids. For example, EPA is producing a flow reduction handbook, and has completed educational films and videotapes. A household water conservation handbook is due soon, as well as a water supply and wastewater treatment coordination study, and EPA also is holding water conservation workshops and conferences. There is also a study available made by the Water Policy Task Force II called "Water Conservation Provisions of Grants and Loans for Municipal Water Supply and Wastewater Treatment Systems." These all are being made available to communities concerned with water conservation.

Q Isn't it true that most water use in the U.S. is industrial and agricultural? If so, why is it important for cities to conserve when they use relatively little of the total?

A It's true that irrigation and electric generation account for more than 75 percent of fresh water consumption. Domestic use accounts for less than 10 percent. But total water withdrawn for domestic use in 1975 equalled over 23 billion gallons per day! And this amount is expected to increase by the year 2,000 to more than 30 billion. This water is used and polluted, and it requires expensive treatment before discharge back to the Nation's waterways. So we are paying excessive costs to treat wastewater and imposing stress on aquifers and surface waters by withdrawals beyond those we actually need. In some cities,

growth is being restricted because water supplies have become inadequate. So conservation can buy time for them to extend the capacity of reservoirs and treatment plants.

Q What is EPA doing to encourage industrial, commercial, and agricultural conservation of water?

A Commercial and institutional flow reduction is encouraged by the same cost effectiveness analysis considered for municipal facility planning, and qualifies for the same 75 percent Federal grant monies. EPA now requires pretreatment for many industrial wastewaters. Costs to polish and recycle this pretreated effluent are often less than raw water treatment and use. This has resulted in economical water reuse in many large water-consuming industries.

The Construction Grants program requires that industrial wastewater flows into a planned municipal treatment plant be carefully reviewed and methods of reducing these flows considered.

EPA will fund projected industrial flows if documented by the industries. Allowances for unforeseen future industrial flows cannot exceed five or 10 percent of the total design flow exclusive of the industrial allowance, depending on the size of the town. The proportionate share of the user charge must also be borne by industry and at the same rate as household use. Therefore, conservation by industry will cut the treatment costs paid by industry and will permit more industrial development.

EPA's responsibility does not extend to agricultural water conservation, but other Federal agencies are involved in this.

Q EPA offers financial incentives to encourage innovative and alternative methods of sewage treatment. What do they have to do with conservation?

A These innovative systems are where nutrients or water is

recycled, energy is recovered, or special sewer systems for small communities are provided. Water recycled or reused eliminates or takes the place of fresh water withdrawals from streams, lakes, or aquifers. So such systems help reduce the demand and the pollution of these waters. And as the U.S. population grows and increases water use, more such reuse of water will relieve the severe strains on these clean water supplies.

Q Isn't it risky for a community to go out on a limb and try one of these novel systems?

A The risk is eliminated by a 100 percent replacement fund. This amounts to a guarantee by EPA that it will provide all the funding necessary to replace an innovative treatment facility that fails to perform as planned.

Q Do you think water conservation will be widely adopted in our society?

A I believe in the next decade we will realize a changed attitude, a revolution in how we use water. I feel we are witnessing the creation of a recycling ethic and a shift away from our throw-away society.

Water conservation, improved waste treatment, significant recycling of treated wastewater, all are parts of a total attack on pollution. Environmental awareness is still growing in this country, and I believe water conservation is here to stay and will continue to grow. □

This interview was conducted by Charles Pierce, Editor; Truman Temple, Associate Editor, and John Heritage, Assistant Editor of EPA Journal.

Recycling Municipal Waste

Last year the EPA helped 83 communities in 39 States develop programs to recycle municipal waste by either turning it into energy or by reusing or conserving valuable metal, glass, and paper from the waste.

EPA's Technical Assistance Panels advised the communities on developing recycling programs, often called "resource recovery" programs, by showing them how to:

- set up waste-to-energy facilities
- analyze municipal waste for energy recovery potential
- locate markets for recovered products
- select a shredder to be used in ferrous metal recovery
- plan regional use of a resource recovery facility

- set up a recycling center
- establish a system for curbside collection of recyclables.

Assistance is provided not only by EPA staff and contractors but also by State and local government personnel. This is the "peer-matching" part of the program, where a community facing a solid waste problem can receive first-hand advice from a State or local official who has experience in handling that same problem. Six national organizations representing State and local governments or their employees assist EPA in operating this element of the program.

EPA's 10 Regional Offices and the Office of Solid Waste

in EPA headquarters manage this program, which covers all aspects of solid and hazardous waste management. Over 400 requests for assistance have been accepted since the beginning of the program in January, 1978. Resource recovery currently accounts for about one-third of the requests. Most of the remaining requests are for assistance in waste collection and disposal and hazardous waste management.

Any State, local, or Federal Government agency wanting help from the Panels program should contact the EPA Regional Office or Jane Stieber, Resource Recovery Branch (WH-564), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460 (202) 755-9140.

Here are some of the communities assisted and the type of assistance provided:

Region 1

Island of Martha's Vineyard, Massachusetts:

Analyze regional resource recovery and landfill options.

Connecticut Resource Recovery Authority:

Visit Redwood City, Calif., to learn about an advanced, small capacity facility to burn waste.

Region 2

New Jersey Department of Environmental Protection:

Methane gas migration study for landfill in Gibbsboro.

Broome County, New York:

Feasibility study of a modular incinerator.

Region 3

Columbia County, Pennsylvania:

Advice on a volunteer recycling program.

York County, Virginia, and adjoining communities:

Advice on modular incinerators.

New River Valley Planning Commission, Virginia:

Assistance with planning for energy recovery and landfill siting.

Region 4

Meridian, Mississippi:

Evaluation of alternatives for sludge disposal.

DeKalb County, Georgia:

Preliminary feasibility study of codisposal of sludge and municipal solid waste.

Marshall County, Alabama:

Assistance to determine the feasibility of utilizing solid waste to produce energy to dry soy beans (replacing natural gas).

Region 5

Cleveland Heights, Ohio:

Assistance in establishing curbside separate collection program.

Ann Arbor, Michigan:

Assist city in selecting a shredder to be used to extend life of landfill and recover ferrous metals.

Rochelle, Illinois:

Assist city in investigating methane gas recovery from a landfill.

Region 6

Oklahoma Department of Health:

Assist in evaluating recovery options for waste tires.

San Juan County, New Mexico:

Planning of regional solid waste management.

Region 7

Hannibal, Missouri:

Investigation of modular incinerators, markets, economics, and technology factors.

Des Moines Metropolitan Area Solid Waste Agency:

Assistance in locating markets for resource recovery (additional feasibility work).

Missouri Department of Natural Resources for the University of Missouri at Columbia and the City of Columbia:

Investigate the feasibility of incinerating special wastes.

Region 8

Billings, Montana:

Guidance on a cardboard recycling program.

North Dakota Health Department:

Analyze State laws and regulations on resource recovery.

Wyoming Department of Environmental Quality:

State solid waste planning.

Region 9

Central Arizona Association of Governments: City and County of Honolulu, Hawaii:

Assist in learning about resource recovery for rural areas. Assistance in evaluating contractors' proposals for an energy recovery facility.

Region 10

Southeast Alaska (Ketchikan):

Study of regional approaches to solid waste management.

Yakima County Public Works Department, Washington:

Review of solid waste management options.

The Right Choices

By Roger Williams

You realize, of course," my friend said, "that street in front of your house is connected to every other road and highway in America." The statement kind of dangled there in the space between us. "It's only a matter of connections, turns, and distances."

Unlike the highways he referred to, that particular conversation led nowhere, but his matter-of-fact observation has stayed with me.

That simple idea of connections, so elemental to understanding and dealing with environmental and energy issues, is routinely ignored by millions of Americans until a blackout, a strike, a foreign oil embargo, or a sharp price increase brings the connections into sudden, discomforting focus.

Tonight, millions of lights, appliances, motors, and gadgets will be switched on in Chicago. How many users of that electricity will realize that following the electrical wires in their homes would lead them to a coal strip mine on the Montana-Wyoming border?

There, power shovels seven stories tall dig coal from the earth in twenty-five cubic yard bites, filling trains a mile long with 10,000 tons of coal. Sixteen such trains

leave daily from Wyoming alone. A train-load arriving at a 1,000 megawatt power plant—a not-unusual size for an urban area and capable of providing the electrical needs for about a million homes—is enough coal to last one day.

There, possibly, the connections are better understood because it is there that the environmental, social, and economic impacts—good and bad—are felt.

And it is there in Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming that EPA's Region 8 office works at the task of balancing the need for markedly increased domestic energy production and the need to preserve and protect some of the highest quality environment remaining in the Nation.

The region has about half the Nation's coal reserves, some 200 billion tons with 84 billion tons available for today's strip-mining techniques. Mining of that coal, at a rate of 60 million tons per year in 1975, doubled by 1978 and is projected to reach 300 million tons per year by 1985. Coal-fired power plant capacity, 16,000 megawatts (mw) in 1976, will double by 1985.

Uranium production is expected to triple between 1978 and 1985.

An oil shale resource estimated at 731 billion barrels—compared to total U.S. oil consumption of 6.5 billion barrels in 1978—seems to be nearing development, with the industry currently awaiting an improved economic climate. The President's energy program envisions a 400,000 barrels per day oil shale industry by 1990.

Oil and conventional natural gas reserves in the region are substantial, and up to 400 trillion standard cubic feet of recoverable gas lie locked in "tight" sandstone and shale formations awaiting incentives to industry to make their recovery economic.

If the resource base is huge, so is the potential for environmental damage from its exploitation. Even the best controlled coal-fired power plants will emit thousands of tons of sulfur dioxide gas each year. Much of that gas, through a series of chemical reactions in the air, becomes sulfate, obscuring visibility in this land of awesome vistas.

Scarce water in the arid and semi-arid West is consumed at the rate of 15,000 acre feet per year by a 1,000 mw power plant. Huge quantities are used in fugitive dust control, reclamation, and other uses at mine sites. Mining may disturb underground water supplies as well.

Spent shale—the material remaining





Roger Williams (left), EPA Region 8 Administrator, is joined at recent ceremony in Denver honoring citizen activists by Robert Redford, actor and environmentalist, and Douglas M. Costle, EPA Administrator.

after shale has been crushed and burned to extract the "oil"—would fill entire mountain valleys under one of the mining/retorting plans. A shale industry, too, would consume large amounts of water.

Sudden, large population increases from the influx of energy project workers and their families overtax the abilities of primarily small rural communities to provide housing, schools, water, sewers, and other essential services. Proper planning and "front-end" financial assistance are needed in many communities to help them cope with the boom and avoid negative impacts.

And, side-by-side with the resources are millions of acres of National Parks and monuments, current and proposed wilderness areas, and Indian reservations encompassing some of the most beautiful and primitive environment remaining in this country. Many of those areas enjoy the special protection of Class I air quality under the Clean Air Act's "prevention of significant deterioration" policy. That policy, called PSD, is designed to protect areas where the air is already cleaner than required by National standards. PSD contains pollution limits far more stringent than the National standards. More than one-third—70 million acres—of the Nation's Class I areas are in this Region. There are hundreds of miles of sparkling, free-flowing streams, wide open spaces, and areas that offer a rare commodity—solitude. Those qualities attract millions of tourists annually and lead residents and visitors alike to understand—the West has a lot to lose.

Energy or energy-related proposals on-hand or expected in the next few years in the region number in the hundreds. Each will involve EPA's review or permit responsibilities at one point or another.

Late in 1979, I directed the preparation of a regional energy policy, putting down on paper this Regional Office's commitments and procedures related to energy development.

This policy is our way of demonstrating to industry, environmentalists, other levels of government, and interested citizens that this Region is committed to helping the

Nation achieve energy self-sufficiency.

But since we are first and foremost an environmental/health agency, assurance that environmental standards and objectives are not violated by energy facilities is the cornerstone of the policy. It is our experience in the Region that we can accomplish reasonable energy goals without weakening existing local, State, and Federal environmental requirements.

High in the policy's objectives is a commitment to process key permits covering air and water discharges for energy facilities within six months of our receipt of a completed application. We will commit ourselves to similar timetables for review of permit applications under the Resource Conservation and Recovery Act and the underground injection program (to protect underground water supplies) when the rules for those programs are finalized.

Especially important, we will assist other agencies during the "scoping phase" of impact statement preparation to identify and resolve many troublesome aspects of energy projects early to avoid delays inherent in protracted conflicts. Review of energy impact statements will be given highest possible priority.

We will provide a similar service to representatives of the energy industry itself, in seminars concentrating on details of permit application forms and other issues.

To the degree possible under the various laws, we will consolidate our permit programs and develop procedures for a single joint application form. Internally and with other Federal, State, and local agencies, we will coordinate our reviews of energy project applications to cut out as much duplication as possible in reporting, application, and monitoring requirements.

Our regional perception of the energy, environment, and conservation connection is sharpened by the existence of vast resources, and we are increasing our promotion of conservation. We insist upon full consideration of energy conservation and recovery techniques, for instance, in plans for new sewage treatment facilities submitted by communities.

We are actively pursuing innovative and alternative waste treatment technologies

and providing financial incentives for their application. Under the Resource Conservation and Recovery Act and the President's Urban Policy Program we will fund programs aimed at turning wastes into resources, thereby saving or recovering energy.

In our review of energy proposals, we will carefully scrutinize energy demand projections since recent information indicates electrical demand is growing at a slower rate than most utilities have been accustomed to planning for. We will look for and encourage water-saving techniques on the part of industry as well, since water is so limited a resource here and must be shared by agriculture, communities, and industry while its environmental uses are also protected.

Cooling techniques which use less water; the use of poorer quality waters for industrial purposes; and water management techniques which do not contribute to increasing salinity in the Colorado River Basin will receive favored treatment in the Regional Office.

We will markedly increase our communications with all concerned with western energy development to reduce confusion and delays and to assure that the best possible projects are built.

We will continue to encourage and support strong State roles in guiding their own destinies, and we will delegate Federal programs to the States just as quickly as they establish the needed authorities specified by the Congress.

In this era of intense public concern over energy supplies, we can only preserve the important benefits we have realized through environmental laws if we administer them as fairly, comprehensively and expeditiously as we can.

Like the roads in front of our houses, the path to energy self-sufficiency and environmental protection can take us anywhere we want to go. It's only a matter of connections, turns, and distances. Working together we can make the right choices. □

Williams is Administrator EPA Region 8.

Haphazard conservation can be almost as damaging as haphazard development. Without clear intentions, careful planning, and a sound base of information upon which to set priorities, conservation efforts may take the battle but ultimately lose the war.

Conservationists are saddled in their work by very real restrictions: limited time and funds, and the demands of complex political, social, and economic forces. As in most other human endeavors, there is a need in conservation to make a maximum impact with a minimum expenditure of human and material resources. How should these hard choices be made?

Researchers have noted that a fundamental scientific justification for conservation is to protect the diversity of life on our planet. This means safeguarding the best examples of all components of the natural world. By retaining samples of the rich variety of life forms that have evolved over many eons, we can "store" options for the future—give ourselves time to answer questions, many of which we're still unable to ask.

For example, the key to a new source of high-energy food may lie hidden in the genes of a particular prairie plant; and if that plant, itself a unique biochemical product of evolution, is destroyed by heedless alteration of a landscape, we will never know its secrets. It is clearly in our best interest as a species to preserve other species and the natural systems which sustain them.

Protecting Habitat and Species

Given the practical limitations of conservation and the pressing need to protect a great diversity of life forms, a strategy can

be developed. We can concentrate conservation resources on protecting biotic diversity with special emphasis on the protection of rare and endangered species of plants and animals. A corollary of this approach is the preservation of the natural areas in which those beleaguered biotic "elements" are found—areas which are valuable for their beauty, the opportunities they afford for passive recreation and ecological study, and sometimes for their contributions to the economy. (Marshes, for example, are financially important for the role they play in insuring productive fisheries.)

Once the goal of protecting biotic diversity has been adopted, a number of approaches lie open to conservationists. The Nature Conservancy has chosen to focus on one key aspect of the total problem: the preservation of critical habitat and the variety of life it shelters. Much simplified, the Conservancy is intent on building a modern-day Noah's ark. But unlike Noah, we are going to take along the plants, too.

To fashion the ark, the Conservancy has chosen a three-part conservation campaign. We work by:

- Identifying the areas which support the best examples of all components of the

natural world—finding out what is rare and where it exists;

- Protecting natural areas, usually through acquisition by gift or by assisting and advising government or other privately supported conservation organizations; and increasing awareness of the need to safeguard natural areas;
- Managing the largest private sanctuary system in the world (with over 670 Conservancy-owned preserves) by means of volunteer land stewards and staff; and encouraging compatible use by researchers, students, and the public.

The Nature Conservancy is a nonprofit conservation organization with a current membership of 67,000. Membership, which has more than doubled in the last 2 years, is open to everyone upon payment of minimum dues. There are 35 volunteer chapters in 29 States. They are complemented by three dozen professionally staffed offices. Staff backgrounds vary from systems ecology to business, from biology to public relations, from forestry to law and finance.

Vanishing Natural Areas

The Conservancy is an outgrowth of the Ecological Society of America which in 1917 established a Committee for the Preservation of Natural Conditions. In creating the committee, the Society recognized what many would discover half a century later: that the Nation's natural areas were disappearing. In 1946, from this original group and its companion Committee for the Study of Plant and Animal Communities, sprang the Ecologists' Union. Four years later, in 1950, the Ecologists' Union became The Nature Con-

The Nature
Conservancy

MODERN NOAH'S ARK

By PATRICK F. TRACHAU



servancy and was incorporated as such the following year.

The new organization began with 342 members and goals not unlike those of the Conservancy today. It spent several years experimenting with various methods of natural-area preservation. Then in 1953, after a number of false starts, the Conservancy, working with a committee of local conservationists near New York City, actually bought a natural area at Mianus River Gorge. Local fund-raising efforts repaid a loan from the central fund, which could then be used again.

Since that first project, the Conservancy and its members have been involved in 2,260 acquisitions comprising about 1.6 million acres and located in every State, Canada, the Caribbean, and Latin America. Major conservancy projects have included:

- *Virginia Coast Reserve*: Designated as an international biosphere reserve by the United Nations, the Virginia Coast Reserve comprises all or part of 13 islands along Virginia's Atlantic Coast. Funds to create preserves on the islands were raised through public subscription with the majority of the \$4.5 million needed provided by the Mary Flagler Cary Charitable Trust. Preserve headquarters are at Brownsville in Northampton County, Va.
- *Santa Cruz Island*: Largest of the Channel Islands, Santa Cruz lies 24 miles south of Santa Barbara in the Pacific. The island is home to the Channel Island fox and supports rich marine life and bird life, as well as many rare and endemic plants. Long-term preservation of 90 percent of the island was brought about by an innovative arrangement between the seller, Dr. Cary Stanton, and the Conservancy. Funds to purchase the Stanton interest were raised throughout California and the Nation.
- *Ordway Prairie System*: Comprising 24,305 acres in 5 States, the Ordway system is made up of a variety of prairie preserves. The two largest are in South Dakota and Kansas. The Samuel Ordway Memorial Preserve near Aberdeen, S. Dak., is a pothole prairie and home to a large number of waterfowl. The Konza in Kansas is a tall-grass prairie, where grasses reach a height of more than 6 feet. A contribution from a single individual, Miss Katharine Ordway, made the entire protected system a reality.
- *Great Dismal Swamp*: Beginning with a news-making donation to the Conservancy of 49,097 acres of forest bog, blackwater lake, and secluded wetland, Union Camp, a forest products company, led the effort to preserve the Great Dismal Swamp. This remarkable wilderness lies within 10 miles of a million-person-plus metropolis, Hampton Roads, Va. Subsequent purchases and a major donation from Weyerhaeuser Com-

pany of 11,000 acres have now brought over 80,000 acres of the Great Dismal Swamp under conservation protection. Most of the swamp is now a national wildlife refuge.

- *Mashomack Forest*: A little over 100 miles from New York City, Mashomack Forest lies on Shelter Island between the tips of the split tail of Long Island. The forest and its wetlands constitute a singular resource. Nesting osprey and least tern frequent the marshes and high ground. Complex negotiations, including purchase of the company that owned the property as well as a public fund-raising campaign of \$6 million, led to the purchase and the establishment of the Conservancy sanctuary at Mashomack. At this writing, a final \$1 million is still being sought.

The list could go on, with many hundreds of projects, each with its own story. In Dutchess County, N.Y., Conservancy members worked to acquire representative wetland habitat; in the State of Washington, both rare plants and bald eagle habitat have been priorities; along the coast of Maine, Conservancy members have created a multi-island preserve honoring the chapter's first honorary chairperson, Rachel Carson.

Where The Rare Species Are

In recent years, without reducing acquisition activity, the Conservancy has placed growing emphasis on the identification and stewardship, or management, aspects of its overall conservation program. Identification programs, most of them undertaken in cooperation with State governments, have provided a new and improved tool to increase the effectiveness of conservation work within States. Aided by up-to-date data processing facilities and techniques, researchers are involved in a continuing process of inventorying natural diversity—by finding out what is rare and where it exists. Using inventory and assessment methods developed by the Conservancy, workers determine the relative rarity of plant and animal species, aquatic habitats, and other unique natural features. The results, "natural heritage inventories," also show which elements are protected and which are not. The data can be used to guide early planning decisions, to channel further research, to set protection priorities, and to direct private and public protection efforts.

Twenty-one States and the Tennessee Valley Authority now have continuing Natural Heritage programs. Ideally, the identification process leads to the protection phases of the Conservancy's tripartite conservation approach. In most cases, protection relates to actual acquisition of the sort noted above; however, the Conservancy is now experimenting with the systematic

application of techniques that don't include fee ownership. Tried and true non-ownership protection tools, such as conservation easements and dedication of land, are being employed along with a variety of other, newer construction methods such as landowner contact programs in an effort to increase the efficiency of the protection process.

Local Responsibility

Stewardship, the final element in the Conservancy package, includes both the management of Conservancy-owned areas



and the monitoring of areas transferred to other managers. Of the total 670 Conservancy preserves, only 25 are managed by Conservancy-paid staff. The others are the responsibility of local management committees. The first step for such a management committee is to develop a master plan based on a comprehensive ecological inventory of the preserve. The committee then determines what is necessary to protect the preserve and what uses can be accommodated without negative impact. Most Conservancy preserves are open for passive recreation, such as hiking, nature study, bird watching and photography, and

for use by researchers and students.

From its inventory programs to its long-term management plans, the Nature Conservancy specializes in the preservation of biotic diversity through the protection of natural areas. To support the acquisition aspects of the total program, it has been necessary to build major financial resources. The Conservancy completed in 1979 a three-year program to increase the organization's own acquisition funds from \$4 million to its current \$27 million. Owing to the revolving nature of the funds (the money is used to acquire land and is then repaid, either through fund-raising or

re-sale of lands to another public or private conservation organization), the present \$27 million is expected to preserve about \$300 million worth of land in the next decade.

While the operational emphasis of the Conservancy is narrow—to find, protect, and manage natural areas—the goal of the organization is broad and universal: to preserve the best remaining examples of all unprotected elements of our amazingly diverse natural world. □

Patrick Noonan is President of the Nature Conservancy.



Great Dismal Swamp



We have no cause for complacency about the rate at which we consume our natural endowment," EPA Deputy Administrator Barbara Blum warned as a new conservation report by a Cabinet-level committee was submitted to the President and Congress.

Blum, who served as the acting chair for this committee, said that "We do not appear to be facing an imminent shortage of material resources similar to that which we face with energy resources."

However, she emphasized that "our materials use practices affect environmental quality, energy consumption, waste generation, the balance of trade, and other important national concerns.

"Individuals, private companies, local governments, and the Federal Government all make choices every day which affect our use and conservation of resources."

The report, entitled *Choices for Conservation*, was requested by Congress to supply information on Federal incentives and disincentives to materials conservation.

The Committee included the Secretaries of Commerce, Energy, Interior, Labor, Treasury, the Chairmen of the Council on Environmental Quality and the Council of Economic

The material objects of our life flow in a torrent... down the drain.

Choices for Conservation

Advisors, and a representative of the Office of Management and Budget.

The committee agreed on a series of findings and recommendations for each policy studied:

Beverage Container Deposit Legislation

The issue which received the greatest attention was proposed national mandatory beverage container deposit legislation. The committee found that mandatory uniform deposits on all beer and soft drink containers could result in significant conservation of virgin material and energy resources. The committee also found that mandatory deposits would eliminate up to two percent of municipal solid waste, and effectively reduce litter associated with beverage containers.

While there was considerable support in favor of beverage container deposit legislation, the full committee was not prepared to recommend its immediate adoption because of uncertain impacts on prices and labor.

Taxes On Virgin Materials

The committee found that the present Federal tax structure reduces the cost of domestic virgin materials significantly, leading to overuse of these resources. Most of the committee members recommended that the Administration consider

eliminating or modifying these subsidies. Most of the members also recommend that new taxes on virgin material extraction not be considered further until existing tax policies encouraging virgin material use are eliminated.

Solid Waste Disposal Charge

The committee recommended against a national solid waste charge (product charge) on consumer goods and packaging. The committee agreed that there is a theoretical justification for making the price of a product reflect the costs of municipal solid waste management, but it found the net economic benefits and waste reduction from such a measure would most likely be low in practice, although the data are uncertain.

Local User Fees

On the other hand, the committee favored the adoption of local user fees for municipal solid waste collection and disposal. Such fees would vary

according to the amount of wastes discarded. The committee recommended further study of Federal policies that inhibit the adoption of local user fees, including the non-deductibility of fees for Federal income tax purposes and the current exclusion of user fees from the local tax base calculation used for Federal revenue sharing.

Resource Recovery Subsidies

The committee found that subsidies for resource recovery can be an effective but potentially expensive tool to stimulate resource recovery, and did not recommend new subsidies. Likewise, the committee found that regulations on product design could be effectively employed to stimulate resource conservation, but it did not recommend that they be presently adopted because of problems with administration and en-

forcement, the burden on businesses, possible inflation effects, and general cost-ineffectiveness.

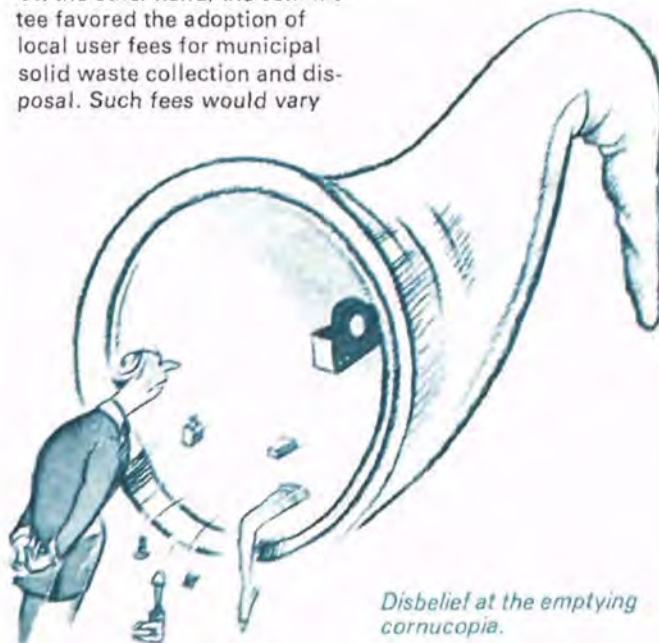
National Litter Tax

The committee rejected a proposal for a national litter tax, finding that it would not provide any incentive to clean up litter or reduce the rate of litter generation, and that it would not be an effective substitute for a beverage container deposit system. The committee also called for further study of extending the deposit concept to durable and hazardous goods or possibly offering bounties for their return.

Railroad Freight Rates

Finally, the committee found that railroad freight rates probably discriminate against some secondary materials, but that such discrimination probably makes only a small difference in the amount of most secondary materials used. □

Copies of the Choices for Conservation report may be obtained by writing to Solid Waste Information, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268, citing Publication SW-779.



The city of Lakeland in central Florida has set October, 1981, as completion date for its \$186 million, 364 megawatt (mw) power generating unit. The unit, to be fueled with a combination of high-sulfur Kentucky coal and solid waste, will use sewage water effluent from Lakeland's sewage treatment plant for cooling purposes.

When complete, the unit will be the first in the Southeast using coal and trash for fuel and sewage water effluent for cooling. No other unit in the region burns coal and solid waste. The only generating plant in the Southeast cooled with sewage water effluent is a much smaller unit operated by the Vero Beach Municipal Plant.

Lakeland city officials recognized in 1975 that expansion of existing power facilities would be necessary to meet demand by late 1981 or early 1982. The city's annual growth rate is 6 percent, a factor figuring prominently in the decision to expand present capacity.

Originally, Lakeland officials hoped to build an additional oil-fired unit at its C. D. McIntosh, Jr. Station. Two units at the McIntosh site produce 90 and 125 mw, respectively. One is fired by oil, with the other capable of burning either oil or natural gas.

Hopes of building a 250-mw unit to meet the challenges of the 1980's were dashed in 1975, however, when Federal officials rejected plans. A moratorium on construction of oil-fired units, which went into effect after the OPEC oil embargo, triggered the rejection.

With plans turned down, city officials went back to the drawing boards. During

the revision period the city of Orlando, also needing added capacity to keep pace with growth, agreed to assist Lakeland financially with the new unit in return for 40 percent of the output. Subsequently, plans for a unit burning coal and garbage were developed.

80-20 Mixture Planned

The new plant, designed to run on an 80-20 percent mixture of coal and solid waste collected in Lakeland and surrounding communities, was officially approved in 1978 by both the U.S. Environmental Protection Agency and Florida Department of Natural Resources. (EPA Region 4 furnished technical assistance on the project. —Ed.)

Phase I, including site preparation and installation of boiler foundations, pilings and a unit train track, was completed in July. Phase II, now in progress, includes installation of boilers and turbines and all other necessary plant equipment. The new unit is being built on a 120-acre portion of the McIntosh site.

[The facility is designed to accept all types of solid waste and separate it before combustion. Initially a shredder drum breaks up the waste, where it then moves on a belt through an electromagnetic separator that removes iron products. The remainder passes through an air classifier that floats lighter substances such as paper and cardboard above the belt. Heavier material drops into separate compartments. In the final step, the combustible material is blown into the boiler.]

Lakeland is located in citrus-laden Polk County, about 30 miles east of Tampa and 50 miles southwest of Orlando. The city's growth results from a steady migration from the northern States. This influx of new

residents, coupled with development of new industries and expansion of the phosphate industry with major installations south of Lakeland, required expansion of existing generating facilities. Without expansion, providing electrical service in the 260-square-mile service area served by the utility would have been impossible by late 1981.

At present, the utility serves nearly 21,000 customers within Lakeland's city limits and an additional 32,000 in unincorporated sections of Polk County. The number of customers is expected to climb to nearly 60,000 by mid-1981.

Oil Twice Coal's Cost

Burning coal and refuse is appealing both economically and ecologically. From an economic viewpoint, coal is favorable primarily because its price will not escalate as rapidly as the price of OPEC oil. Right now, the cost of a million BTU's from oil is \$3.50 while the same output from coal is half as much at \$1.74.

The city recently contracted with a Kentucky fuel company for coal over the next 10 years at a total cost of \$250 million or \$25 per ton. The annual savings resulting from the use of coal, instead of oil, is estimated at \$40 million. The city expects an initial additional savings of \$300,000 a year by burning solid waste, and projects long-range annual savings of \$600,000 because of the plant's trash-burning capability.

TRASH + COAL + SEWAGE =

By W. R. Lesnett

Another factor weighing heavily in favor of coal is supply. With the United States possessing perhaps the largest coal reserves of any nation on Earth, there should be an abundant supply for the utility. Abrupt cutoffs are unlikely since coal, unlike OPEC oil, is controlled in this country.

The contract gives the city the right to vary the amount of coal consumed each year from 504,000 to 1,200,000 tons. If the supplier begins to run out of coal, the city has first crack at the remaining supply. In the event the company does not deliver for three consecutive months, Lakeland can make purchases on the spot market and bill the supplier.

If the new plant had been designed to burn oil, the opportunity to burn solid waste would not have been as economically attractive as it now is, because it would have cost several million dollars to add precipitators and other equipment at an oil-fired plant to give it the capability to burn trash. On the other hand, coal-fired units come equipped with precipitators, giving them the capability to handle ash, control particulate material, and burn trash.

New Landfills Averted

It is anticipated that Lakeland will burn up to 300 tons of solid waste per day in the plant. Right now, the city does not produce enough to meet this demand. However, if growth patterns that dictated construction of the new power plant hold up, there is bound to be much more garbage. By burning it, Lakeland will prolong the life of existing county landfill areas and hopefully

avert the need for new ones which represent a waste of real estate.

Polk County officials say Lakeland's ability to burn solid waste from Lakeland and other Polk County cities could prolong the useful life of existing landfill operations by 20 years. County officials seem enthusiastic about working with Lakeland, particularly since proposed new Federal anti-pollution regulations threaten to drive up the cost of operating landfills. There are four in Polk County.

Right now, the dumping fee is \$6 per ton. That could more than double if the Environmental Protection Agency requires installation of material to line landfills, preventing garbage from seeping into the water supply.

The economic burden on Lakeland's sanitation department will be greatly reduced once the new plant goes on line, since dumping fees at the unit are projected to be \$1 per ton less than at the county landfill site. The city also will realize a savings in transporting garbage and reduce wear and tear on sanitation vehicles.

In the future, the utility plans to accept solid waste from nearby communities. When other cities begin dumping in Lakeland, revenue generated for the city by using trash to create electricity will increase.

The use of sewage water effluent for cooling purposes should go a long way toward protecting the city's lakes. At one

of the two plants on the McIntosh site, water is pulled from Lake Parker, pumped to a cooling tower and discharged back into the lake. The water temperature is increased 10 degrees before it is put back in the lake. At the other unit, water pumped from the same lake goes to the cooling tower, where it is evaporated into the air.

Sewage Water for Coolant

Not a single drop of water will be pumped from or into the lake at the new unit. Instead, the unit will rely on sewage water effluent from the city's waste water treatment plant for cooling the boilers.

Sewage water effluent will be pumped through a seven-and-a-half-mile pipeline to the new plant from the sewage facility after treatment and then to the cooling tower where it eventually evaporates. A pilot project conducted in Lakeland over a six month period indicated no side effects from use of the effluent.

In addition to generating electricity, helping the city meet its garbage disposal needs and other advantages, the plant also will produce sludge that can be used for patching city and county roads. It is estimated that 1,000 tons of sludge per day will be produced in the unit's sulfur removal system.

When complete, the new Lakeland unit should prove to be one of the lowest-cost, coal-burning units of its capacity in operation. □

The author is Director of the Lakeland Department of Electric and Water Utilities. This article was adapted from Public Power Magazine, December, 1979.



ENERGY

Some months ago the Duesseldorf fire and police departments rescued a man from the Rhine River.

"The man resisted the rescuers," explains Klaus Bungert, mayor of Duesseldorf, "saying he only wanted to have a swim. But authorities automatically consider swimming in the Rhine to amount to attempted suicide."

The mayor draws smiles when he recounts this episode to audiences, but a serious message underlies the story. The Rhine, according to the authoritative German magazine, *Der Spiegel*, is "the major European sewer." Its annual load of pollutants includes 3,150 tons of chromium, 1,520 tons of copper, 12,300 tons of zinc, 70 tons of mercury and 350 tons of arsenic. A bottle of Rhine water exhibited at a Duesseldorf trade fair last year

listed 105 chemical compounds suspended in the sample—and this was only a fraction of the toxics found in the river.

Thermal Problem

In fact, a few years ago a group of German, Dutch, and French industries known as the Rhine Valley Action Group called for a ban on the building of any more industrial centers along the river. They argued that no new plants should locate there until tolerable pollution limits had been determined. One scientist from the Senckenberg Institute in Frankfurt, warning of thermal

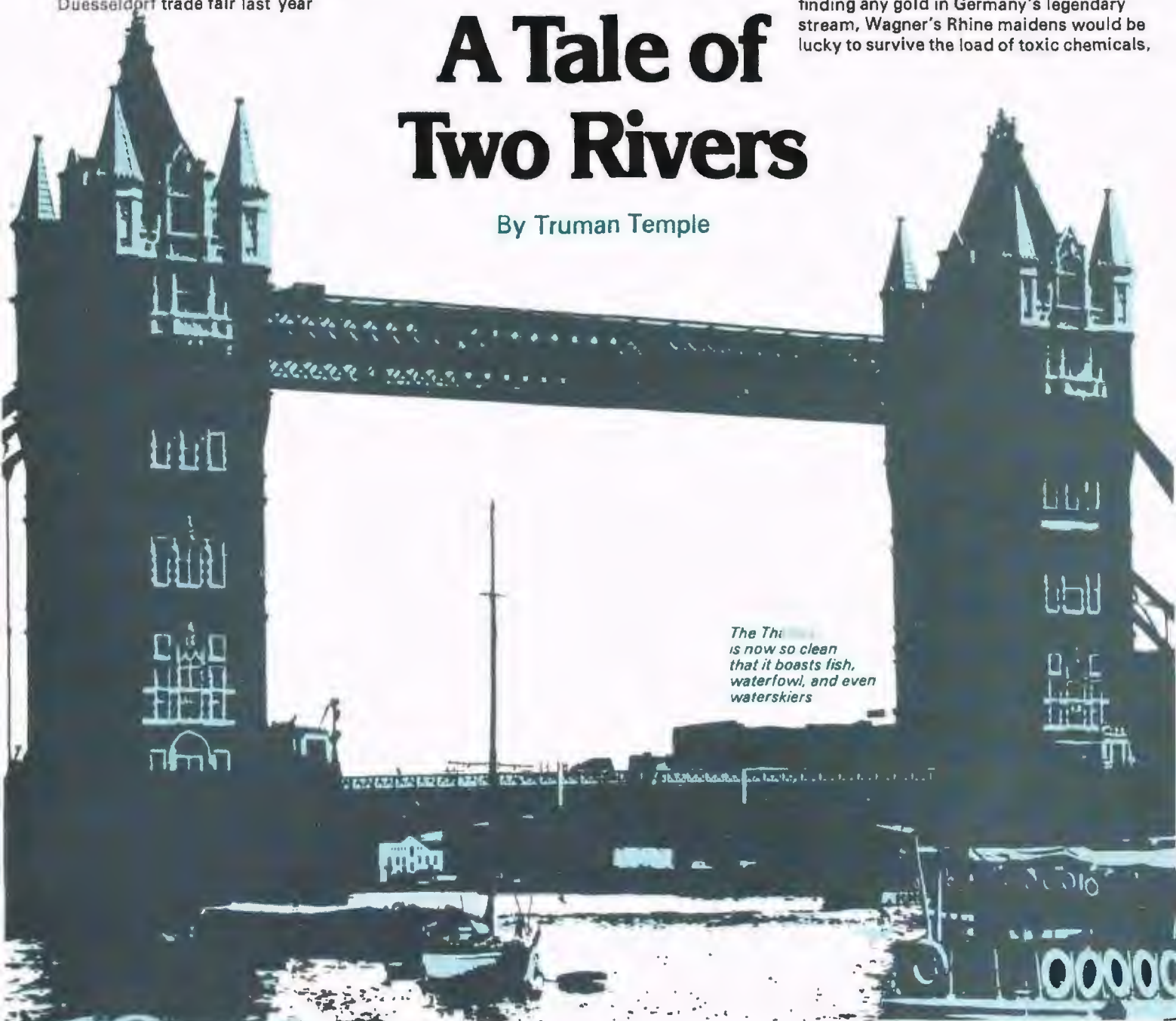
wastes from nuclear plants, said that if this heated the river above 26 degrees Centigrade, "then the Rhine is dead."

By contrast, fishermen on the Thames near London have reeled in the first salmon to be found in that river in more than a century. At a recent Thames angling contest, 90 species of fish were caught. Shrimp have reappeared in the river for the first time since the turn of the century. Thousands of fowl are returning to their former homes in the Thames estuary. The waterway, in fact, has made a comeback that is no less than astonishing.

The difference in the condition of these two major European rivers has not escaped notice. The *New York Times* commented in an editorial: "As the Thames improves, the Rhine regrettably gets worse. Far from finding any gold in Germany's legendary stream, Wagner's Rhine maidens would be lucky to survive the load of toxic chemicals,

A Tale of Two Rivers

By Truman Temple



The Thames is now so clean that it boasts fish, waterfowl, and even waterskiers

and no self-respecting Lorelei would still be doing business in the river. Nevertheless, the revival of the Thames should hold out hope that with enough effort, skill, and determination, any river can be brought back to life."

Why is the picture so different from the Thames and the Rhine? What is the secret of rescuing a major waterway from the kind of pollution that afflicts other rivers not only in Europe but the United States? And what are the peculiar obstacles that have kept the Rhine—also once famous for its salmon and sturgeon—from enjoying the same revival?

Multi-National Waterway

To begin with, the Thames is exclusively an English river, and controlling its quality is simpler from an administrative point of

view. The Rhine is multi-national. It begins in Switzerland and wends its way north past the Austrian frontier to Lake Constance where it enters Germany. Further along, the Rhine courses past the French industrial region of Alsace, receiving a heavy loading of salts from the French potash mines. It then receives the full impact of tributaries draining the heavy iron, steel, and chemical industries of the Ruhr basin. Finally, it broadens into a delta as it exits through Holland into the North Sea. Other countries also make a contribution indirectly to the river's quality since tributaries drain into it from Luxembourg and Belgium. So the river is an international problem, and efforts to clean it up have involved many jurisdictions.

In addition, the Rhine is 820 miles long, almost four times the length of the Thames, and far more of it is used by shipping. An international waterway since the Treaty of Vienna in 1815, the Rhine is navigable overall for some 500 miles, as far upstream

as Lake Constance. Approximately 18,000 ships annually use the Rhine and the canals linked with it, and the leakage and dumping of oily bilge water by these vessels contributes in no small way to the pollution.

There is also a sociological reason for the lack of unified action on the problem. As Ralph Johnson and Gardner Brown noted in their book, *Cleaning Up Europe's Waters*, "In Germany, water quality control historically has been under the control of state and local governments. Germany was not, in fact, united as a country until 1871, and even this unification occurred only by leaving large areas of domestic policy, including water quality management, untouched by the central government." Similar problems exist among all the states along the Rhine.

Unlike the United States, which has clear constitutional power to enact and carry out uniform Federal pollution control laws, the

The mighty Rhine, flowing here past one of many castles on its banks, remains severely polluted.



German government can only pass "framework" legislation that takes effect when each of the local states or "Laender"—and there are nearly a dozen of them—enacts implementing laws. The French have even less federal authority, and have had difficulty implementing international agreements signed by the central government aimed at stopping pollution of the river.

Policing With Helicopters

German police use fairly sophisticated methods of enforcement such as surveillance by helicopters to trace oil spills, but violations persist. The oil pollution increases when there is fog over the river, suggesting that some ships and factories discharge these wastes when they can do so undetected.

A variety of other pollutants afflict the river. Raw sewage from a very dense population is one offender. (More than 50 million persons live along the Rhine and its tributaries.) Illegal discharges of chemicals is another. Some years ago two officials of a shipping company received prison sentences and heavy fines after it was found that company ships had dumped 8,650 tons of industrial waste into the Rhine.

All of this is not to say that there has been no attempt to control pollution of the Rhine. An estimated 20 billion marks (nearly \$12 billion at current exchange rates) have been spent by Germany in the last few years to clean up the river.

Nor has there been any lack of organizations dedicated to cleaning up the waterway. One of the best known is the International Commission for the Protection of the Rhine Against Pollution, established in 1963 (although delegates from various governments had begun meeting on the subject in 1950). Its members include France, Germany, Luxembourg, the Netherlands, and Switzerland, and each nation contributes funds to carry out research on the nature, quantity and origin of pollution. Another organization is the "Working Group for Preserving the Purity of the Rhine," composed of delegates from six regions in the Federal German Republic: Baden-Wurtemberg, Bavaria, Hesse, North Rhine Westphalia, Rhineland Palatinate, and the Saar. This body carried out a joint study of the Rhine and its tributaries in 1965 and financed creation in 1970 of the North Rhine Water Control Station, which now keeps a watch on the state of the river at the frontier between Germany and the Netherlands.

In addition there is the Rhine Valley Action Group, an industry organization previously mentioned and the Interparliamentary Conferences on Pollution of the Rhine, which have been held in the Netherlands and in France, seeking solutions to the

problem. (Members, in fact, have turned down a scheme to create yet another organization, a Rhine river basin authority, arguing that the institutions now available should be made more effective.)

Because Germany produces a wide variety of pollution control equipment, and historically was one of the pioneers in the 19th century in the technology of water purification, her citizens have a continuing awareness of the need to clean up their historic river. The German Federal Government and the states touching either the Rhine or Lake Constance in 1977 agreed to contribute \$680 million over the ensuing three years to clean up both the river and the lake. Additional contributions by local communities will bring the total in this latest program to more than \$850 million. The seriousness of the whole problem is underscored by the fact that some 20 million Europeans get their drinking water from the Rhine.

The funds and efforts have achieved some results in controlling certain pollutants entering the waterway. According to a 1977 report by the Federation of German Industry, there has been a 60 percent reduction in the quantity of mercury in the river since 1973, and in 1976 the quantity of organic pollutants in the Rhine was down by one third from the previous year.

But much remains to be done. It is estimated that some 2,000 different chemical compounds regularly find their way into the Rhine, and controlling them is a complex challenge. As the English poet, Samuel Taylor Coleridge, wrote a century and a half ago:

"The river Rhine, it is well known,
Doth wash your city of Cologne;
But tell me, nymphs! what power divine
Shall henceforth wash the river Rhine?"

English poets have generally been kinder to the Thames. Richard Addison in 1712 called it "the noblest river in Europe." Edmund Spenser in the 16th century referred to it as the "sweet Thames." But this waterway also has had its problems.

By the mid-19th century, the Industrial Revolution and the population explosion in London had turned the tidal section of the river below London into a foul waterway often referred to as an open sewer. (The 146 miles of freshwater upstream have never been seriously polluted.) It was not until 1963 that a serious effort was begun by water authorities to clean it up. In that year a government report showed that most pollution in the tidal section came from antiquated sewage works handling both domestic and industrial waste. The remedy was a huge reconstruction program for treatment plants accompanied by tough new regulations.

The English decided their most important river was worthy of being made into a showpiece, and proceeded to approve funds and new laws. In the past decade and

a half, nearly half a billion dollars has been spent modernizing sewage plants, building reservoirs, and installing a computer to monitor water quality. Today no raw sewage enters the Thames at any point along its length. Factories are prohibited from discharging anything but uncontaminated water into the river. Since 1964, only soft detergents have been available for sale in England. Fines for oil spills and dumping of refuse in the river have been increased from \$125 to \$1,000. The government pays for refuse barges to collect 7,000 tons of driftwood and other debris annually. Houseboats and power cruisers are required to have chemical holding toilets. A fleet of special ships carries more than five millions tons of sludge annually from the treatment plants and dumps it out in the North Sea. One of the worst polluters on the Thames, a gas works at Beckton, has been closed since discovery of natural gas in the North Sea.

Barnacles and Water Skiers

The result of all these actions is the salvation of a once fetid waterway. Seals now bask on the mudflats at Gravesend near the mouth of the river. Dolphins are sometimes seen playing opposite the Tower of London. Commercial fishing fleets are plying the estuary, and myriads of waterfowl from Northern Europe, absent since the turn of the century, now spend their winters along the Thames. The ultimate compliment for the English environment authorities is that yachtsmen complain of once again having to scrape barnacles, which couldn't live there 15 years ago. Even water skiers, who shun the Potomac in Washington because of sewage problems, have become so numerous on the Thames that they're a navigation hazard for barges.

"It is the first time in the world," declares the British magazine *Water*, "that an industrial river once so polluted as to be recognized as lifeless has been restored to something approaching a natural state."

The chairman of the Thames Water Authority goes a step further. "This is the cleanest metropolitan estuary in the world," he says. "We challenge anyone to disprove it."

Can Europeans rescue the Rhine, the Danube, and the Seine with similar success? More importantly, can they stave off pollution effectively enough to preserve these major rivers as sources of drinking water for densely populated European cities? The English have shown how much can be done. Given the same will power, and public support, there is reason to hope that other nations can make use of new laws and available technology to clean up their own rivers. □

Truman Temple is Associate Editor of EPA Journal.

Earth Day '80

By Mike McCabe

April 22 is a historic date. Ten years ago on that date, millions of citizens demonstrated their support for a change in this Nation's values. They added momentum to a movement that had its ideological roots before the turn of the century, but which had failed to reach prominence in our national agenda. Few people who participated in the activities that day realized the profound and exciting effect their actions would have on society. For they had launched no less than a sweeping reordering of the way this country does business. A new dimension of concern and evaluation would be added that required a recognition of our responsibility to act as stewards of an awesome heritage.

That day was Earth Day. April 22, 1980, recognizes that our job is not over; nor will it ever be as long as we have to exploit nature for our survival. Earth Day '80 signals a rededication, in a crucial year, to those goals that are in our true self interest, to goals expressed in a public pledge a decade ago and remembered in a public celebration.

Since the first Earth Day, we have been confronted with an energy crisis that assaults our environment and our economy.

We are at a crossroads where the energy choices we make now will determine what kind of national heritage we leave to future generations. The state of the economy, with its inflation and recession, gives detractors an opportunity to press for the setting aside of pollution controls and resource protection standards until more favorable

conditions prevail—as if environmental protection were an economic luxury instead of a social responsibility to ourselves. As an election year, 1980 has special importance since candidates running for all levels of office formulate policy that will shape the course of the new decade. A national display of support for environmental values on Earth Day could impose those issues on every candidate's agenda.

Earth Day '80 will focus on those communities where citizen action has made life more environmentally sound and more rewarding. Events and activities are planned that will spotlight streams and rivers that now support fish where none lived ten years ago. Urban gardens, rising from what once were rubble-strewn lots, will be the site of neighborhood fairs. Open houses will be held at nature centers that educate people to the value of wildlife. Inner-city parks will hold miniature hikes. New factories that have been designed to minimize insults to the environment will have guided tours for local residents. Conferences and town meetings will take place where citizens will discuss the environmental issues that still confront their community.

People are organizing events that are suited to their particular community. Already, efforts are underway in almost every State in the Nation. Here are a few:

Portland, Ore.: In a waterfowl park created by citizen action, a day-long fair will be held with exhibits, speakers, and concerts. An environmental film festival will be held at the Museum of Science and Technology. The following Saturday will be "Garbage Day" in Portland, focusing on the issues of solid waste and recycling.

Baltimore, Md.: The Baltimore Environmental Center will host a statewide conference on "Environmental Issues: A Look at the Past Ten Years and a Look at the Coming Ten." In College Park, at the University of Maryland, a week-long Earth Day '80 celebration will be held with special emphasis on energy and the environment. Activities all

week include speakers, seminars, films, and a crafts fair.

Pittsburgh, Pa.: The Carnegie Museum of Natural History will sponsor Earth Week '80 featuring lectures, major speakers, and special activities aimed at school groups and families. The week's activities will provide a regional focus on the environmental improvements made in the area and how the quality of life has been affected.

Butte, Mont.: The National Center for Appropriate Technology will be holding an open house with demonstrations of small-scale technology developed in the last decade. In ten other Montana towns and cities the Alternative Energy Resource Organization will sponsor presentations and workshops on new, environmentally-sound energy resources and conservation.

Jersey City, N.J.: A sunrise celebration at Eagle Rock, overlooking the Manhattan skyline, will kick-off day-long events at Liberty Park. April 22 is the tenth anniversary of the New Jersey Department of Environmental Resources, which will be focusing on coastline issues in conjunction with Year of the Coast activities.

Concord, Mass.: Week long activities will include special environmental curricula in public schools, workshops, and field trips with special attention given to drinking water issues of the community and the impact of hazardous wastes.

Fresno, Calif.: The First National Recycling Conference will be held April 21-24 to gain perspective on what has developed in the last ten years in recycling and what needs to be done in the future. Further south the San Diego State University Center for Appropriate Technology will hold an Earth Day '80 fair with a skate-a-thon to raise money for the center.

Memphis, Tenn.: The Orpheum Theatre, a turn of the century vaudeville showcase at the head of historic Beale Street, will host an open house. This great architectural masterpiece has been saved by citizen action and serves as a cultural magnet in downtown Memphis.

This is just a sampling of

what people are doing all over the country to celebrate Earth Day '80. You can demonstrate your support for the environment by participating in activities on April 22. Better yet, why not organize one yourself?

Work with others in your community to sponsor Earth Day '80 activities. Focus on the constructive ways you can improve the quality of the environment in your home, your workplace, your community, your State, in other words, in *your* environment.

If you have an environmentally-related activity planned during late April or early May, why not move it to April 22 to give more attention to the efforts?

Obviously, there are different kinds of events and activities that will be part of Earth Day '80. Only a few are mentioned here. If you have ideas or would like to help organize something please contact the National Earth Day '80 Office. The address and phone are: Earth Day '80, 1638 R Street, N.W., Washington, D.C. 20009, (202) 293-2550.

As a national clearinghouse for Earth Day '80 and the achievements that have been made in environmental quality, we are collecting examples of success stories. If you have worked to improve the environment in your area, please send us a recent newspaper article or fact sheet on your efforts. We would like to share your accomplishments with others.

The tough decisions we faced on the first Earth Day did not stop us from setting goals that now stand as a legacy. We have proved what can be done. Now we must make sure those goals are not cast aside for short-term and often illusory benefits. From coast to coast and around the world in those communities where the environmental movement has its roots, celebrations of Earth Day '80 will prove that the environmental ethic is strong and that it is, in fact, a lifestyle. □

Mike McCabe is Executive Director of the Earth Day '80 Office in Washington, D.C.

The Green Season

The swelling dawn chorus of songbirds, the splash of a whistling swan returning to a country stream, the bright yellow blooms of a forsythia still ringed below with melting snow, and the insistent mating call of spring peepers, tiny frogs just awakening from winter hibernation.

These are just a few of the results produced by the silent turning of the vast celestial machinery that brings us spring. As it has through the years, the return of this green season can bring hope and an element of certainty and order to an often confused and troubled world.

Yet, commenting on the general indifference of many people to the arrival of spring, Louis J. Halle, in his minor classic, "Spring in Washington," wrote:

"Another year I shall . . . insert advertisements in the newspapers after New Year's Day calling attention to the forthcoming arrival of spring in town, proclaiming it the most lavish spectacle on Earth and offering hilltop or valley-bottom seats at a stiff price.

"You will see people flock to buy tickets, though they never thought it worth a free view before."

In the same way, hundreds of Washington bus commuters cross the Potomac every evening without a glance at this majestic river or the spectacular sunsets that often light up the western skies.

While many of them would be willing to stand in line at an art gallery to see a superb painting of a sunset, they are blind to the opportunity to see the infinitely more glorious actual setting of the sun.

Apart from the beauty of spring, this is an ideal time to begin taking part without charge in one of the most challenging games in the world—fathoming the secrets of nature.

While the study of the natural world is a task of awesome complexity, involving many scientific fields, learning about nature can offer rewards at many different levels.

Just as it is possible to appreciate a symphony without knowing much about music so one can enjoy a sunset without knowing solar physics. Yet the more we know about a subject, the keener is our appreciation.

The treasures of field and woods offer a grandeur and richness quite lacking in the sterile world of parking lots, neon signs, and gasoline stations.

Some of the wonders offered in March in the Washington area are the dusk courting flight of woodcocks; the arrival of pine warblers, usually the first of these butterflies of the bird world to return here; the birth of otter, rabbit, and mink kits; the blooming of pussy willows and the perfumed trailing arbutus; the nesting of bluebirds; and the arrival of rockfish, shad, and herring as these fish move from the sea to spawn in their river birthplaces.

Even the apparently ordinary bud of a tulip poplar tree is a jewel worth examining. Open

the duck-bill shaped bud and notice with what exquisite care the new leaf is folded within.

The simplest of flowers can offer much to intrigue us. The violet, for example, blooms in more than 50 varieties. It comes in deep purple, pale blue, white, and even green shades.

Pondering the lesson of a flower, Tennyson wrote "Little flower, but if I could understand what you are, root and all, and all in all, I should know what God and man is."

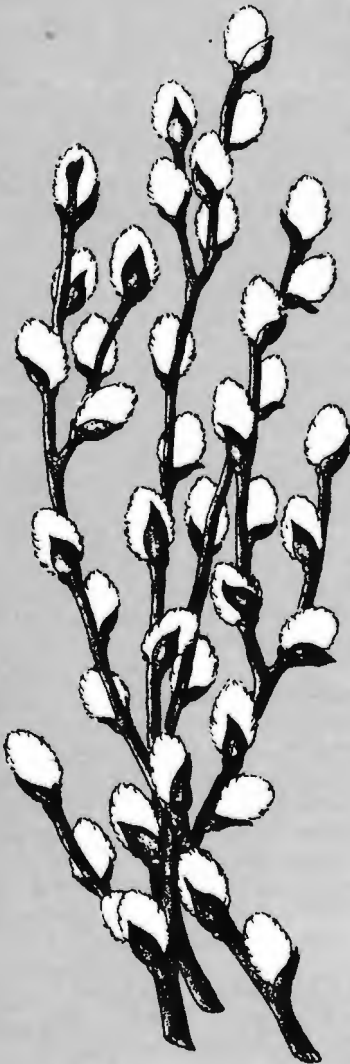
Now that the snows of winter are being washed away by rains and the pulse of the natural world is beating at its highest, we can once again begin to enjoy the lingering daylight hours of the new season.

From a hemlock tree the white-throated sparrow is sounding its plaintive call "Old Sam Peabody, Peabody, Peabody," and from a shadbush a cardinal is briskly singing "What Cheer, What Cheer" as we resume our walks over the greening land.

As more people start to recognize the delights of the outdoors, it is unlikely they will quietly acquiesce in their destruction by pollution.

Yet without the marshalling of new environmental supporters, we risk the fate cited long ago by Wordsworth:

"The world is too much with us late and soon,
Getting and spending we
lay waste our powers.
Little we see in Nature that
is ours. . . ."—C.D.P. □



Preserving A Colonial Discovery

what like sonar systems that are used to map ocean floor contours. The radar system can, however, record the presence of a number of superimposed layers or deposits of artifacts in the ground. (Previously a ground penetrating radar system was investigated by EPA's Office of Research and Development as a means of locating buried pipes and utility lines.)

The radar study required about 10 days in the field. After the data were processed and interpreted, they were superimposed on a map of the district. The map was not as one would hope—a nice orderly representation of foundations, wells, and privies. Rather it was a representation of the current state of the remains—fallen-in walls and activity areas mixed with the various soil strata. However, the good correlation with the existing historic maps of the area confirmed the overall accuracy of the radar picture.

Based on the results of the radar study, archeologists drew several conclusions. First, historic remains were present in a continuous line along both sides of Landing Lane. No gap was found in subsurface remains that could provide an opening for the pipe. This left a choice between the original proposed alignment for the new sewer and the box culvert alternative which would use the old trench of the existing sewer. The radar study indicated that either alternative would substantially disturb subsurface deposits of cultural materials. A final factor entered into the routing decision. There would be a great deal of movement of heavy equipment over parts of the site during construction. The original alignment was better protected from this, with more than three feet of shale deposited over the remains. This could thus limit the area of direct impact to a 15-foot-wide trench across the area of the site. The radar study had provided the necessary "hard" information to allow the selection of a corridor for the pipe with minimum impact on the cultural resources.

Data Recovery

The next step was to develop a Memorandum of Agreement with the Advisory Council on Historic Preservation detailing what EPA would require before and during actual construction. The principal effort beforehand was the careful excavation of those sections of the site that would have been destroyed by the pipe installation. Every effort was made to design a "data recovery operation" that would reduce the time in the field, to make the

ground quickly available for the pipe installation. Here again the radar study proved its usefulness by providing an advance look into the subsoil, pinpointing the parts of the corridor that would need prior excavation. Scientists needed advanced technology in the excavation effort itself with the use of an infrared recording transit to determine the source and features of artifacts. They also used overhead stereo photography to record details of the relationship of artifacts as they were discovered. An on-site computer terminal allowed rapid coding and sorting of data, providing prompt feedback to the excavation crew. With these aids the Rutgers team under the direction of Dr. Grossman was able in an eight-week excavation period to carefully and accurately remove the material that would normally have required an entire field season to excavate.

Future Directions

The next phase is now being carried out. A year of laboratory and analysis work will result in a detailed account of the life of the occupants of the Landing community. This information will be made available to help archaeologists and historians piece together the steps in the economic and social development of New Jersey. Contemporary problems in land use can

also benefit from the study of adaptations and solutions from the past. For example, preliminary analysis of the historic Landing Lane material is identifying the problems of flood-plain residents that we are familiar with today. Perhaps the solutions from 200 years ago will help form the basis of new approaches for the future.

EPA's wastewater treatment program has greatly benefitted from experience with the Landing Lane discovery and excavation. Subsurface radar studies have been carried out in other urban centers in Region 2, where the access to the subsoils is limited before exposure by the actual construction. Of greater importance is EPA realization of the need for advance discovery and evaluation of any cultural resources that might be disturbed by construction activities. This early concern is necessary if we are really to conserve these cultural materials which are part of the country's heritage. □

John Vetter is Chairman of the Department of Anthropology at Adelphi University, Long Island, N.Y. and consultant to EPA in cultural resource management. Richard Coleates is a wildlife biologist with EPA's Region 2.

This bowl turned up in the excavation at Raritan Landing archeological site.



A review of recent major EPA activities and developments in the pollution control program areas.

AGENCYWIDE

EPA Budget

President Carter has proposed an increase in the fiscal year 1981 budget for EPA with substantial increases in the hazardous wastes program.

The Agency's total budget would be \$5.34 billion, including \$3.7 billion for constructing sewage treatment plants, \$1.39 billion for the Agency's operations, and \$250 million for the new Oil and Hazardous Substances Liability "Superfund." The workforce would grow to 11,237 from last year's 11,015.

The proposed operating budget would increase by \$105 million and 222 employee work-years. It would include increases of 47 percent in dollars and 91 percent in personnel for the hazardous waste portion of the solid waste program.

"When viewed in the context of the President's effort to restrain the growth in the Federal Budget, this budget demonstrates a continuing commitment to solve such problems as air and water pollution, hazardous wastes, pesticides, toxic substances, and other threats to public health and the environment," said EPA Assistant Administrator William Drayton.

The largest portion of the EPA budget will continue to be directed towards improving water and air quality: \$422 million and 3,571 employee work-years for water programs, including drinking water, and \$248 million and 1,888 employee work-years for air programs.

Flexibility Urged

EPA Administrator Douglas M. Costle has urged that States and cities be given more flexibility in the use of Federal grant funds to deal with environmental problems. Costle said the Integrated Environmental Assistance Act, now being considered by Congress, would give the environment's front-line managers (in State and local governments) the flexibility, encouragement, and resources to improve the management of their programs.

Testifying before the Senate Subcommittee on Environmental Pollution, Committee on Environment and Public Works, Costle said the proposed law would allow up to 20 percent of the funds currently allocated under EPA's various grant programs to be shifted from one program to another, or to new cross-cutting programs such as common inspections, a common laboratory, or a common enforcement program. EPA currently administers 16 separate, or "categorical" grant programs for State and local assistance, involving \$300 million in FY 1979.

Costle also said that the integrated assistance program would not be mandatory and that the Act would not change current methods of requesting funds from Congress or methods of allotting funds to recipients.

AIR POLLUTION

Auto pollution

Air quality in high altitude regions of the country would improve significantly as a result of new auto pollution standards proposed by the EPA. The proposed standards would reduce exhaust emissions from passen-

ger cars and light-duty trucks sold at altitudes above 4,000 feet beginning in 1982.

At the same time, EPA has proposed another set of rules requiring auto-makers to make instructions available to auto service outlets and the public on how 1968 and later model vehicles could be modified to lower tailpipe emissions if operated at high elevations. The modification would be voluntary and could not cost the car owner more than \$20, according to the proposal. Auto producers would have to submit instructions to EPA not later than July 1, 1981.

The proposed standards would require that all vehicles either meet or be capable of meeting the high altitude standards beginning with the 1982 model year. Auto-makers could achieve the standards in one of two ways: by producing cars that meet the standards as they come off the assembly line or by producing cars that can be modified to meet the standards if sold in a high-altitude area.

Lead Pollution

New regulations proposed by the EPA would cut atmospheric lead emissions from new lead-acid battery plants by 97 percent. There are two major types of lead-acid storage batteries manufactured in the United States: 1) starting-lighting-ignition batteries, which account for 80 percent of the market, and 2) industrial storage batteries, used in low-voltage power systems and industrial fork-lift trucks. Only new facilities at lead-acid battery plants with the capacity to produce 500 or more batteries per day, or existing ones that have been modified or reconstructed, would be cov-

ered by the proposed regulations.

The proposed rules would limit atmospheric lead emissions from new battery plants in 1985 to 3.1 tons per year—as compared to 104 annual tons that could be emitted if there were no Federal rules.

Lead has its most pronounced adverse effects on the human blood-forming, nervous and kidney systems, but it may also harm the reproductive, endocrine, hepatic, cardiovascular, immunologic, and gastrointestinal process. Exposure to high levels may have severe and sometimes fatal consequences such as brain disease, colic, palsy, and anemia.

EPA estimates that the capital cost of installing pollution control equipment to meet the proposed standards in the next five years would total about \$8.6 million. The standards would increase annual operational costs to the lead-acid battery industry in 1985 by about \$4 million. The wholesale price of a battery manufactured at an affected plant would be increased by about 30 cents or 1.5 percent.

ENFORCEMENT

Hazardous Waste

The Department of Justice, on behalf of EPA, has filed a lawsuit alleging hazardous waste disposal practices at the Flemington Landfill, a waste disposal site in New Hanover County, N.C. Named as defendants in the lawsuit are Waste Industries Inc., Waste Industries of New Hanover County, several private parties owning land in the County, and the New Hanover County Commissioners.

In the suit the Department of Justice charges the defendants with con-

tributing to an imminent and substantial endangerment to human health and the environment, caused by the leaching of dangerous chemicals into Flemington groundwater. The contaminated groundwater has reached a number of residential wells in the vicinity of the landfill. Contaminants found in water samples taken from those wells include four known carcinogens and several suspected carcinogens as well as high concentrations of lead.

For more than a year, many residents in the vicinity of the landfill have had to obtain their domestic water from three surplus water tanks obtained and filled by the County. Last winter, these tanks froze on several occasions, and have once again begun to freeze. They are also subject to rusting and in some cases located over one-half mile from the affected residents, many of whom are aged and unable to use the tanks.

The suit is a result of an eight-month investigation by EPA and part of a nationwide effort by the Agency and the Justice Department to end the threat posed by hazardous waste disposal sites.

GM Recall

The EPA has ordered General Motors Corporation to recall approximately 140,000 of its 1976 Oldsmobile, Pontiac, and Buick vehicles with the 260 cubic inch displacement (CID) engine which failed to meet Federal exhaust emission standards.

The vehicles involved include the following model lines: Oldsmobile-Cutlass, Omega, and F-85; Pontiac-Lemans, Grand LeMans, and Ventura; and Buick Skylark. Vehicles sold in California are not included in the order.

According to the Agency, there are defects in the Exhaust Gas Recirculation (EGR) system and improper carburetion which cause the vehicles to emit pollutants in excess of the 1976 Federal standard for oxides of nitrogen.

Such pollution can adversely affect persons with acute respiratory illness, causing difficulty in breathing, chest pains, and bronchitis in children. In addition, these emissions are a major constituent in the formation of urban smog and are suspected of contributing to acid rain.

Gas Stations

EPA has announced actions against six gasoline retailers which could involve \$19,000 in civil penalties for illegally using improper gasoline nozzles. The Agency has issued civil complaints against the following California stations for allegedly equipping leaded gasoline pumps with undersized nozzles, which allow the introduction of leaded gasoline into vehicles that should use unleaded gasoline: Dick's Exxon (Tracy), Don's Texaco (Tahoe City), Arco Mini Mart (Los Angeles), Mohawk Petroleum (Los Angeles), USA Petroleum (Santa Monica), and Discount Gas (Van Nuys).

Using the wrong fuel ruins the catalytic converter, a major emission control device, and results in an eight-fold increase in vehicles' emissions. Use of leaded gasoline in vehicles requiring unleaded fuel increases emissions of airborne lead, carbon monoxide, and hydrocarbons.

NOISE

Noise Regulation

The EPA has established a new regulation to con-

trol noise from some of the vehicles and equipment in the Nation's approximately 4,000 railroad yards. The regulation sets limits on yard noise from switcher locomotives, locomotive testing equipment, track brakes (called retarders), and car coupling operations. In addition, the regulation makes minor revisions to standards established in 1975 putting ceilings on noise from locomotives and railroad cars traveling around the country.

The Agency estimates that between 6.5 million and 10 million people in the U.S. are exposed to rail noise levels in excess of amounts considered to be protective of public health and welfare. EPA said the new regulation will provide a 10 to 15 percent reduction in noise impact on these people.

Administrator Costle said the regulation, written under Section 17 of the Noise Control Act, is the first of two regulatory actions the Agency will take to comply with a court order to revise its interstate rail carrier noise regulations. The second action will be the issuance next year of a standard for the collective noise coming from rail yards. Total cost to the industry to comply with this final regulation is estimated to be approximately \$24 million annually.

PESTICIDES

Review System

The EPA is developing a new system for reviewing the safety of pesticide products. Called the "registration standards system," the new approach would consist of setting safety standards for pesticide ingredients, then approving or "registering" the sale and use of individual products that meet the standards and disapproving those that don't. Pesticide com-

panies could appeal disapprovals to the Agency.

The new system does not change the health and environmental criteria used by the Agency to decide whether to approve a pesticide. Rather than review the safety information for each product, the Agency would review it for the toxic ingredient common to many products. It would then prescribe what it considered acceptable concentration and uses of this ingredient and approve those products that meet these conditions. There are now about 1,500 pesticides ingredients and some 35,000 products that contain them.

Officials hope the new approach will speed up the review of new products and of the thousands of insecticides, herbicides, and other pesticides already in use.

The Agency would like to begin proposing the new standard by the end of this year.

Crop Insurance

The Federal agency that insures farmers against crop losses from insect damage and other natural hazards has recognized on an experimental basis that "Integrated Pest Management (IPM)," a pest control technique, may be more effective than traditional pesticides spraying in curbing destructive pests on cotton.

The Federal Crop Insurance Corporation (FCIC) of the U.S. Department of Agriculture, in cooperation with the EPA and the Arkansas Agricultural Experiment Station and Cooperative Extension Service, will offer insurance this year to cotton growers in six Arkansas counties who belong to a Community IPM Program for combating cotton bollworm and budworm insects.

In the past, FCIC has developed premium structures on the basis of conventional pest control measures, usually the routine application of chemical pesticides. The Arkansas project will mark the first time that FCIC has determined IPM systems to be a recognized practice for insurance protection and is developing actuarial data for IPM practitioners.

Among the IPM measures used in the Arkansas program are "scouting" or carefully checking fields for insect build-ups to limit insecticide spraying to the most effective times, the use of pest-resistant cotton varieties, and frequent field cultivation to bury part of the insect population.

Mother's Milk

The EPA has announced that it found no detectable residues of the chemical dioxin (2,3,7,8 tetrachlorodibenzo-p-dioxin, or TCDD) in 103 milk samples from nursing mothers in three western States.

Dioxin, an extremely dangerous chemical, is an unavoidable component of the herbicides 2,4,5-T and Silvex, which have been sprayed to control weeds and brush in forest areas, rights-of-way, rangeland, and crops for many years. The samples were obtained from 103 mothers selected from areas in California, Oregon, and Washington where the dioxin-containing herbicides were known to have been used. EPA has notified each mother who participated in the survey of the test results.

Dioxin has caused birth defects and miscarriages in laboratory animals, including monkeys, at the lowest possible dosage, and has caused cancer in other laboratory animals at low levels. Most uses of 2,4,5-T and Silvex

were temporarily halted by EPA last spring when scientists found a statistical correlation between the spraying of 2,4,5-T in a forested area of Oregon and an above normal rate of miscarriages in the same area.

EPA emphasized that no residues were detected using the most modern scientific equipment. This equipment is capable of measuring residues down to 1 to 4 parts per trillion. At this time, the technology does not exist to measure residues below that level. It is not known whether any dioxin is present below the limit of detection.

SOLID WASTE

Advance Notice

In a major step to expedite an effective national program for the safe control and disposal of hazardous wastes, the EPA has given advance notice of the requirements for States in setting up and enforcing their hazardous waste programs. Final regulations will be issued in April defining requirements for interim and permanent State hazardous waste programs.

"EPA wants to support and assist States to develop strong, effective programs for managing hazardous wastes. We also want to avoid duplicative Federal and State programs requiring unnecessary costs and red tape," said EPA Administrator Douglas M. Costle.

About 83 percent of hazardous wastes are generated in twenty states: California, Florida, Georgia, Illinois, Indiana, Louisiana, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Wisconsin, and West Virginia. □



Christopher Palmer

He has been named Special Assistant to the Deputy Administrator, with responsibility for advising her on hazardous waste, energy matters, and other special projects. Palmer had been Chief Energy Advisor to Senator Charles H. Percy since 1976 and Special Energy Counsel to the Senate Subcommittee on Investigations, since 1979. He was a senior consultant to the firm of Booz-Allen & Hamilton from 1973-76, specializing in energy studies for government agencies. Palmer was an officer in the British Navy from 1965-72. He earned a bachelor's degree in mechanical engineering in 1970, and a master's degree in ocean engineering in 1971, from London University, England, and also a master's in public administration from the John F. Kennedy School of Government at Harvard University in 1973.



Charles S. Warren

He has been appointed Regional Administrator of EPA's office in New York City, with responsibility for the States of New York and New Jersey, Puerto Rico and the Virgin Islands. "Charles Warren will bring to his new job a wealth of environmental, managerial, and liaison experience in the executive and legislative branches of the Federal government," said Deputy Administrator Barbara Blum. He had been Director of the Office of Legislation at EPA headquarters since 1977. Before joining the Agency, Warren was chief domestic advisor to U.S. Senator Jacob Javits of New York. He was an associate with the law firm of Donovan, Leisure, Newton and Irvine in New York from 1965-1967 and with the Washington law firm of Arent, Fox, Kintner, Plotkin and Kahn from 1967-1970. Warren graduated Phi Beta Kappa from the University of Florida in 1962. He earned a law degree from the Columbia University School of Law in 1965 and an L.L.M. degree from the New York University School of Law in 1967.



Frank S. Napal

He has been named Director of the Office of Public Affairs in Region 2. Napal was most recently Director of Communications for the Floating Hospital, a non-profit preventive health care center for underprivileged children and senior citizens. He was also director of the Political/Judicial Communication program at Emerson College in Boston from 1970 to 1975. In addition to teaching, he served as a political consultant and campaign manager for numerous Bay State politicians. An accomplished speaker, Napal is the recipient of more than 130 intercollegiate awards and he represented the United States during the 1967 World's Fair Debate Series. He also toured England lecturing on the American political system. He has a bachelor's degree in Business and Industrial Communication and a master's in Political and Judicial Communication from Emerson College.



Robert L. Booth

He has been elected to a 3-year term on the Board of Directors of the American Society for Testing and Materials, a source of voluntary consensus standards for materials, products, systems, and services. Booth is Deputy Director of EPA's Environmental Monitoring and Support Laboratory, Cincinnati, Ohio. He joined the Federal Water Pollution Control Administration, an EPA predecessor agency, in 1962 as a research chemist, and was supervisory chemist from 1967-74. He served as technical coordinator for the laboratory from 1974-76 before becoming Deputy Director. Booth received a bachelor's degree from Indiana State University in 1955 and a master's from the University of Illinois in 1961.

A Conserving Society

Continued from page 37

forts us; it weakens any sense of the need for urgent action on what appear to be distant threats.

Our Brief Span

But the threats are not so distant—for, in comparison with the life of our globe, the human history is little more than an incident. As David Brower once described it, if we compress the four-billion year existence of the Earth into the six working days of the week, with creation beginning Monday morning, we find that the humblest form of life—a microbe—did not appear until Tuesday at noon. From Wednesday through Friday primitive forms of life experimented, competed, found their niche, or vanished. At 4 p.m. on Saturday, the large reptiles appeared, and at 9 p.m., our oldest trees. On this one-week scale, people—four million years old—emerged at three minutes to twelve. The Industrial Revolution started at one-fortieth of a second before midnight.

Thus our modern history of environmental depletion—compounded by technological development, massive resource-consumption, and unprecedented population growth—is quite recent, quite new; in our global week, it amounts to no more than the blink of an eye. It is insanity for us to assume that our modern patterns of environmental depletion can continue indefinitely.

We must recognize that the Earth does not march to a human clock. The ozone now disappearing from the stratosphere will not be replaced for a century or more; the lakes whose life has been destroyed by acid rain could remain in that condition for decades, *even if we eliminated immediately* all the emissions that produce it.

We have begun to arrest the damage of past years, and to prevent the future deterioration of our finite global commons. But we must broaden the scope and hasten the tempo of our cooperation—for human activities are shrinking the size of our global commons at a geometric, not an arithmetic, pace.

The human kind stands at twelve o'clock. What lies beyond, we are not sure. The future of our species depends on the ability of our social and political institutions to change human behavior as rapidly as we have been changing this small pasture that sustains our common life. Our actions to conserve the Earth's resources—including its air and water—will determine whether humanity is sinking into a long and bitter night . . . or whether we are assuring for our children a new dawn. □

Passenger Trains

Continued from page 37

We operate today with about 1,200 revenue passenger cars. For a nationwide system as large as ours, this is an inadequate number. By comparison, the British, French and Germans operate their rail passenger services with between 15,000 and 18,000 cars each on systems which are less than half our size. In Italy, there are about 11,000 rail cars in service and South Africa operates nearly 10,000. The Japanese, restricted by their island geography and mountainous terrain, operate more than 26,000.

Because we operate so few rail passenger cars over so large a network, we are very thin—systemwide. About 60 percent of our network is served by only one train a day, or less, each way. One of the most important attributes of common carrier transportation is frequency of service. The British and French have proved recently that every time they have been able to increase frequency of service, they have increased ridership. A recent report by British Rail, "The Marketing Case for High Speed Trains," says:

"Research confirms convincingly that reduced journey times resulting from higher speed coupled with good frequency have been the most significant factors in attracting more rail passengers.

They go on to say:

"Principal cities and towns are linked with London at least every hour. Cross country service intervals are often as good and where there is lower traffic potential, a frequency of at least every two hours is usual."

You can see what this says about once-a-day service.

From my hotel in Tokyo, I could see the Shinkansen trains leaving Tokyo station every seven minutes for that 100 mph dash through the populous eastern corridor of Japan. We know we must get into that business in our populous corridors, but to get there from where we are now will take some long steps, every one of which must be well planned. We have some very real obstacles along the way.

Congress has joined with us now and has provided us with future funding so that we may go out and work with selected industries to re-create this manufacturing capability here at home. To get all of this started again will take a lot of money, a lot of time and a lot of planning. We are scouring the industries of the world today looking for the products we must have to improve our fleet in this country. We shall have to work out the process of technology

transfer to the United States in order to rekindle in our industry a joint and mutually beneficial arrangement by which we shall once again have a vital rolling stock industry in this country. This is a big job for us in Amtrak and it is a huge task for American industry. With the help of the Congress which we obtained last year, I am confident we can get the job done.

And there are other steps. It is only reasonable to direct our efforts toward the most important targets first. In every corridor we serve today ridership and the demand for more service are both rising dramatically. We have got to keep our nationwide system alive and well, and we have got to improve service in many corridors. We have a major improvement program underway in the Northeast Corridor, which will be completed in the mid-80's.

In this country the enormous task before us is that which involves the development and resolution of some process which will permit the improvement of track for passenger trains. Unlike the situation in other countries where the track is owned by the government, all but a few segments of the more than 200,000 miles of track in this country are privately owned and are designed for the freight operations of those private owners. Rail passenger service in this country depends on the condition of that privately-owned track.

The average speed of Amtrak trains over our nationwide network is just above 40 mph. The speed rail passenger trains ought to be able to run in order to provide a reasonable alternative to the automobile lies somewhere in the 75 to 105 mph range. At this speed a passenger train can deliver door-to-door elapsed times equal to or better than automobile travel.

We hope to see better track as the railroads invest more money in their systems. We hope to be able to improve important sections of the track ourselves to meet our faster requirement. We believe there is a possibility that some segments of track, especially in corridors, may become dedicated solely to passenger service. If these improvements can be brought about, we shall see better passenger service. This improvement is another one of those things that must be approached realistically in terms of time and money with the cooperation of the government and the private railroads.

This is a brief review of our current problems and of our plans for the future of rail passenger service. I believe it is important to bring public attention to these matters in order that we may all work together to build a better railroad. This is a very big task and it can only be accomplished with the efforts of all Americans, men and women alike. □

Alan Boyd is President of the National Railroad Passenger Corporation (Amtrak).

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REGION

Education Program

Region 1 is sponsoring the eighth consecutive poem and poster program in environmental education for elementary school students in New England. Paul G. Keough, Director of the Office of Public Awareness at the Boston Regional Office, explained that elementary school teachers throughout the region will discuss environmental issues with their students. "After the discussion has been completed," Keough said, "those teachers enrolled in the program will have their students prepare a poem, poster, or short story about the environment. They will then forward the two best entries from their class to our office for judging." In April a panel of citizens will review all of the entries and select the most creative ones for recognition. Region 1 awards plaques to the 100 best entries and certificates to the 200 runners-up. In previous years more than 3,500 elementary school teachers and 100,000 youngsters from New England have participated annually.

tion, "Region 2 1977-78 ERAMS Summary Data Report," notes the results of measurements taken in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands as part of the Environmental Radiation Ambient Monitoring System (ERAMS). The network, which operates nationwide, tracks radiation patterns near facilities that are part of the uranium fuel cycle, such as nuclear power plants, fuel fabrication facilities, etc. The system provides data on pollution levels for standard-setting, to verify that areas meet Federal standards, to evaluate controls, and to determine environmental trends. The information helps scientists assess population exposure to radioactive pollutants. Some results of the monitoring are: average levels of radiation in New York State water samples were less than 2 percent of the EPA Drinking Water Standard for tritium and 7 percent of the limit for strontium 90; average levels in New Jersey were less than 1.5 percent of the EPA Drinking Water Standard for tritium and 3 percent of the limit for strontium 90, and San Juan drinking water samples were less than 1.5 percent of the EPA Drinking Water Standard for tritium and 4 percent of the limit for strontium 90.

the city have required reductions in sludge dumping each year. In 1972 when the Agency first regulated ocean dumping, Philadelphia disposed of some 142 million pounds of sludge each year. The last permit requires that no more than 40 million pounds of sludge be dumped for the 12-month period ending June, 1980, and not more than 10 million pounds from July to December, 1980. These conditions are based on the terms of a May, 1978, Consent Decree between Philadelphia and EPA that ended more than three years of disagreement and litigation over ocean dumping and the operation of the City's three sewage treatment plants. One of the most promising alternatives being developed by the City to replace the ocean dumping is the use of sludge to reclaim strip-mined land in upstate Pennsylvania. Other methods include land application or landfilling of liquid sludge, sale or giveaway of composted sludge, and manufacture of road repair material from sludge and incinerator ash.

Air Agreement

The City of Danville, Va., recently signed a consent agreement with Region 3 to end air pollution at its Brantly Steam Generating Plant and to finance a \$10,000 environmental study in lieu of a fine. The agreement will end a pollution problem that began in 1974 when EPA found that the coal-burning plant, which supplies electricity to Danville, emitted more than 4.5 times the amount of particulate matter allowed by State air pollution regulations. EPA ordered Danville to install pollution

control equipment but the City failed to meet the required deadlines. The Agency brought suit against the City to resolve this long-standing problem. State and Federal officials recommended a number of solutions, including installation of controls that would have allowed Danville to continue burning coal. City officials chose to control pollution from the plant by limiting coal to 10 percent of the fuel input. They also chose to fund a project of environmental significance to the general public rather than pay a fine to the Federal Government for past violations. EPA often approves such studies based on recommendations of State officials. The Virginia State Water Control Board suggested a study of the nesting habits, distribution, and mortality of the loggerhead sea turtle, which lives on the eastern shore of Virginia and is considered a threatened species. The Virginia Institute of Marine Science and the School of Marine Science at the College of William and Mary will conduct the study.

4

REGION

Air Study

The National Commission on Air Quality (NCAQ) will evaluate portions of 4 States in Region 4 as part of a national study of the air pollution control effort. Under the 1977 Amendments to the Clean Air Act the Commission must evaluate the substance and implementation of the Act and recommend legislative or regulatory changes to more effectively promote the goals of the Act. The

Commission will begin a study this month of the Ohio River Valley from Louisville, Ky., to Dayton, Ohio. There are several air quality disputes in the area among States and other political entities. Each political jurisdiction has different emission limitations, control measures, and enforcement practices for the same interstate metropolitan area. Also, there is no accepted method for allocating increments under EPA's Prevention of Significant Deterioration regulations to air pollution sources in one State that may have an impact on another State. The Commission may draw up procedures to resolve these problems. The NCAQ also will examine the State of Florida, and the eastern TVA region, which includes sections of Tennessee, Alabama, and Kentucky, as part of its study of the ability of State and local governments to implement and enforce the Clean Air Act.

5

REGION

Akron Recycles

EPA Deputy Administrator Barbara Blum spoke recently at the dedication of the Akron, Ohio, Recycle Energy System, a facility that recycles the ferrous metals, aluminum, and glass from 1,000 tons per day of solid waste and burns the remainder to make steam for local businesses. The system replaces a 75-year old coal-burning plant that was obsolete and not in compliance with State air pollution standards. By using waste for fuel

2

REGION

Radiation Report

Radioactive pollution levels continued to be well below Federal health standards in samples of air, water, and milk taken in Region 2, according to a report published recently by EPA. The publica-

3

REGION

Ocean Dumping Halt

Region 3 recently issued the City of Philadelphia its final permit to dump sewage sludge into the ocean off the coast of Delaware/Maryland. Under this permit all dumping must end December 31, 1980. EPA permits to

the plant relieves pressure on the city's landfills, which were filling up rapidly, and obviates the need to burn 14,000 tons of coal. In her remarks Deputy Administrator Blum said it is significant that the system is the result of local initiative, construction, and funding; no Federal funding is involved. To finance the project, Akron and Summit County sold \$5 million in general obligation bonds and got backing from the State of Ohio Water Development Authority for another \$46 million in revenue bonds. According to David L. Chapman, Deputy Director of the Akron Department of Public Service, all operating costs of the plant and the retirement of the bonds will be covered by revenues generated by operation of the plant.

6

REGION

Waste Awareness

Region 6 has initiated a public awareness campaign to inform citizens about the dangers of hazardous waste sites. More than 20 radio, television, and newspaper representatives toured the Motco hazardous waste disposal site near Texas City, Tex. along with Congressman Ray Roberts, EPA Deputy Administrator Barbara Blum, Region 6 Administrator Adlene Harrison, Assistant Administrator for Water and Waste Management Chris Beck, and State and local officials. Hazardous waste disposal at the 11.2 acre site began in 1959. Styrene tars, acids, organics, chlorides, and heavy metals from area

industries were dumped there before the operator went bankrupt and stopped operation in 1976.

Oil Spill

The Region 6 Response Team met in Corpus Christi, Tex. recently to plan ways to protect the Texas coastline from oil that may be carried to shore from the blowout at the Ixtoc-1 well in Mexico's Bay of Campeche. The well blew out last June, but the flow of ocean currents kept oil away from the coast. An annual reversal in the current, likely to be completed in April, could carry oil slicks north toward Texas. Officials estimate there is a 20 percent chance of oil hitting in March, increasing to near 100 percent in May or June if the well continues to flow uncapped after March 1. The cleanup effort so far has cost \$7 million.

7

REGION

Energy Independence

Farmers near the Region 7 community of Goessel, Kans., have an answer to the energy crisis—and they call it "Goesseline." The farmers have formed the Consumer Ethanol Production Organization (CEPO—OPEC spelled backwards), with the goal of converting their farm equipment to run entirely on a gasoline substitute. Rather than gasohol, which is 90 percent gas and 10 percent alcohol, they plan to use 160 proof alcohol made from crops grown on local farms and distilled in a solar still. A

local corporation is providing the expertise to build the solar still. Members of the organization feel they have three obstacles to overcome in demonstrating the feasibility of alcohol as fuel. Their first objective is to show that mash left over from the distilling process can be fed to cattle without drying, a process that uses much energy. Second, they must demonstrate that the distilling process can run on solar energy rather than fossil fuels. Finally the biggest challenge will be to show that 160-proof alcohol can be used to run farm equipment. Critics contend that only gasohol is suitable for this use. Some engines may need higher compression settings; all engines will need to be cleaned before receiving the highly solvent alcohol, and there is an unresolved question of how to burn alcohol in diesel engines.

8

REGION

Awards Ceremony

The Denver Regional Office recently recognized 28 citizens for their achievements in environmental protection. The award categories included Environmental Action, Industry, Journalism, Government, and Innovation in Waste Treatment. At the same ceremony 36 EPA employees received the Agency's Bronze Medal for Commendable Service. EPA Administrator Douglas Costle presented the awards. The keynote address was given by actor-environmentalist Robert Redford, who serves on the Boards of Directors of the National

Wildlife Foundation, Natural Resources Defense Council, the Environmental Defense Fund, and Solar Lobby. "Ten years ago," said Administrator Costle, "environmental concern was restricted to a handful of activists . . . who must often have felt like prophets crying in the wilderness. Today, we honor not only citizen activists but representatives of critical institutions such as the media, private industry, and all levels of government . . . institutions in which, a decade ago, we would have been hard pressed to find significant evidence of environmental concern." Regional Administrator Roger Williams said, "Public ardor for environmental protection has cooled some since 1970, but has been transformed into a mature professional movement of scientists, lawyers, engineers, and journalists who are everywhere."

9

REGION

Consider the Connections

EPA officials in Region 9 and elsewhere are constantly being reminded of the interrelated aspects of modern life. Two recent examples follow. California State Air Resources Board officials calculate that if all the cars in the Los Angeles area were suddenly switched to gasohol, hydrocarbon emissions would increase about 25 percent. Although the hydrocarbon increase would be offset by reductions in carbon monoxide and nitrogen oxide emissions, the situation poses

a dilemma for smog-conscious California. Problems in the Middle East and cutbacks in grain sales to the Soviet Union are feeding an already strong enthusiasm for gasohol. In another instance, the City of Phoenix and five other communities in Arizona have lost Federal funding for much-needed expansion of a shared wastewater treatment plant because of cost overruns that have been attributed to inflation. Inflation, the Middle East, and grain sales are not, at first glance, environmental subjects. But, as one official recently observed, "If you're gonna keep up with the environment, you've gotta keep up with everything."

10

REGION

Water Standards

EPA staff testified before the State Board of Health recently about the conservation of Idaho's dwindling population of trout, steelhead, and salmon. The Board was holding hearings to consider proposals that would have significantly weakened State water quality standards. A representative from Region 10 warned that a proposed dissolved oxygen limit would result in smaller adult fish, which would be susceptible to higher mortality. Similar testimony from private citizens and environmental groups was a major factor in the Board's decision early this year to adopt standards that were more stringent than those proposed. The final standards will help prevent further declines in Idaho's fishery resources. □



The Long Tidal River

Continued from page 14

river valley through gifts or outright purchases. Another 1,000 acres are protected by conservation easements that restrict future development of the land. Says Council President Percy, "It's not the amount of land, but the quality of the environment saved that's important." Some of the land purchased by the Council, such as the beaches, has been conveyed to State and local entities for administration, providing continued access to water recreation for local residents. The group has also purchased or held options on a number of islands in the river, making available camping and canoeing stops for people using the river.

At the headwaters of the Connecticut, the river is not officially protected. The Connecticut Lakes are safeguarded by their remoteness and the short summer season of the north country. Much of the surrounding land is owned by paper companies and individuals who have done little development so far.

However, those who would maintain the gains made in water quality on the river

cannot rest easy. While the cleanup and protection activities are making headway along the river the problems of an energy-short era are making inroads as well.

A Mixed Blessing

For example, in the tiny town of Lancaster, N.H. (pop. 4,000) the town council was approached recently by an entrepreneur who proposed to build a small oil refinery in a field outside of town. The refinery, to produce heavy oil and gasoline, would tap a pipeline that extends from Portland, Me., into Canada. Residents, sold on the idea of increased employment and promises of low-cost gas, gave their approval at a town meeting and the proposal was passed by the town zoning board.

After the glow faded, Lancaster reconsidered and some wondered if the disruption of up to 200 construction trucks per day rumbling through town would be worth the 20 jobs that finally would be available. They also wonder about the effects of construction on the Israel and Connecticut rivers, less than a mile from the refinery site. The possibilities of permanent damage from industrial accidents at the site no longer seem to be outweighed by the allure of accessible oil.

The people of Lancaster are asking for an environmental impact assessment from

Mist settles over the upper reaches of the Connecticut River in this view from Peacham, Vt. (See story on P. 10)

Back cover: Sunlight glistens on the grass at Schaefer Prairie, a Nature Conservancy preserve approximately 40 miles southwest of Minneapolis, Minn. (See story on P. 21)

the developer. They are taking a hard look at what this project will cost them and residents downriver. Such involvement on the local level may be crucial to maintaining water quality gains in the future.

Even with the problems that remain to be solved, EPA officials are optimistic. As Administrator Douglas M. Costle told the Water Pollution Control Federation last fall, "We know that large portions of the Nation's waters will not improve until municipalities, States, and industries tackle such headaches as urban runoff, combined sewer overflows, and soil and chemical runoff from forestry, mining, and agriculture. . . . The homely truth is that our water clean-up effort has not yet had time to demonstrate its full impact. We already have noteworthy results across the country—and we will have many more to show in the next few years." □

Chris Perham is an Assistant Editor of EPA Journal.



Official Business
Penalty for Private Use \$300

