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AMERICA'S SHAME

The United States once stood tall as the guardian of natural resources. But Ronald Reagan has relinquished that position. Today the progress of the rest of the world stands as a telling reminder of what America has lost.

BY LARRY TYE PHOTOGRAPHED BY BILL LUSTER

The West Germans saw their beloved woodlands withering under a shower of acid rain. One of every three trees was hurt, one of every 100 dead or dying. The Black Forest, a national treasure, was ravaged. Pollution was also eating into the German economy. So the government struck back with the world's toughest emissions clean-up plan — much tougher than any efforts in the United States.

The Norwegians saw the lakes in their pastoral southern region dying. Every fish perished in every lake in a 33-square-mile area. Because it had no native industry to befoul the air, Norway embarked on an ambitious research program — and found that the pollution was coming from Britain, hundreds of miles away. But President Reagan remains unconvinced that air pollution travels long distances, and he is recommending that the United States keep researching — and not act on — its own acid rain.

The Germans and Norwegians also saw a valuable resource in PCBs, arsenic and other perilous chemicals — chemicals the United States has dumped on the ground for years. The Germans recycle them or safely store them under-

ground; the Norwegians are pioneers in burning them for energy.

The Germans and British saw their mightiest rivers — the Ruhr and the Thames — not as sewers, but as resources. Industries line their banks. But unlike U.S. factories, they work closely with cities to treat sewage and eliminate runoff and other pollutants that have stalled U.S. clean-water efforts.

The Japanese and the French saw how to make nuclear power work safely. Their programs have been successes — while the United States has been plagued with failed plants, failing utilities and millions in good money spent after bad.

Air pollution, water pollution, hazardous wastes, nuclear safety: Four issues on which the United States once set the pace.

Profoundly moved by the environmental awareness of the late 1960s, it passed the world's first comprehensive air- and water-pollution-control laws, hazardous-waste cleanup fund and nuclear regulatory program. It was the first country to devote an agency to the

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safeguarding of natural resources — and the Environmental Protection Agency thrived under Republican and Democrat alike.

Until Ronald Reagan moved into the White House.

His reign over U.S. environmental programs has eroded the United States' standing as guardian of natural resources; it has soiled the American image abroad. The United States has relinquished its lead.

S. David Freeman, a member and former chairman of the Tennessee Valley Authority, said: "The whole world, with the exception of the U.S. executive branch, seems to be moving toward stronger action. Thank goodness many countries haven't followed our example."

Even Reagan's current EPA administrator, William Ruckelshaus, admits that "we've stalled a bit."

To examine the decline in the U.S. world role, a Courier-Journal reporter and photographer spent a month in six European nations — trooping through West Germany's Black Forest and salt mines; touring a Norwegian cement plant and British landfill; talking to industrial leaders, government planners and environmentalists. In the eyes of Europeans, the United States, over the past three years, has fallen from defender of the environment to apologist for polluters.

During his election campaign in 1980, Reagan asserted that trees — and Mount St. Helens — generate more air pollution than cars.

The people Reagan put in charge of EPA and the Interior Department shared his belief that the pendulum had swung too far, that industry had been saddled with too many regulations. During their

first year, Reagan budget planners asked for a 22.5 percent cut in the EPA operating budget from President Jimmy Carter's austerity budget; Congress limited the reduction to 19.7 percent. Staffing was cut by 12 percent.

The reductions have continued. The \$1.2 billion EPA operating budget Reagan requested for 1985 is equal to the agency's spending power in 1974, when pollution was less serious and hazardous wastes were virtually uncontrolled.

Reagan's retrenchment on domestic environmental initiatives was limited by the Clean Air Act and other laws. But in the international arena there were no such limits. Reagan officials ignored a NATO environment program started by President Richard Nixon. Siding with the chemical industry, they ended Carter's progress

toward protecting consumers from dangerous chemicals.

Anne Gorsuch Burford, who ran EPA during the first 22 months of the Reagan presidency, said: "We tried to get all the hoops and loops and procedural regulations down to a minimum. Environmental programs during my tenure emphasized environmental results. . . . We were getting the job done."

But the League of Conservation Voters, a non-partisan environmental group, recently gave Reagan a D-minus in natural resources programs and F's in energy and pollution programs.

"President Reagan has broken faith with the American people on environmental protection," the League study concluded. "In the name of 'getting the government off our backs' they are giving away our natural heritage." □

ACID RAIN

Germany's forests are no longer black. Norway's lakes are dying. The culprit is acid rain, and they know what causes it. But while the Germans and Norwegians move aggressively to clean up air pollution, the United States prefers to study

Senior environmental officials from 36 nations met in Geneva, Switzerland, in 1979 to discuss acid rain — the broadest dialogue ever held on the issue.

President Jimmy Carter's U.S. delegation, eager to clean up emissions, found itself mediating conflicts that divided the Europeans. West Germany, one of Europe's worst air polluters, believed that too little was known about acid rain to decide how to control it. Norway, whose lakes had been devastated by acid rain, insisted on an immediate, aggressive cleanup program.

The 36 nations followed a middle line laid down by the United States: They agreed to consider ways to cut acid emissions, but delayed any action.

Since then, the U.S. government has lost interest in stopping acid rain and done nothing to implement the modest Geneva agreement. President Reagan, borrowing a line from West Germany, says too little is known about the problem to begin solving it.

West Germany, meanwhile, has made a dramatically different turnaround: Today it is one of Norway's strongest allies in pushing for emission controls, much to the satisfaction of its neighbor to the north.

So as the United States idly watches, Norway demonstrates how acid rain is caused, how it

travels and how it wreaks havoc upon lakes and forests, while West Germany shows how the pollution can be cleaned up.

The evidence that led to Germany's stunning reversal on acid rain is in the yellow needles that cover the snow in the Black Forest. *Schwarzwald*, as it is known, is immense, covering 2,500 square miles in southwestern West Germany. It is also mountainous.

But the Black Forest's most distinguishing characteristic — to the millions who have read about it in German literature and thousands who have visited it each year — has been the unusual hue that gave it its name. The forest was so crowded with firs, spruce and other trees that sunlight was blocked. It was black as pitch.

Today, however, the needle cover on the snow is too thick and too yellow. The trees are too brown, the tree tops far too thin. But what stands out most is how far you can see through distant lines of trees — and how much sun shines back at you. The forest is no longer black.

Tree problems didn't develop overnight, however, and damage isn't limited to the Black Forest.

Throughout the 1970s reports of damaged firs, spruce, pines and beech poured in from across Germany. Some forest experts blamed hot weather, others pointed to normal battles for survival among

species, while a third group insisted that fungi caused the damage.

In 1979, a professor at the University of Goettingen offered a less orthodox explanation for dying forests: air pollution. His tests showed abnormally high acid levels in the soil, and he suggested this was because of airborne deposits.

The government wasn't convinced. West German officials argued at the 1979 Geneva conference and elsewhere that acting without more evidence would be an expensive mistake. They cited disagreements among scientists over the relationship between air pollution and forest damage.

But the evidence of a link to acid

rain continued to mount, as did the blight.

In 1982, the Germans conducted their first federal forest study and found that 8 percent of Germany's trees — covering 1.4 million acres — were hurt. The damage was widespread, which tended to rule out localized causes like fungi or fights among species. More and more German scientists acknowledged that air pollution contributed to the problem.

Four weeks after the damage survey was released, Chancellor Helmut Schmidt announced a program to cut sulfur dioxide pollution by 60 percent over the next decade. Nitrogen oxides, the other

major source of acid rain, would be reduced by about 40 percent. It was the world's most aggressive program to eliminate acid rain, stronger even than the most ambitious effort being considered by the U.S. Congress.

Although Schmidt was voted out of office in 1982, his successor, Helmut Kohl — a conservative in the Reagan mold — surprised his environmental critics by vowing to carry out all of his predecessor's acid-rain proposals. And he has.

"Environmental protection costs money," says Dr. Richard Lamme, a senior official responsible for implementing Kohl's acid-rain

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control program. "But in the long run it pays. If you destroy what you live on you can't have economic progress."

Yet even as politicians acted, Germany's acid-rain woes continued to grow.

A second forest survey, released late last year, showed that 34.4 percent of Germany's trees were damaged, a dramatic jump from the 1982 level. Twenty-five percent of the trees in the latest survey were slightly hurt, 8.5 percent moderately hurt, and 0.9 percent — almost one tree in every 100 — were dead or dying.

Lammel said this year's study could turn up even more tree damage — as much as 40 percent. This new evidence has helped the Kohl government, however, as it moves to cut emissions.

Kohl has been helped, too, by Germans' love for their woodlands.

The special enchantment can be seen in German lore: woodlands engulfed Hansel and Gretel, terrified Little Red Riding Hood, charmed Snow White and Rose Red.

"To the normal German the forest is mainly something in the mind — it's not practical, not economic," said Riederer von Paar, president of the German Foresters Association. "Forests seem to be the last area where people can feel free."

The landscape along the Black Forest is dotted with chalets and farms doubling as guest houses. Skiers, joggers and walkers fill the paths. And the Black Forest isn't unique; forests cover one-third of West Germany.

Another important supporter of the cleanup is the forestry industry. Dying forests mean about \$250 million a year in lost income from timber, paper and other products, Lammel said.

"We must also consider the
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floods we'd have on the Rhine River, dryness in other areas and avalanches from the mountains," he said. Tree death could mean erosion and tremendous costs for flood control and irrigation.

And tourism would suffer.

"Our forests are in our poorest areas, like your Appalachians," Lammel said. "With dead trees over large areas the tourist business would die. And the government would have to help people who profit from tourism."

As a result — unlike most West German industries — the forest industry was strongly behind the cleanup, Lammel said. And with \$38 billion in annual earnings — 6 percent of Germany's gross national product — it was powerful.

Today Germany has strict new standards for all plants — large and small, old and new. Large plants have to cut 85 percent of sulfur from their emissions, mid-sized plants 60 percent and small plants have to use low-sulfur fuel.

Government planners say the program, which will require adding scrubbers and other pollution-control equipment at 1,500 facilities, will cost less than \$4 billion — an average of about \$2.6 million per plant. Industry executives predict it will be twice that.

Before the program took effect, Germany's emission guidelines weren't as strict as U.S. standards. While the Germans set requirements for new industrial and power plants, these typically didn't include scrubbers and other expensive systems required for new U.S. plants.

The new program changes that. West Germany is now as tough as the United States on new plants, and it is tougher on older plants. Those in Germany are required to have scrubbers; older U.S. plants aren't.

The difference is key: U.S. government studies show that, unless
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controls are put on old plants, acid-rain problems will persist into the next century.

"They have responded to the scientific information; we have not," said Greg Wetstone, an attorney at the Environmental Law Institute in Washington who has written extensively about international acid-rain issues.

The Germans also are requiring cars sold after 1986 to have catalytic converters and to use unleaded gasoline, which will eliminate about 30 percent of Germany's nitrogen oxide pollution. An additional 10 percent will be cut through other steps. U.S. law has required catalytic converters on new cars since 1975.

Also impressive is the German acid-rain research program, with nearly \$25 million over the next 18 months. This is almost half of what the United States — with 40 times as much land — will spend on acid-rain studies under President Reagan's new program for 1984-85. And it's about equal to what America is spending now.

The German research, from which the United States could learn, is attempting to:

- Determine which pollutants damage trees.

German officials believe acid rain is the main culprit in forest damage, but not the only one. Ozone from cars and factories — and sulfur and nitrogen, the constituents of acid rain — can attack trees without falling as rain.

But even so, German officials caution that's no excuse for not battling acid rain — now.

"I've heard of about 3,000 different air pollutants, and nobody knows how they react and combine," said Hansjochen Schroter, a government forestry scientist. "But we can say with sulfur dioxide and nitrogen oxides that we know them, we can measure them, we know their effects on trees and

so we can begin to reduce these pollutants."

- Learn which trees are being hurt and how, and in what ways acid rain affects soil.

Researchers know that tree damage is worse at higher elevations, because pollution clouds and ozone are more intense. Older trees also are hit harder, because their roots have soaked in diseased soil longer.

- Find out how to revive damaged trees.

German scientists think adding nutrients to the soil might restore sick trees. They're dropping solutions of calcium, magnesium and other chemicals from airplanes and blowing them in from roads. New ways to breed, plant and thin trees are also being tried.

As many as 20 percent of damaged trees can be helped by these

approaches, according to Karl Rehfuess, a leading forestry researcher at the University of Munich and self-described optimist.

Yet even with all these programs, Germany is limited in how much it can do to solve its acid-rain problem. That's because half of its air pollution is produced by France, Britain, Switzerland and other countries. West Germany

has thus set out to persuade them, particularly Britain, to follow its lead.

Germany is asking the other nine members of the European Community to install scrubbers on their plants and to use unleaded gasoline in their cars. It is also trying to persuade the United States and other non-European nations to do the same.

"It's our duty to show you people what's going on here," said Riederer von Paar, president of the German Foresters Association. "You should start on controls before it gets as bad as here. We lost so much time."

Germany's efforts to get its neighbors to clean their emissions have a familiar ring to Norway, whose lakes — the nation's most cherished resource — have been pelted by acid rain for years.

As with forest damage, the most compelling evidence is damage to life. Brooks and streams around damaged lakes can look healthy, with dark green vegetation visible on the bottom. But the vegetation is algae, and it's often the only life in the stream — or the lake itself. Most other plants — and all the fish — are dead.

Closer examination of the lake, with the aid of a laboratory, yields still more evidence of how man has disturbed nature. Acid levels are dangerously high. And more aluminum is present than should be.

"It's killed all lakes within 33 square kilometers" in southern Norway, said Merete Johannessen, a scientist who has studied the problem for years at the Norwegian Institute for Water Research. This is 80 percent of the region's lakes, she added. "There are so many we can't put a number on it, so we say thousands of lakes have been killed."

Unlike Germany, Norway can't do much to eliminate its air pollution because nearly all of it blows in from elsewhere. In many ways, Norway is a victim in Europe as are Canada and the Northeast United States in North America.

And Norway has highly advanced research to prove its case. Norwegian studies show that sulfur and nitrogen pollutants fall as acid rain long distances from where they are produced and that cutting emission of these pollutants will

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rejuvenate dying and dead lakes.

The first point was easy to prove: There's little industry — and few people — in southern Norway.

"We have trajectories to tell where the acid rain came from. The United Kingdom is the main contributor," Johannessen said.

This contradicts Reagan administration assertions that there is no evidence to prove that acid rain is carried long distances.

The Norwegians can also predict, based on exhaustive tests, how much reduction in acidity will revive a lake. Johannessen explains the importance of that:

"When you address yourselves to foreign countries producing acid rain and say 'Stop it,' they ask, 'Will it help?' We can now provide answers. A 30 percent reduction in acid rain over 10 years would bring back to life 20 percent of the acidified lakes [in Norway]. . . .

"And we have a huge, huge number of threatened lakes which probably will lose their fish populations if nothing happens. They too can be saved by a small reduction."

The Norwegians acknowledge that some tough questions about acid rain remain unanswered. But they've set up several real-life tests to find answers.

In one case, they're building a roof and walls around a small, highly acidified lake, to prevent more rain from getting in. With constant testing, scientists will be able to analyze how a lake is revived.

Norwegians also have studied whether adding lime to dying lakes is worth the expense and effort. This approach, which is used in Sweden and some parts of the United States, is a key element of the Reagan's acid-rain plan.

The Norwegian conclusion: "You can do it in specific . . . areas where people are motivated to do it themselves," Johannessen said. "But liming is like aspirin. It

brings the lake from one polluted state to another. The only solution is to reduce emissions."

Lime can hurt fish by causing toxic metals to leach from lake soils. It can also spur other chemical changes where streams feed into lakes, scientists say.

The U.S. and Canadian governments have acknowledged the importance of Norway's research by helping pay for it. In return, Norwegians have focused attention on American and Canadian problems, and they've found parallels with Norway.

For instance, New York's Adirondack Mountains, where many lakes have lost fish life, would have no problem if rain were less acidic, Johannessen said.

That's of little solace to Lou Curth, of Riparius, N.Y.

Curth learned how acid rains could soil a pristine environment during a visit to Scandinavia 10 years ago. "I remember going out with my wife's brother ice fishing. You could see the scum on the ice. The soot settled right on the ice."

But Curth, a New York forest ranger, never thought he'd see a similar trail of pollution in his own back yard in the middle of the 6 million-acre Adirondack Park.

The realization that he was wrong came slowly and began with the lakes.

"That's the problem with acid rain. It sneaks up on you. You start to go fishing and don't get anything, but you don't know why it's happening. The whole food chain is disrupted. For a short time you get trophy-size trout because their competition for food is gone. You think this is great, but then all of a sudden everything disappears. Once they're gone it's all over."

Curth also watched acid-rain damage creep into lush woodlands.

"I noticed a browning, a dieback, particularly with the spruce. It's the early death of the trees, a slowing of growth, kind of like a person going around constantly with a low-grade fever and never really feeling up to par."

He has seen how air pollution eroded the local economy.

"Many places the people just aren't going there to fish anymore. This in turn hurts the local economy, which is based on tourism."

And Curth fears even worse news lies ahead.

"The next question on everyone's mind is that a lot of people live here because they think it's a clean healthy place to live. If acid rain is doing this to aquatic life and the forests, what about people? Nobody has answered that question yet, I'm afraid."

But American scientists have devoted increasing attention to

acid rain and have answered many of Curth's questions.

In June a panel of scientists — appointed by Reagan to review U.S.-Canadian acid-rain research — concluded, "If we take the conservative point of view that we must wait until the scientific knowledge is definitive, the accumulated deposition and damaged environment may reach the point of irreversibility."

Two days later the National Academy of Sciences reported that reductions in sulfur emissions will diminish damage to lakes and other resources in regions where the pollution is produced. It stopped short of saying that emissions from Midwestern coal-burning plants cause acid rain in the Northeast.

Other studies, however, are close to resolving this issue. Last fall scientists released samples of a carbon-fluorine gas from Dayton, Ohio. The gases do not occur naturally and are easily detected after traveling hundreds of miles. Weather stations across New England are using sampling equipment to watch for them, and certain trends already are evident.

"Gases released in Ohio have been detected as far away as Vermont," said Gil Farber, a director of the study at the National Oceanic and Atmospheric Administration. "In my mind there was never any doubt that there are times when winds carry sulfur and other pollutants from the Midwest to the Northeast and into Canada."

The tests have yet to determine, however, how much pollution is lost as it travels those long distances, Farber said.

Further studies show that existing laws — which require anti-pollution equipment on new power plants and industries but not on old ones — won't help anytime soon in the battle against acid rain. The Office of Technology Assessment, a congressional research

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agency, has concluded that under existing air-pollution controls, sulfur levels will continue to increase through 1990. Real reductions won't be realized until 2015.

Political pressure to tighten those controls seemed to be working in the waning months of the Carter administration.

A year after the 1979 conference in Geneva, Carter signed a pact with Canada committing the two countries to negotiate a cutback on sulfur emissions. Douglas Costle, Carter's EPA head, told governors they might have to cut air pollution to reduce Canada's acid rain. Carter and Costle asserted that acid rain caused major damage; that sulfur dioxide and nitrogen oxides can be carried over long distances, and that America must share responsibility for cleaning them up.

John Roberts, Canada's environment minister when Carter was in office and now minister of employment and immigration, said steps were taken "to vigorously apply existing regulations in both countries."

But the progress ceased soon after Reagan took office. Negotiations slowed, and key scientists were replaced on study groups set up after the 1980 accord. Canada offered to cut in half its sulfur emissions if the United States would do the same — but Reagan officials rejected the offer in June 1982, saying too little is known about acid rain's causes.

"Over the past three years there's been no significant progress in terms of negotiating an agreement," Roberts said. "Frankly, I'm very disappointed at this lack of responsibility on what we think is a clear, urgent and pressing danger."

But in their disappointment, the Canadians moved ahead last month with a plan to cut acid emissions by 50 percent over the next 10 years.

When Reagan named William Ruckelshaus to head EPA a year ago there were new signs of movement. Reagan ordered Ruckelshaus to meet acid rain "head on" — and the EPA director proposed a plan to reduce sulfur emissions by 3.4 million tons in New England and in Ohio, West Virginia, New York and Pennsylvania. It would serve as a pilot program; if it worked it could be expanded.

But the plan was killed, largely because it would cost too much.

During his State of the Union address in January, Reagan outlined a program that offered nothing to reduce acid rain:

"I am proposing a research program that doubles our current funding. And we will take additional action to restore our lakes and develop new technology to reduce pollution that causes acid rain."

While Ruckelshaus preferred emission reductions rather than more research and liming lakes, he supports Reagan's approach.

"If I feel he [the president] is so fundamentally wrong about something he's proposing then I've always got a choice to leave the administration," the EPA administrator said. "But I don't believe that. I don't feel at this stage it's irrational to say we're not yet ready to endorse a sulfur dioxide control program in the country."

However, the president's suggestion that research rather than controls are needed generated outrage among environmentalists. "President Reagan has abdicated his responsibility," charged Liz Barratt-Brown of the Natural Resources Defense Council.

Lou Curth, the New York forest ranger, was even more upset.

"It's ridiculous," he said. "There's so much evidence of the damage and so many people being hurt we just can't afford to let it go on this way. The time has passed for this studying business." □

HAZARDOUS WASTES

The West German government's carefully managed underground storage sites and incinerators stand in stark contrast to the generally haphazard land disposal of toxic wastes in the United States.

First you strip, exchanging street clothes for a white shirt and pants, a gray hard hat, black boots, a miner's lamp and an oxygen rescue pack. Then you start down the elevator shaft, 250 floors down, at the mind-boggling rate of three floors per second. Finally, you step out.

There isn't much to see — at first.

Then your eyes adjust, and the blackness gives way to a honeycomb of tunnels just wide enough for two cars to pass. Cars, or rather jeeps and small trucks, dart in both directions. Lights on either side offer some guidance, and phones on the walls some sense of contact with the outside world, almost half a mile above.

The overwhelming sensation in this subterranean maze, however, is of otherworldliness — of being trapped.

That's the whole idea.

For down under with you are drums, thousands of them, filled with some of the most acutely toxic substances like arsenic, PCBs and cyanide. If the West German government is right, most will never see the light of day again.

This is Herfa-Neurode.

It's one of the oldest preserved salt deposits anywhere, dating back

250 million years. It's also one of the most impenetrable natural barriers imaginable, in a layer of salt about 2,300 feet down, under a solid covering of clay and shale.

For most of the past 80 years the Herfa-Neurode region of West Germany, two hours from Frankfurt near the East German border, was mined for potash used in fertilizers. But 13 years ago that part of the mine was closed.

Today, Herfa-Neurode is where Europe stores wastes too dangerous to handle anywhere else — about 40,000 tons a year. Even U.S. firms have shipped a small amount of toxic materials 4,000 miles to the West German site.

Four hundred miles away, the Germans have an equally imposing waste-disposal arrangement, only here wastes are burned.

The Ebenhausen/Gallenbach installation near Munich isn't a run-of-the-mill incinerator, like the one handling Louisville's garbage. The facility has an intricate laboratory to test wastes, ensuring they can be burned. It has a chemical plant to treat them before burning and to handle effluents after. And it has a landfill, with 20 years' storage capacity, for anything that won't burn.

Then there's the incinerator.

With two rotary kilns for solid wastes and eight burners for liquids, it can handle 70,000 tons a year. That's about equal to all the wastes generated in Kentucky each year that require special handling, according to Alex Barber, head of state waste programs.

Temperatures as high as 1,800 degrees Fahrenheit ensure the dangerous wastes are completely incinerated. Scrubbers and other anti-pollution equipment enable the plant to meet air pollution standards.

A water-purification plant ensures liquids are safely disposed of. De-watering facilities alter incinerator sludge so it can be stored. And

a turbine transforms steam to electricity, to supply the plant and part of the surrounding community.

Overall, Ebenhausen represents a high-technology, highly honed approach to waste disposal.

Half way around the world is a third toxic waste site: Kentucky's Valley of the Drums.

The drums are gone, and the area is being decontaminated. But memories and concerns linger — of endless stacks of containers filled with unidentified toxins, and of how they might have hurt people living near the site in northern Bullitt County and along the creek that runs from it.

The Valley of the Drums isn't

unique. It is one of seven sites in Kentucky and 546 nationwide on the federal government's list of dumps with problems so serious that they qualify for federal clean-up aid. Up to 1,600 more face major cleanups without federal help, the Environmental Protection Agency says.

As Germany's underground salt deposits and incinerator stand as testaments to its care in handling hazardous wastes, the desolate American dump sites attest to negligence.

The German government has consciously pursued the world's most ambitious hazardous waste-

disposal program the past decade.

"It's our philosophy that the state has the major responsibility," said Bernd Wolbeck, director of German waste programs. "With wastes, we don't have a free market economy. We have a rigid framework for disposal."

That framework includes guidelines that, among other things, require the strict accounting of wastes from production to disposal. This means that businesses — and the government — know how much waste they've generated, its type and where it is at any moment.

The U.S. government and many

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states, including Kentucky, have similar reporting requirements. But these systems are typically much less thorough and of considerably less practical use, according to a 1983 study by the Office of Technology Assessment, a research branch of Congress.

The West German government plans to standardize waste disposal practices soon. But for now the German states vary in how they meet federal guidelines.

The state of Bavaria plays the most direct, expansive role.

It runs 10 collection centers near waste-producing industries and sewage plants. The centers treat the wastes to reduce the volume and make them easier to handle, then ship them to more advanced facilities.

The state also runs two incinerators, including Ebenhausen; two chemical-treatment plants; a recycling center, and a landfill at Galtenbach. It owns more than 75 percent of this \$45 million network, with cities and industries sharing the rest.

In West Germany as a whole, about 35 percent of toxic wastes are handled in government facilities. In Bavaria, government disposes of about 98 percent of all wastes.

"If industry did it there might be a danger of disposing of wastes less safely," said Franz Defregger, Bavaria's environmental minister. But with government running the show, "There's no pressure to make a profit so more care is taken to treat the wastes properly.

"Government involvement is the only way."

The United States, however, has relied on another method of disposal: The free market.

The government sets standards for privately run waste facilities, licenses and inspects them, and imposes penalties when rules or laws are broken. But businesses and communities are on their own

in disposing of wastes. And that's posed serious problems:

- As much as 80 percent of America's toxic wastes are still handled in the least safe ways: Stored above ground, dumped in deep wells or buried.

The 80 percent estimate comes from the Office of Technology Assessment's 1983 study. John Lehman, director of EPA's waste management division, said 80 percent is too high, but he admitted that EPA doesn't know how much waste is disposed of on land.

In contrast, the German government knows how its wastes are being disposed of — and in Bavaria, at least, much less is going to land sites. Bavaria buries 40 percent of its wastes at landfills, and most of this has been chemically treated and won't burn in incinerators.

The German state incinerates 30 percent of its wastes, compared with just 4 percent of toxic wastes burned in America. Bavaria chemically treats its remaining wastes; EPA has no precise U.S. figure on treatment.

The technology for incineration, underground storage and chemical treatment is available in the United States, but only large firms like Dow Chemical and Shell Oil use it.

Smaller companies and cities can't afford such solutions. Unless the government helps pay for them, or forces their use by banning landfills, most waste producers will continue relying exclusively on land disposal.

Landfills take up large amounts of space, often smell, attract scavenging birds and rodents, and are generally unwanted neighbors. Wastes can leach into groundwater. And landfills can cause air pollution and other serious hazards.

"In the last three years it's become painfully clear that America's best-secured landfills don't work," said Bruce Piasecki, a pro-

fessor of environmental history at Clarkson College of Technology in upstate New York who has written on new disposal methods. "If land disposal, the dominant form of hazardous waste treatment, is clearly a dead end for our wastes, we must go to Europe to learn what they've been doing for the last decade."

• Industries generate too much toxic waste.

That's true partly because dumping it in landfills is cheaper than recycling, or altering production so the waste isn't produced in the first place.

In Bavaria, the inducement to recycle is strong because the government restricts what substances can be disposed of on land and sets disposal costs. The average cost for landfill disposal is \$34 per ton, for chemical treatment \$70 per ton, and for incineration \$156 per ton.

Companies have responded, according to Defregger, Bavaria's environmental minister. Ebenhausen has seen its load of solvents and other easily recycled materials drop as waste charges rose.

The underground world of Herfa-Neurode — where disposal costs about \$75 a ton — is carefully organized with color-coded charts outside each cavern so that, if a use is someday found for a particular waste, that waste can be retrieved easily. More than 1,000 tons already have been reused in this way.

Such retrieval is impossible in the haphazard dumping at U.S. landfills.

Some American firms have made progress in cutting waste production. Louisville's Porter Paint Co., for instance, cut its waste by 11 percent by changing its processes to reuse byproducts.

But disposal is still much cheaper in large U.S. disposal facilities. Landfills can charge as little as \$20 a ton and incinerators \$80 a ton, according to EPA. Toxic wastes

can be injected into wells for just \$6 a ton.

The EPA waste program "does not now provide direct incentives" for firms to cut back on their waste generation, the Office of Technology Assessment study concluded. "Moreover, a number of current regulatory policies" — such as not strictly regulating thousands of existing landfills — "may actually act as disincentives for waste reduction and treatment activities."

The technology office estimates that U.S. firms produce one ton of hazardous wastes a year for every American — but it says this could be cut in half with a strong recycling program.

• There's often nowhere to put wastes, even on land.

It's difficult to predict how many and what kind of waste-disposal facilities a community or region will need — even in the short-term. And it's nearly impossible to win public support for toxic-waste facilities.

Kentucky's Waste Siting Board knows. Set up in 1982 to determine if the state needs a facility to burn or treat wastes, the board has so far been unable to agree even on whether there is a problem.

Joyce Specht, board member and director of environmental programs at Porter Paint, thinks Kentuckians will resist any plan the board comes up with.

"It's the old NIMBY syndrome: 'Not in my back yard,'" she said. "The biggest thing Kentucky needs to do as far as a site is concerned is begin an educational process with the general public."

Bavaria, with its extensive planning system, has overcome such problems.

The state knows what wastes are being produced, where they're going and whether more disposal sites will be needed. The German public apparently has confidence

Continued

that disposal systems will work.

Bob Arnott, a Colorado health official who has studied German waste disposal, said, "The Germans approach waste management with a great deal more emphasis on the last word: They do effectively manage."

●
Congress recognized America's waste disposal ills in 1976 when it passed the Resource Conservation and Recovery Act, empowering EPA to set standards for waste handling. But most experts agree hazardous-waste disposal hasn't become any safer during the Reagan administration.

The EPA hazardous-waste budget was cut deeply just as waste problems were becoming more insidious: The president is seeking \$143 million to deal with hazardous wastes next year. That's \$8 million less than the agency was getting when Reagan took office; when inflation is considered, it's \$44 million less.

Environmentalists and other critics charge that EPA dragged its feet in approving regulations to crack down on unsafe land disposal and to control 600,000 firms generating small amounts of waste. Those small firms are now exempt from federal regulation.

Congress, however, is moving ahead. Legislation is likely to be approved soon to stop companies from dumping certain wastes in landfills and to make remaining land disposal sites safer.

EPA's Lehman said the Reagan administration hasn't made up its mind yet on whether to go along with this legislation. The "official administration position is that it is basically noncommittal about most of all this."

But congressional officials say they expect the president to sign whatever bill is approved, largely because it has overwhelming support in Congress.

"We've had a scientific consen-

sus about the undesirability of landfills for a long time," said Linda Greer, a waste expert with the Washington-based Environmental Defense Fund.

"If the Reagan administration had been more aggressive in pushing wastes out of landfills we'd have a larger proportion going to more environmentally desirable alternatives," she said. "It's a big failing on their part."

EPA administrator William Ruckelshaus admits the agency — under Reagan and his predecessors — hasn't acted quickly enough to end land disposal of U.S. wastes and to encourage recycling and treatment.

"There are certain kinds of wastes that ought not to be disposed of on land under any set of circumstances," he said. "This includes mobile wastes that move into the food chain very easily or move through the soil into the water supply almost regardless of where you put them or how you dispose of them on land."

But while the EPA boss calls for government to strictly enforce waste-disposal rules, he would continue relying on the free market to decide on solutions.

"To actually go out and say to Illinois [or other states], 'This is the way you do it and no other way,' is hazardous in and of itself

because we may be choosing wrong," he said.

"We did this in energy and have lurched from nuclear power to oil to natural gas. Every four to five years we change our minds and wrench the country around."

Germany's waste-disposal setup also has its flaws.

State governments have occasionally overestimated their waste load and overbuilt disposal facilities. Waste costs are so high, government officials admit, that some firms illegally ship their wastes across the East German border. And there is a question of conflict of interest with the government owning and regulating waste facilities.

West Germany also has about 1,000 abandoned wastes sites, according to preliminary government surveys.

But on the whole, the German government's involvement has helped provide that country with more — and safer — disposal options, according to Piasecki, the environmental history professor from Clarkson College of Technology.

"If the landfillers remain king and the sloppy managers control the market, all the companies wanting to employ safe destruction technologies have lost their market." □

WATER POLLUTION

The Ruhr and Thames rivers — for Germany and Britain they are important sources of water and arteries of commerce. For the United States they can be important examples of how centralized authorities can clean up pollution and save money.

America has transformed the Ohio River and dozens of other waterways from free-flowing sewers to fish-filled rivers over the past several decades. But things are at an impasse: The rivers aren't as clean as they should be, and the federal government, which is drafting a new clean-water bill, is running low on commitment — and money — to finish the job.

For the Ohio, this means that problems with storm sewage, agricultural runoff, toxic chemicals and other hard-to-get-at pollutants will probably persist. Its waters may never be clean enough for safe swimming and other recreation.

Water experts on the Ohio and other waterways agree that America needs a fresh approach to the cleanup, one that won't bust the budget. They think the pollution-fighting experiences of West Germany's Ruhr River and Britain's Thames River may provide just the approach they're after.

The Germans developed an unusual scheme: They brought all the industries and cities along the Ruhr together to administer — and pay for — cleaning up the river.

The Thames program was equally effective: One of Europe's dirti-

est rivers was turned into one of its cleanest. And it was done at bargain rates.

The Ruhr faces problems as imposing as any river anywhere. Ten percent of Germany's 61 million people and 40 percent of its industries reside in the Ruhr Valley. Coal mines, steel and textile mills, and chemical and paper plants — all heavy polluters — line its banks.

Yet the Ruhr must supply drinking water to 70 percent of the valley and just under 10 percent of the nation. That is an imposing demand upon a river just 141 miles long — one-seventh the span of the Ohio.

The Germans long ago responded to these special challenges with a special program: In 1913 they created two utility-like agencies, one to fight pollution and the other to ensure adequate drinking supplies.

The cleanup group runs the 118 wastewater treatment plants, 20 miles of interceptor sewers, five low-level dams, 61 pumping stations and five power plants along the Ruhr. The supply group operates five large and nine small reservoirs, five major hydroelectric plants, along with other systems

involved in storing and selling drinking water.

Membership in the agencies is unique, by American standards. The cleanup group includes all communities and industries discharging anywhere in the valley; the supply group involves anyone using the river for drinking water or electricity.

This means that everyone with a stake in the problem is involved. And it ensures that one group, with the power to act anywhere along the river, holds actual cleanup duties.

In the United States, responsibility for cleaning up waterways is shared by federal, state, local and regional agencies. This often leads to confusion, frustration and expensive duplication of effort.

The Ohio offers a case in point: Four federal, one regional, eight state and hundreds of local agencies are all fighting river pollution. Some groups don't pull their weight; others lack authority to rigorously pursue cleanup efforts. As a result, the cleanup is often stalled or stopped.

American water cleanup bureau-

cracies also leave out industries and other parties whose help is needed to eliminate pollution. This breeds an adversarial relationship between industry and government: Industries clean only what they're made to, and government must fight for even this marginal progress.

"What we learned early on from the Ruhr is what could happen with government and industry working together on a regional basis to solve water pollution problems," said Leo Weaver, head of the eight-state Ohio River Valley

Water Sanitation Commission, or ORSANCO.

"It's an extremely effective way of approaching this because you are dealing with perpetrators of pollution and those affected by it. There is a vested interest [in a successful cleanup] for all concerned."

The payment scheme for the Ruhr River programs is even more unusual: Polluters are taxed based on the amount and danger of their effluents, with fees set steeply enough to discourage continued pollution. Groups using the water

to drink, produce energy, or for any other purpose are taxed based on how much they use.

This ensures that polluters, and people who benefit from clean water, help pay for the cleanup. With costs borne by local groups, there is more incentive to economize.

To pay for sewage-treatment plants and other capital projects, the pollution-control agency can issue bonds. It can also apply for federal grants to cover up to 50 percent of the costs.

This approach contrasts with

water-pollution programs in the United States, where the federal government has paid up to 75 percent of the cost of sewage-treatment plants and shares other water cleanup and enforcement expenses.

Under the U.S. system, sewage-treatment projects have cost more than needed, and money was often spent on projects that failed.

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Again, there is a compelling example nearby: Louisville's Metropolitan Sewer District.

Expensive projects at MSD's Morris Forman Wastewater Treatment Plant have consumed an inordinate share of federal sewage-treatment money available to Kentucky. But they've had only limited success in eliminating Louisville's river pollution.

The Morris Forman plant's persistent operating problems also illustrate how tough it is in America, even with a large plant, to iron out the bugs. Independent agencies such as MSD have no easy way to share information about similar problems. And the federal government doesn't provide financial aid for running the expensive plants it has helped to build.

As the federal government runs out of patience with the cost and duration of the battle against water pollution, local governments are being asked to pay a larger share of the costs. The Ruhr River model could show them how.

"Suddenly people [in the United States] find they've built these billion-dollar treatment plants and can't afford to operate them," said Edward Cleary, ORSANCO's first director who now writes about water issues from his California home. "As people find their taxes going up because environmental needs are eating up money we must look at more efficient ways of doing things.

"On the Ruhr, municipalities, water companies and people needing sewage treatment come together to make decisions and distribute costs. This ought to be given a greater trial in the United States."

The Ruhr approach has been tried in the United States — in the Houston area — and it's

considered a stunning success.

In 1970 the Gulf Coast Waste Disposal Authority took over water supply and cleanup responsibilities from several communities and industries near Houston. It runs 20 municipal sewage-treatment plants serving 120,000 people, along with four industrial facilities serving 42 industries. More cities and firms are joining all the time.

The reason, deputy general manager Joe Taylor says, is that the authority has proved it can "treat waste in larger volumes at a lower cost than small plants." Well-trained operators at the authority's large plants do a better job than small-town sewage officials, who may double as public works directors or dog catchers.

The authority is also pioneering the use of water-supply controls to fight pollution. It can pump huge amounts of water into slow-flowing, polluted summer streams to help dilute and clean contaminants.

Taylor said the Ruhr River provided inspiration and a blueprint for the Gulf Coast group.

"We primarily learned that regionalization pays, that you've got to treat a water system as an entire unit," he said. "What we do up at this end of the river affects what happens down there."

The British have also learned that the approach to cleaning up water helps determine its effectiveness — and its cost.

Before 1974, British water officials faced many of the same difficulties their U.S. counterparts face today: Persistent pollution, splintering of responsibilities and poor planning in the use of dwindling financial resources.

The Water Act of 1973 changed that. It consolidated 1,600 sewer agencies and 187 water-supply groups into 10 regional authori-

ties. Like the Ruhr associations, the British authorities are charged with ensuring adequate quality and quantities of water. Agency expenses are paid from tariffs on local users and polluters, again like the Ruhr.

The Thames River Authority, for example, handles pollution-control, navigation and water-supply activities for 12.1 million people living along Britain's best-known and grandest river.

The most obvious benefit has been a streamlining of control programs: The authority replaced 200 agencies that were operating in 1973. Staffing shrunk from 12,000 to 10,000. The cost of doing business went down while efficiency rose, authority officials say.

"It's a very neat way of going about it," said Derek Gregg, a spokesman for the authority. "It's the only logical way to do it."

Daniel Okun agreed. After monitoring the British system for a decade, Okun, a University of North Carolina professor and water resources specialist, concluded it is revolutionary and could prove of great use in the United States. He said regional systems:

- Fight pollution more efficiently.

The U.S. sewage-treatment program is in a perpetual state of crisis: Small communities often can't effectively operate sophisticated sewage-treatment plants; large ones have their own problems, as Louisville has shown. Each city is preoccupied with solving its problem, losing sight of the overall river cleanup.

The response to a January spill of three toxic chemicals in the Ohio River illustrates the danger of a splintered anti-pollution program. ORSANCO astutely detected and followed the chemicals as they floated downstream

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from West Virginia. But state officials in Kentucky and elsewhere often contradicted ORSANCO's warnings on how risky the chemicals were, leaving local water officials confused over whether they should stop taking water in. With cleanup duties so divided, no one found out where the chemicals came from.

In spills in Britain, a regional authority would issue a warning to all its plants, and the response would be uniform. With larger, regional treatment plants, each facility would have the sophisticated technology to respond to toxic chemical spills.

With reorganization, the British "got all the plants working. And with all the towns working together they could manage the whole water resource much better, with each no longer polluting its neighbor," Okun said. "There's no question, the overall pollution-control effort was very much enhanced."

● Handle water shortages better.

America has about 50,000 small water systems, each depending on its own source and 99 percent serving fewer than 50,000 people. Most can't afford technical or financial expertise needed to plan for emergencies, so during dry spells they often run out of water.

"Regionalization works so well because the authority, which runs the water works for all these communities, knows the options, has better management and can quickly straighten things out," Okun said. "And systems can be connected with pipelines so that all towns won't run out during an emergency."

● Are more economical.

Britain has shown that fewer people are needed to do the job, be it water supply or pollution control, when dozens of small agencies are replaced by one large one.

"Regional authorities provide the same or better service with a lot less people." □

NUCLEAR SAFETY

While the U.S. nuclear industry founders, the Japanese and Europeans show how nuclear plants can be built safely and economically. But some question whether their lessons can be transferred to America.

During a recent trip to Japan, Victor Gilinsky, a member of the U.S. Nuclear Regulatory Commission, heard a story from a U.S. Environmental Protection Agency official:

EPA tests emission-control systems of cars coming off the assembly line. The inspections are also run on Japanese automobiles to be sold in American markets.

In America, 15 percent to 25 percent of the cars fail the tests — and EPA considers that acceptable. American manufacturers reason that better performance would be too costly and isn't needed to meet federal guidelines.

In Japan, 100 percent of the cars pass the tests. It's a matter of pride for car manufacturers; a single failure would be embarrassing.

The subject was cars. But Gilinsky thinks the story applies even more to nuclear power plants.

"The tendency in the United States is to build things with only as much care as is absolutely necessary," he said. "In Japan, they concentrate on getting things done right in the first place. They turn out quality products."

The results of the differing approaches have been dramatic.

The Japanese take an average of five years to build a nuclear power

plant; in America, it takes 10 years. The average Japanese plant has fewer than one emergency shutdown a year; the average American plant has six shutdowns.

Even more telling: Since 1972, U.S. utilities have canceled 197 nuclear plants that were ordered or under construction, including Marble Hill in Indiana and Zimmer in Ohio. The Japanese haven't canceled any.

These differences are especially important in light of the Reagan administration's campaign to revive the U.S. nuclear industry. White House legislation draws heavily from experiences in Europe and Japan, but environmentalists worry that the president is misreading those lessons.

The United States gave birth to the Japanese nuclear power industry in the 1960s. The U.S. Atomic Energy Commission furnished safety regulations under which plants were built, and Westinghouse Electric Corp. and General Electric Co. provided the design and engineering models.

The U.S. nuclear industry, with 76 plants in operation, is still much bigger. Japan has just 25.

But in safety and reliability, the Japanese progeny has already sur-

passed its American progenitors.

The evidence begins in the design stage. Japan uses just three basic designs to build nuclear reactors, so mistakes can be weeded out quickly and avoided in the future.

In the United States, four firms design nuclear systems and 12 others do engineering work. Almost every plant is unique, so lessons learned at one plant often are not readily applied to others.

NRC officials say benefits of the Japanese design philosophy became clear after the 1979 accident at Three Mile Island in Pennsylv-

nia: Japanese plants didn't have many of the safety flaws that contributed to the accident. Uniform designs made the flaws they did have easier to correct.

The U.S. approach was meant to foster creativity as it gave the country a varied network of nuclear power stations. But it has deteriorated into "an almost maddening degree of diversity," Gilinsky said. "And NRC operations are dictated by the structure of the industry. We have to write . . . to each plant when we have a problem."

The Japanese also build their plants differently from American firms.

Japan has just three utilities, all of which own several plants that they built themselves. The utilities have staffs intimately familiar with nuclear power, able to build the plants correctly and finish on time.

But in America, dozens of utilities own just one or two nuclear plants, and most hire outside firms to build them. For experience with nuclear power, utilities like those that were building Zimmer and Marble Hill must rely on other

companies, which are seldom held liable for their mistakes — or for long construction delays. (Although suits against contractors are common, they seldom fully compensate a utility for losses or cost increases.) The result tends to be major troubles, a longer construction process and a more costly and less safe reactor.

"My counterparts in Japan are just shocked by some of the problems we have here with quality-assurance breakdowns and pipe crackings," said Harold Denton, NRC's top nuclear safety official.

"They'd already changed to newer, more crack-resistant piping while in the United States we're still debating if such cracking occurs."

Another telling distinction between U.S. and Japanese nuclear programs lies in operations.

Preventive maintenance is a watchword of the Japanese program. Each time the Japanese shut down a plant to add fuel, they also take apart valves and test pumps and other equipment to ensure the plant will function during an emergency.

In contrast, the U.S. nuclear industry philosophy is "let it run until it breaks, then fix it," Denton said.

Routine operations are also more meticulous in Japan, NRC officials say. "Japanese operators giving me a tour apologized for one control room panel that was lit," signaling a system in need of attention, Gilinsky said. "We have on average 20 lit here."

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Denton and other NRC officials are quick to point out that some American plants have as good a safety record as their Japanese counterparts. But the overall setup of the industry doesn't encourage that kind of good performance, they say.

"Our plants are subjected to a lot more challenges to which safety systems have to respond," Denton said. "This is due to technical or human problems."

Japanese nuclear design, construction, operation and regulation also have assumed a distinctively Japanese flavor. The U.S. nuclear industry and NRC are no longer active in that country's nuclear power program, and Japan is replacing the United States as the world's premier reactor exporter.

"In Japan they've been able to take an American technology and turn it into plants which seem more economical and probably safer in many respects," Denton said.

Japan isn't the only nation to borrow — then improve on — American nuclear technology. Others include:

West Germany — Utilities contract with architect-engineers to build nuclear plants, much as in the United States. But builders there are held to much stricter standards.

"The vendor has to do its best," said Hans-Christoph Breest, a nuclear official in West Germany's Interior Department. "Otherwise, the utility won't pay. It won't take over the plant."

Germany is also more careful about safety. Since 1977 it has required two backup systems for safety equipment, as opposed to one required in the United States.

U.S. nuclear firms think one extra safety system provides adequate protection — and they don't worry about the lack of backup when safety systems are being repaired, said Bob Pollard, a former

NRC safety official now working for the anti-nuclear Union of Concerned Scientists.

"The Germans, however, have at least three systems. They figure that if one system fails and the other is out of service for maintenance, you'll still have one safety system left."

Britain — The British plan to take the German cautiousness about backup systems a step further in future plants.

They've proposed building several Westinghouse-type nuclear plants, with the first one at Sizewell on Britain's east coast. Their plans would require three backup systems for most safety equipment, one more than the Germans use and two more than in most Westinghouse plants built in the United States.

"They've tended to take things

that have presented problems in the United States and work on those," Denton said. "They're writing on a clean slate and are trying to make changes to make the plants cleaner and more efficient."

Sweden — This small country has gone much further than the United States in safety.

The United States and Sweden both require a remote station for shutting down a plant in the event of an accident.

But in America the remote system is designed on the assumption that the main control room is still operable, Pollard said. "The remote station is electronically interconnected to the main control room. If you lose the main one, you lose the remote one too."

In Sweden, Pollard said, the situation is much more logical: Planners assume that the main control station is destroyed; thus the remote station must be totally independent.

France — The French have one of the world's most ambitious nuclear power programs, with 33 reactors in operation and an additional 29 under construction. It is probably also the world's most centralized nuclear network: 26 operating plants are identical, and a single government-owned utility builds and runs all 33 plants.

This French system makes it even easier than Japan's for plants to learn from one another.

After the Three Mile Island accident, France made 128 changes in its nuclear plants. Some were minor, others involved major safety systems. But all were made without shutting down the plants, said Bertrand Barre, nuclear attaché in the French Embassy in Washington.

"Any lesson learned is easily applicable to all the plants," he said. "It also cuts down on construction costs by allowing the utility to make massive orders."

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Gilinsky, of the NRC, thinks the French experience is one America should take notice of.

"They can spend a lot more time revising things and taking care of problems because they only have to do it once, as opposed to 60 times here," he said. "And they can train people and use them for any plant. People don't have to learn and unlearn things. That's terribly important."

NRC's Denton says he isn't surprised by these international experiences with nuclear power. "The countries all reflect, to some extent, their general approach to industrialization:

"The Germans are very clean and procedurally oriented. The Japanese are highly concerned to see that quality is built in, not inspected in. And U.S. industry takes the approach that if you meet NRC requirements it's good enough.

"We really have a minimum set of requirements, which is not the same as having every piece of equipment maintained in tiptop shape all the time."

Denton and others acknowledge that the European and Japanese approaches, where the state avidly promotes nuclear power, could present problems. If government becomes too involved, it could lose its objectivity on safety issues.

But generally they think U.S. nuclear firms can learn from the Swedish approach to remote-control operation, the German and British conservatism in ensuring backup safety systems, and the Japanese general care in operation.

"I would anticipate that the next generation of U.S. nuclear plants would be based on learning from all these countries," Denton said. "They would try to come up with a design that's more inherently forgiving of human error and equipment problems."

But many fear that's not what the United States will get if the Reagan administration has its way.

Reagan officials envision a U.S. network of nearly identical nuclear plants, built in half the time of today's plants — and at 70 percent of the cost. The program embraces the Reagan theme of reduced government regulation.

But Gilinsky thinks Reagan planners should go back to the drawing board in their attempts to boost the industry.

"The underlying premise [in the Reagan plan] seems to be that everything will be all right if we just get the regulators out of the way," he said. "That just isn't right.

"There are real, serious safety problems out there and you have an industry which is highly fragmented and not able to regulate itself."

The administration's bill would:

- Have NRC approve part or all of a general nuclear plant design, which any utility could use to design individual plants. Approved parts would no longer be reviewed by NRC before construction of plants. Once a design was approved, new safety hearings wouldn't be required for 10 years.

Opponents worry that important safety improvements developed during the 10-year period wouldn't be implemented, exposing the public to unnecessary risk of an accident. And they say U.S. nuclear designs are so flawed that they aren't worth replicating.

Gilinsky said standardized plants make sense for countries like France, where one utility builds and runs reactors, but they would pose problems for 60 U.S. utilities. "The reason we don't have standardization is that we have a highly fragmented industry," he said.

- Require reactors to get just one license, when construction is started. Plants must now get two licenses, one to begin building and one to start operation, issued after the plant is complete.

Tom Dillon, deputy assistant secretary of energy, said a one-license system would eliminate expensive hearings for the second license. And NRC could ensure that the plant is built according to its design.

But Gilinsky said NRC doesn't know until a plant is completed whether it was built properly. Allowing utilities to decide on their own when to start reactors is "downright irresponsible."

Mike Faden, spokesman for the anti-nuclear Union of Concerned Scientists, said that without operating-license hearings, construction flaws at Ohio's Zim-

mer plant and other reactors wouldn't have been uncovered. And he worries that public involvement would be limited to the pre-construction stage, when most people don't know or care much about the reactor.

● End many of the requirements that utilities improve old reactors as new safety systems are designed. The NRC would have to show how changes would improve overall plant safety before a utility could be ordered to make modifications. This would save utilities millions of dollars, Dillon said.

But Faden said the bill would mean regulators would have to compare repair costs to safety benefits — a major change in the philosophy of U.S. nuclear regulatory programs. Now costs may not be considered in safety issues. "You can calculate costs very precisely but safety benefits are always imprecise and speculative."

In practical terms, Faden said, the change would prevent NRC from correcting flaws like those uncovered at Three Mile Island and other reactors — thus keeping old plants from being made safer.

Nuclear industry lobbyists and environmentalists both say the bill is probably too controversial to pass Congress in an election year. But that's all they agree on.

Patrick Higgins of the Atomic Industrial Forum, an industry trade group, said the Reagan-supported bill wouldn't immediately revive the U.S. nuclear program — but it could provide a needed stimulus. "The bill is close to what the industry thinks is needed."

But Faden, the anti-nuclear spokesman, said the bill "basically assumes that intervenors and the public are the problem, not that the industry is having trouble building plants correctly and designing them properly. They're saying if we tighten up the system so outside interlopers don't get in the way, everything will be fine." □

INTERNATIONAL PROGRAMS

Reversed policies and reduced expenditures have cost the United States prestige and credibility around the world. But more important could be the drain of experienced officials who have left international environmental programs.

For nearly a decade Carol Bastian had her head in the clouds, but her eyes were focused on making the Earth a safer place to live.

She was among a select group of U.S. officials trying to understand — and stop — mounting damage to the ozone layer of the Earth's atmosphere, which screens out harmful radiation from the sun. If the deterioration continued, many scientists believed, there could be a dramatic increase in skin cancers, a destruction of crops and a global shift in climate.

The culprit was chlorofluorocarbons, or CFCs — gases released by aerosol spray cans, refrigerators and other products.

In 1978, after more than three years of study, the United States banned CFCs. Then Bastian began an intensive effort to persuade other nations to do the same.

When President Reagan took office, however, the lobbying — and eight years' progress in controlling CFC pollution — ceased. Today Japan and most of eastern and western Europe still use aerosol products.

Bastian, brought back to Earth with a thud, quit the government after 16 years of high-level service. Her last assignment was as deputy director of the Environmental Pro-

tection Agency's international programs.

"I left because I felt so far my conscience was clear, but it couldn't be much longer," she said.

Margaret Brown also had a long, distinguished record of federal service. She too was involved with international environmental issues, at the Food and Drug Administration and EPA. And she shared Bastian's concern about Reagan policies on the environment.

The two women have something else in common now — both left EPA after Reagan took office, as a matter of choice and conscience. Brown resigned in October 1982, seven months after Bastian.

Brown had coordinated the U.S. role in NATO's Committee on the Challenges of Modern Society. The committee assembled experts who, free from political constraints, studied such problems as toxic wastes and water pollution.

Under Reagan, the United States officially has placed the program "under review," but America actually has ceased to be involved — and other NATO nations know it.

"This administration wasn't supporting the program in any way," Brown said. "I resigned because I had nothing to do. . . . I felt it was hopeless."

Bastian and Brown aren't alone. The Courier-Journal talked with eight other career environmental officials working on international problems who quit, were fired or transferred under similar circumstances. They asked not to be identified because they hope to work for the government again or because they are afraid their new jobs may be compromised.

The problem, they all say, is that the Reagan administration broke with its Democratic and Republican predecessors by attacking environmentalists rather than environmental problems.

Two former EPA administrators, Democrat Douglas Costle and Republican Russell Train, agree.

Reagan officials turned their backs on worldwide environmental problems, said Train, who ran EPA under Presidents Nixon and Gerald Ford and is now director of the World Wildlife Fund. Costle, who served under President Jimmy Carter, said EPA was taken over by ideologues who didn't care about the environment.

Bastian witnessed the turnaround.

Senior Reagan EPA officials "reached the conclusion first and

then wanted you to come up with documentation to support them. . . . They assumed environmentalists were on the opposite side of U.S. industry and that they had to protect industry."

The biggest loss, Bastian said, was in the dedicated, experienced people forced out of federal environmental programs over the past three years. The loss was especially acute in the international arena, where it takes years to build relationships with colleagues overseas.

"An administration has the right to set policies and make decisions," Bastian said. "But when

bright people leave because they don't feel free to investigate facts and present them, it's a monumental loss. What you're left with is a myopic view of a whole bunch of little clones that all think the same thing and report what people at the top want to hear."

Brown voiced similar complaints, particularly against EPA under former administrator Anne Gorsuch Burford.

"The bureaucrats in the United States who knew their colleagues in Europe and who sought good solutions don't work there anymore, or if they do they're not given free-

dom to be active participants. They cut the networks between colleagues that took years to build and will take years to rebuild.

"This effect will far outlast Mrs. Gorsuch [Burford]. It's the most detrimental thing to come out of the Reagan administration."

Mrs. Burford looks at EPA's international activities during her 22-month tenure in decidedly different terms.

"I felt strongly and still feel strongly that if there is to be an international approach to the environment that is more than just lip service, other countries should

contribute substantially to that effort," she said. But, she added, other nations expected the United States to pay for everything.

William Ruckelshaus, who took over as EPA head after Mrs. Burford resigned, said he knows America has lost its environmental leadership in many areas and that "this country should take a leadership role internationally."

Ruckelshaus brought Fitzhugh
Continued

Green, a longtime leader in international environmental affairs, back to the agency last year. And the United States has become somewhat more active in pushing for ozone controls and in other worldwide programs. (A recent National Academy of Sciences study said CFCs are damaging the ozone layer at a slower rate than previously estimated. But Dr. Frederick Kaufman, one of the authors, said "aerosol controls were an excellent idea and I'm strongly against lifting them.")

But much of the damage has already been done. For example:

Global 2000 — In July 1980 a coalition of 70 American environmental and health groups released the government-sponsored "Global 2000" report. It explored trends in population, natural resources and the environment, here and abroad, through the end of the century.

President Carter asked for a follow-up report on how the United States could help avoid an impending world environmental crisis. As Reagan was moving into the White House, "Global Future: Time To Act" was published.

"The second report has been almost totally lost from view," said Donald Lesh, director of the Global Tomorrow Coalition. "There has been a distinct tendency in the current administration to see these issues as partisan. But in fact much of the debate can be traced directly to initiatives taken in the early 1970s by Presidents Nixon and Ford.

"I am dismayed to see that bipartisanship neglected if not totally destroyed."

United Nations Environment Programme — Started in 1972 to solve international pollution problems, the program has succeeded in protecting coastal resources in the war-torn Mediterranean Sea area and is active in other unstable regions.

The United States has supported UNEP with \$10 million a year — about 30 percent of its budget. But each year since he took office, Rea-

gan has tried to eliminate the program or cut it by two-thirds. Congress, however, has restored most of its money.

"I don't think this administration has fully recognized the connections between natural-resource realities and national security," said Joan Nicholson, UNEP's Washington representative. "When a nation completely rapes itself of trees and land, it can no longer support its population, and this destabilizes people and makes them hopeless. It creates a real political time bomb."

Again, Mrs. Burford sees administration actions differently.

She cited the large U.S. share of UNEP's budget and said: "I just feel strongly if there's genuine concern out there it should be demonstrated with support to the U.N. agency to which they all subscribe. . . .

"If we're going to go forward on this effort it can't be with one sugar daddy."

Reagan has reversed other environmental policies as well. Although his predecessors aggressively pushed for an international Law of the Sea treaty covering mining and other activities in the oceans, Reagan refused to sign it or to continue negotiations. He also lifted a U.S. ban on export of hazardous materials, opening the door for American firms to sell abroad products that are outlawed here. And he ignored an international agreement to protect cultural and natural resources.

These actions went largely unnoticed by the American public. But their impact was clearly understood — and roundly condemned — by environmentalists of all political persuasions, here and abroad.

First, the cuts hurt America's pride, they said. Under Nixon, Ford and Carter, the United States gained prestige from its domestic achievements and international leadership on the environment. Even the Soviets accepted U.S. pre-eminence and worked hard not to be outdone. But

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under Reagan, the United States has come to be viewed as uninterested in confronting environmental problems.

The cuts also damaged U.S. standing in international trade, former and current EPA officials said. Previous administrations recognized that free trade requires that nations adopt harmonious approaches to testing, labeling and otherwise controlling goods — and that the costs of cleaning pollution is similar for

industries in different countries.

Today, as a result of Reagan's cuts, many other nations worry that the United States no longer cares. And some doubt whether the United States can be trusted as a stable trading partner.

"Old European associates of mine expressed surprise, then frustration, then dismay," former EPA head Train said. "It seemed to be a turning away by the United States from substantive involvement or concern

with global resource matters, or even bilateral issues."

But most important, the Reagan cuts stymied efforts to apply lessons learned elsewhere. The United States has always actively exchanged information with other industrialized countries, usually giving more than it received. But just when this country has the most to learn from such exchanges, cooperation has been slowed and often stopped.

Antonis Tritsis, environmen-

tal minister of Greece and president of the 10-nation European Council of Ministers of the Environment, is very concerned about this. Tritsis, Europe's leading environmental official, calls Reagan environmental policies a "perilous evolution." But he thinks they could "wake up people and governments in a way that hasn't happened in 20 years. It could become like the Vietnam War protests in the United States or 1968 protests in Paris." □

CONCLUSIONS

When William Ruckelshaus took over at the Environmental Protection Agency a year ago, environmental leaders here and abroad hoped the United States would reassert its leadership in protecting the environment.

But that optimism has faded. The leaders now worry that Ruckelshaus' authority is limited, that many officials involved in Anne Gorsuch Burford's controversial EPA administration are still in office, and that things would get even worse during a second Reagan term.

The changeover from Mrs. Burford to Ruckelshaus appeared to be "the difference between night and day," said Douglas Costle, EPA head under President Jimmy Carter. Ruckelshaus did "a tremendous job in restoring morale" at the agency.

The new EPA administrator also got high marks for cleaning up abandoned hazardous-waste dumps, restoring cuts in EPA's operating and research budgets and supporting a strong water cleanup law.

But Costle warns that Ruckelshaus has yet to prove himself on today's most controversial environmental problem: acid rain. "The key to the credibility of this administration is what it does about acid rain," Costle said. "Ruckelshaus recognized that in his acceptance speech. It will be

the bellwether for other nations — and no shell game will work."

Costle does give Ruckelshaus credit for fighting — albeit unsuccessfully — to persuade Reagan to control acid rain.

Yet Carl Pope, national political director for the Sierra Club, said Ruckelshaus "had a number of opportunities to do things that were moderately helpful on acid rain but has chosen instead to do things that were moderately or substantially unhelpful."

He cites EPA actions to let older coal-burning plants change the way they calculate emissions, which would allow an overall increase; to avoid setting short-term limits for nitrogen oxides, which contribute to acid rain and other pollution problems; and to allow nearly a dozen states to relax their anti-pollution plans.

Hazardous waste is another issue on which environmentalists say Ruckelshaus has let them down.

"We are still making enormous volumes of hazardous wastes and we are still dumping them," Pope said. "EPA has a lot of authority on its own to make sure disposal is done in a safer fashion, and it's not using that authority."

As for America regaining world leadership on the environment, that would require "a change in attitude at the White House," said Republican Sen. Robert

Stafford of Vermont, chairman of the Environment and Public Works Committee. During Reagan's early years in office, U.S. standing "was virtually decimated," he said.

Ruckelshaus also has faced resistance from other key administration officials, many of whom helped orchestrate the policies of Mrs. Burford at EPA and James Watt at the Interior Department.

"I'm not able to move at exactly the pace I would like to. Nobody voted for me in 1980, and there are bound to be dissenters," Ruckelshaus says.

That dissent emanates mainly from the Office of Management and Budget. Chris DeMuth, a senior OMB official overseeing EPA, insists that environmental

regulations are too costly — and often aren't soundly grounded in science.

Speaking about recent actions to control the chemical EDB, a preservative in bread and other foods, DeMuth said: "The degree of hysteria about this stuff in some states is utterly out of proportion to the risk. I would have my 2-year-old daughter eat the stuff with 10 times as much [EDB] in it for the next couple of years and it would have absolutely no effect."

On acid rain, DeMuth said Ruckelshaus' proposed pilot program to cut emissions was rejected because of the "thinness of hard scientific information."

Officials at the Energy Department
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ment, State Department and the White House also resist strong environmental controls. In line with Reagan's antagonism toward big government, they want environmental responsibilities shifted to the states.

But many Republicans insist that pollution is one area where the federal government must remain pre-eminent.

"The experience of leaving environmental protection to the states is that it doesn't really happen," said Russell Train, EPA director under Presidents Richard Nixon and Gerald Ford. "We need uniform rules and regulations around the country, not competing entities bidding for industries on the basis of relaxation of environmental rules."

Conservative economist Milton Friedman agreed. "Pollution is an area that government has every reason to be involved in," he said. While he prefers local action, Friedman conceded that "pollution across states has to be handled by the federal government."

Environmentalists' greatest worry, however, is what would happen during a second Reagan term. Ruckelshaus says he is committed to staying at EPA only through the November election, and no one knows who would replace him.

"During his first term, the president's worst environmental policies have often been blocked or modified by Congress, the courts or the force of public opinion," said Steve Pearlman of the League of Conservation Voters, who recently wrote an extensive report on the Reagan environmental record. "But if he is re-elected ... there is no guarantee that the president or his advisers will continue to feel as inhibited by public opinion as they do now."

Patrick Parenteau, vice president of the National Wildlife Federation, a conservative environmental group, said he views a second Reagan term with "a blend of optimism and pessimism."

"I just can't believe that anybody, regardless of ideology, would continue with policies so thoroughly opposed by so many people," he said. "I think what we are likely to see is an administration largely indifferent to environmental considerations, one that won't pay a great deal of attention either pro or con in the environmental area." □