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EPA JOURNAL

WHO NEEDS THE FEDS!
Environmental success stories from grassroots America

Preface

Faced with news about a globe-encompassing environmental crisis, people often feel helpless. "What can I do?" is a common question, spoken or unspoken.

For this issue, *EPA Journal* sought out environmental success stories: cases in which people have, themselves, taken hold of a piece of the environmental crisis and worked out a solution. The examples presented in this issue suggest that a wide range of environmental activities are in fact under way across the country. Far from finding themselves helpless, many people are finding that with initiative and ingenuity, they can solve problems in ways that can add up to a better environment.

In selecting stories for the issue, our criteria were, first, that a particular problem was confronted and substantially solved, and second, that the initiative came from individual citizens, industry, or government at the state or local level. In other words, the impetus to action did not come from EPA or any other federal agency. Given the innumerable environmental initiatives "out there," inevitably our selection of story subjects was somewhat arbitrary and, because of the space of the magazine, limited. Story selections were made by the *Journal* staff and do not necessarily reflect EPA policy or priorities.

We have divided these examples into three categories: citizen initiatives; state and local actions; and industry initiatives. Each category of articles is introduced by someone who is involved in one of the cases, and each section introduction gives a brief rundown of the individual stories in that category.

Article ideas came from several different sources, including EPA's regional offices; Renew America, a group that is in the process of selecting outstanding environmental efforts; and news reports around the country.

This issue also includes a regular feature, Appointments. □

Years of wise land use on their farm won the Craun brothers of Rockingham County, Virginia, a top award from the National Endowment for Soil and Water Conservation. (See article on page 9.)

Michael Reilly photo, Harrisonburg News Record

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EPA is charged by Congress to protect the nation's land, air, and water systems. Under a mandate of national environmental laws, the agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

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CITIZEN INITIATIVES

Introduction by Barbara Reed Earnest

Like the hardy and virtually indestructible ailanthus tree (the "tree of heaven"), thousands of volunteer environmental citizen groups have sprung up all over the United States, often in the most unexpected places. Volunteers have stepped in to fill gaps in city services as local governments have struggled to overcome difficult budget shortfalls.

The groups and individuals you will read about in the following articles have successfully come to terms with the idea of "thinking globally and acting locally." They represent a tapestry of different environmental interests. But all of their projects have contributed directly to the quality of the immediate environment. Many of their efforts could be duplicated in other communities. Others may inspire similar projects and ideas.

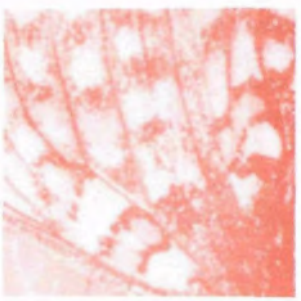
In Chicago, Habitat for Humanity is restoring inner-city housing for the poor (p. 5), while Trout Unlimited has restored a stream near the airport in Seattle (p. 3). Both are organizations with active chapters working in local communities.

Through a remarkable compromise, the habitat of a butterfly was saved near San Jose, California, and the creature has been given protected status under the federal Endangered Species Act (p. 7), while innovative farming techniques by three families living in different parts of the country received high marks for environmental conservation (p. 9). Meanwhile, in Maryland, a scientist has found a way to eliminate the waste and air pollution from dead chickens by recycling them, and a Delaware poultry farmer is showing how this approach can be put into practice (p. 14).

In New York City, more than 400 community gardens are being helped by the Green Guerillas, a volunteer group that provides plants and technical assistance (p. 11).

These individuals and environmental groups have used many different techniques to achieve their goals. Some have inspired local residents to come forward and volunteer their time and talent to lobby and work for their causes. They also have found new ways to solve problems that people knew existed but didn't know how to solve. Yet what really sets these volunteers apart is their perseverance in the face of resistance. There will always be obstacles, but the hope is that many more people at the local level will rise to fight for cleaner air and water, safer waste disposal, and more open green space through better planning and care.

In the next 10 years, major decisions will have to be made if we are to stop some of the destructive trends we are seeing in the environment. Everyone's concern matters, and each person's contribution can make a difference. In fact, without this individual vigilance, the environment will not receive the government attention and funding it needs. Then our precious natural environment will suffer, perhaps irrevocably, both locally and globally. The time could not be better to join or start up a local group and get involved. □



(Earnest is Director of the Green Guerillas in New York City.)

Salmon and Jet Fuel Don't Mix

by Loyd Stafford

The day after Thanksgiving should have been a relaxing day with family members. On this cold Friday morning, however, I was wading up Des Moines Creek in the area of Des Moines Beach Park. The pungent odor of airplane fuel hung heavy in the foggy morning air, and the rainbow oil sheen on the surface of the stream told a deadly story.

I felt a little sick as I picked up the lifeless bodies of the small coho salmon smolt. The Department of Ecology biologists walking a few hundred feet ahead of me had large plastic bags into which they were putting adult coho salmon that had suffocated from jet fuel coating their gills. These mature coho had just started up the stream to spawn.

The farther up the stream I walked, the angrier I became.

Fifty thousand coho smolt that my Des Moines Salmon Chapter had planted in February were gone! What happened this time? Are we ever going to win this pollution battle? I wondered how many of the guys from the chapter had heard about this mess?

The farther up the stream I walked, the angrier I became. Somebody is going to pay for this, I thought to myself. A lot of questions flashed through my mind as I began to analyze the situation.

Des Moines Creek, located near Seattle in southwestern King County in Washington State, flows for approximately four miles from Bow Lake along the southern boundary of the Seattle-Tacoma (Sea-Tac) International Airport, southwestward to Puget Sound. The stream, portions of which flow through developing industrialized areas, has historically experienced negative impacts because of urbanization of its 3,700-acre watershed. These impacts have included previous spills of jet fuel, scouring and erosion from stormwater run-off, dumping of refuse along the stream course, and discharge of pollutants and potentially toxic materials from storm-drainage systems.

Thirty-four thousand gallons of deadly toxic jet fuel spilled into Des Moines Creek late that Thanksgiving evening, November 28, 1985, contaminating the stream from Sea-Tac International Airport to Puget Sound. The jet fuel that killed the salmon also endangered the hundreds of sea gulls, ducks, geese, and other waterfowl that feed at the mouth of Des Moines Creek at Des Moines Beach Park. They ingested the toxic fuel when they preened it from their feathers, and many died as a result.

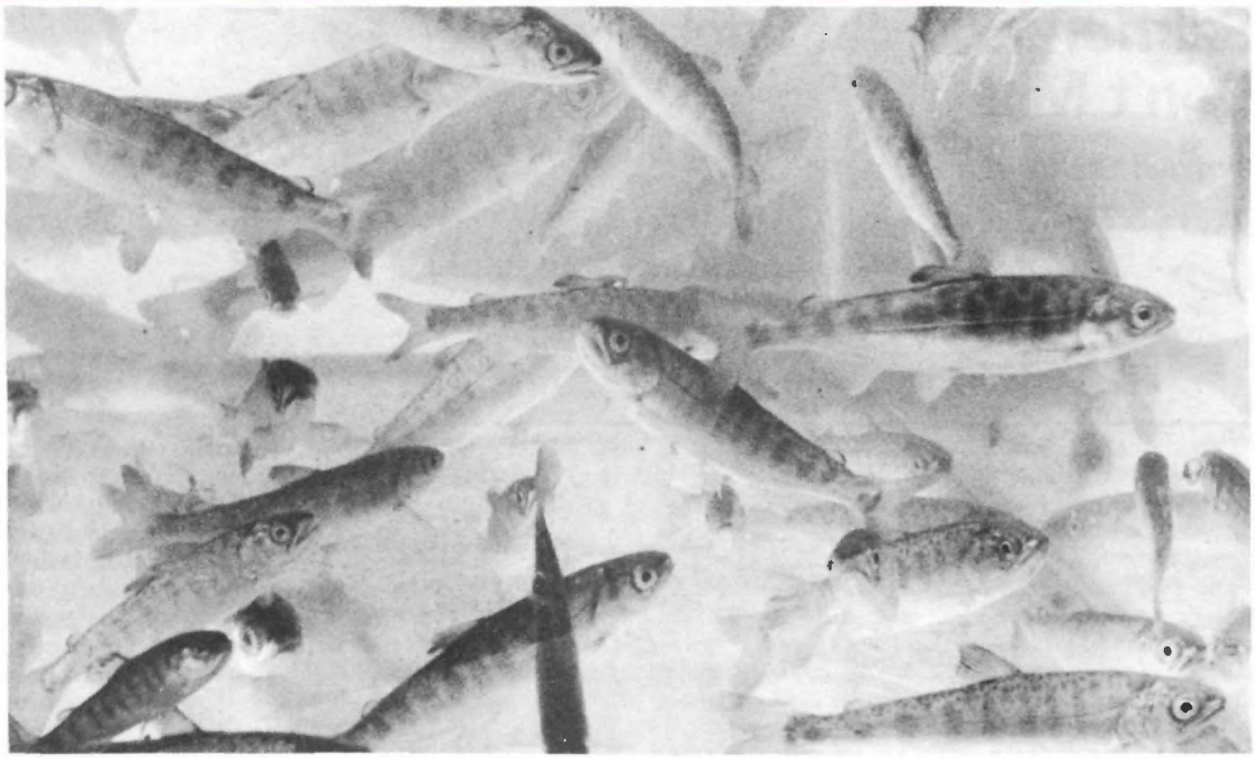
Clean-up crews worked all day Friday to control the spill by blocking the floating fuel with booms, sucking the oily film from the water with hoses and pumping it into 6,000-gallon tank trucks. The workers also threw absorbent, buoyant chips on the water to soak up the spill.

Despite these efforts, State Department of Ecology investigators found dead coho salmon scattered the length of the creek: evidence of the end of another enhancement effort by the Des Moines Salmon Chapter of Trout Unlimited.

The Des Moines Salmon Chapter has been working on this and other streams

Northwest Indian Fisheries Commission photo.

Releasing baby fish with hope and good wishes. Shown is a member of the Puyallup Indian tribe in Washington State.



Juvenile salmon are hardy. Nevertheless they need clean water to thrive.

Northwest Indian Fisheries Commission photo

in the area for more than 10 years. Serving in Trout Unlimited, an organization dedicated to the preservation and enhancement of cold-water fisheries, keeps the members busy.

Shortly before the Thanksgiving 1985 spill, chapter members had removed eight pick-up truckloads of debris from the stream bed. Over the lifetime of the chapter, several other jet fuel spills of smaller size had occurred. Nothing had been done by the perpetrators to prevent future occurrences. The Des Moines Chapter members decided it was time to take a stand: Declare war, or whatever it would take to stop the polluting.

Over the next two weeks, the chapter invited every media source that was willing to respond to come and investigate the disaster. Three TV stations, including the ABC (KOMO) and CBS (KIRO) affiliates, three radio stations, and five newspapers picked up the story.

In addition, at my behest as President of the Des Moines Salmon Chapter, a public hearing was scheduled at the Des Moines City Hall. The meeting was attended by state and county legislators, agency representatives from the State Departments of Fisheries, Ecology, and Wildlife, Sea-Tac Airport officials, and Des Moines city officials. This meeting resulted in the formation of a multi-agency task force with a charter to find a way to stop the polluting and restore the watershed and its fish runs.

The new team began developing its plan. Requirements called for a watershed plan, a fisheries plan, and a public-education plan. King County's Surface Water Management Department and the Municipality of Metropolitan Seattle (METRO) took the watershed plan. The Muckleshoot Indian Tribe provided two biologists to develop the fisheries plan, and the Des Moines Salmon Chapter handled the public-education plan.

As the program began to develop, King County agreed to fund the restoration in the amount of $720,000. This funding came from environmental taxes levied on industries located on Port of Seattle property.

The first project undertaken was to route the run-off from the airport refueling aprons into the airport sewerage treatment facility. This was followed by building bunkers or "berms" around tank storage areas.

Next, the team presented its program for rehabilitating the stream. This started with the construction of a 27-acre containment lake on the Tyee Golf Course. The golf course is under the aircraft flight path. This "lake" has an electronically controlled gate at its bottom; the gate automatically closes when sensors located upstream detect pollutants in the water. At the same time, a 400-foot stretch of the stream in Des Moines Beach Park was relocated.

Now, after about four years of hard work, the stream is clean, water quality is good, and the fish are alive and well. A nature trail is being established along the length of the stream. An Interpretive Center, explaining the habitat, fishery, flora, and fauna, is planned and will be staffed by members of the retirement communities in the area.

Students from the Kent Continuation High School program have undertaken restoration projects as part of their school curriculum. They assisted the Des Moines Parks Department in planting new vegetation along the relocated stream bed. Next, they will plant Chum salmon eggs in the stream as a science project. This will be done in conjunction with the Department of Fisheries and the Des Moines Park management. The construction of additional fish-spawning habitat in 1990 is expected to complete the program.

This restoration project brought a lot of people together, and the rewards are really worth the effort. Come for a hike down Des Moines Creek, and you'll see what I mean. And if you are looking for a worthwhile challenge, join your local Trout Unlimited organization. □

(Stafford is President of the Des Moines, Washington, Salmon Chapter of Trout Unlimited.)

Restoring Housing in the Inner City

by Amy DeVries

From the perspective of the average middle-class American, Chicago's Uptown neighborhood is a disaster. Uptown is a battleground. It is also an area of rebirth.

Tension has been mounting for several years in this multi-racial, multi-ethnic setting as the poor strive to find a place of security and belonging while more affluent residents try to make Uptown more liveable for themselves. Ultimately the struggle revolves around whether low-income families will be included or excluded in neighborhood renewal. This struggle fosters a very unstable environment, with competing attitudes of three groups: the poor who live in Uptown, its upper-class inhabitants, and those who live outside Uptown but want to help.

Uptown is a battleground. It is also an area of rebirth.

A striking example of the hopelessness of some Uptown residents occurred recently when a college student who was trying to help clean up the area was confronted by a man shuffling by on the street. The man shook his head. "You people are wastin' your time," he said, his speech so slurred that it was almost unintelligible. "By tomorrow mornin' at this time, this whole lot's gonna be covered with beer bottles. Why don't ya jus' go home?"

Once a flourishing neighborhood, Uptown has become run down due to lack of maintenance and lack of care on the part of many of its residents. There is little sense of community. And when an attitude of "every person for himself" prevails, some people, particularly low-income families, may get pushed into substandard living situations.

Uptown Habitat for Humanity is trying to solve a part of these environmental problems. Our office is a local affiliate of an international organization that provides decent housing for humankind. Using volunteers from all sections of humanity—rich and poor, skilled and unskilled, young and old—Habitat brings higher-income partners together with low-income families to build and rehabilitate houses. In the process, Habitat partners also try to build new resources for responding to the challenges of life such as education, and employment, inter-personal, and home-maintenance skills.

Habitat for Humanity is a non-profit, no-interest loan organization. Through an application process based on need, low-income families are chosen by a committee for the Habitat program. It is not a "give-away" program. Operating on "sweat equity," the families put in time and energy working on projects in which they can not put the money. All members of Habitat families work hard to own their own homes.

The summer of 1989 was an exciting one for Uptown Habitat. Four new homes were started for four low-income families of varied backgrounds by 400 young people and their youth group counselors under the direction of Habitat staff. Under a program called "Make A Difference" (M.A.D.), these teenagers from across the nation enthusiastically left their safer, more stable environments to challenge the insecurity and instability of Uptown. Each M.A.D. workcamp lasted for one week, during which the young people worked side by side with Habitat

Habitat for Humanity photo

Anyone who wants to live in a house built or restored by Habitat for Humanity must put in at least 500 hours of "sweat equity" working on the project.

R. Luthringer photo, Habitat for Humanity

Teenagers find they can make a difference by participating in a Habitat summer camp. They work side-by-side every day with low-income families trying to improve housing conditions.

families on the project. For many of them, this was their first introduction to the harsh realities of inner-city life. This experience opened the eyes of these privileged young people to the housing problems of low-income citizens of this country.

During the summer, more was accomplished than building homes. Many young people received an education in humanity. As one M.A.D. worker said, "I discovered things about myself, about others, and about this world we live in." The participants admired the "way you people 'just do it' even with all the hurdles you must overcome." Special speakers at the "camp" helped instill in the participants a new understanding and compassion for the poor, and those feelings are likely to affect the way they live the rest of their lives.

Obtaining property for the current project, located at Leland and Kenmore, was an environmental victory in itself. The property is the former site of a 14-unit burn-out. The building suffered 20 fires in 10 years and was featured on ABC's 20/20 on a program entitled "Arson For Profit." Habitat for Humanity was able to obtain the land, and now, out of the hopelessness and despair of the rubble comes new hope as these new homes are built with love and care.

Cold, inadequate, over-crowded shelters were "home" to the families with whom the volunteers worked. Two of the families who will own the homes currently being built are refugees from Central America and Southeast Asia, where they lived in unstable political environments as well as inadequate housing. Their flight from undesirable surroundings landed them in the unstable environment of a low-income American community.

The indigenous American families also have a strong need for a stable environment. For example, a single black woman with two small children is struggling to raise them on her own after being separated from her husband due to his drug abuse problems. The family lives in a neighborhood where drugs are prevalent and present a distinct danger to this woman and her children. The outside door of their apartment building does not shut, and often drug users take advantage of this opportunity to come in off the street. Sometimes the family can hear and smell their activities going on right outside the apartment door.

Inside, the apartment is bare. There is little furniture and little decoration. The young daughter does not have a bed of her own and must sleep with her mother, a situation that is becoming difficult as she grows older. The son sleeps in the living area off the kitchen. The apartment is the best of many they have lived in, despite its neighborhood.

The family is extremely excited about the opportunity to own a home of its own in a more stable environment. Family members willingly work at the Habitat site on Saturdays and assist in the building of their new home. More than just a construction project for them, their prospective home means hope for reconstructing their lives. It gives them personal dignity.

Uptown Habitat for Humanity has completed seven homes over the four and a half years of its existence, with the construction of four more in progress and an additional four to be started in the next six to eight months.

The relatively small contribution of Habitat for Humanity seems insignificant compared to the extensive problem of homelessness in the world, but it is a proud accomplishment considering that Habitat is not funded by the government. The work at Uptown is accomplished entirely through volunteer donations of labor and materials.

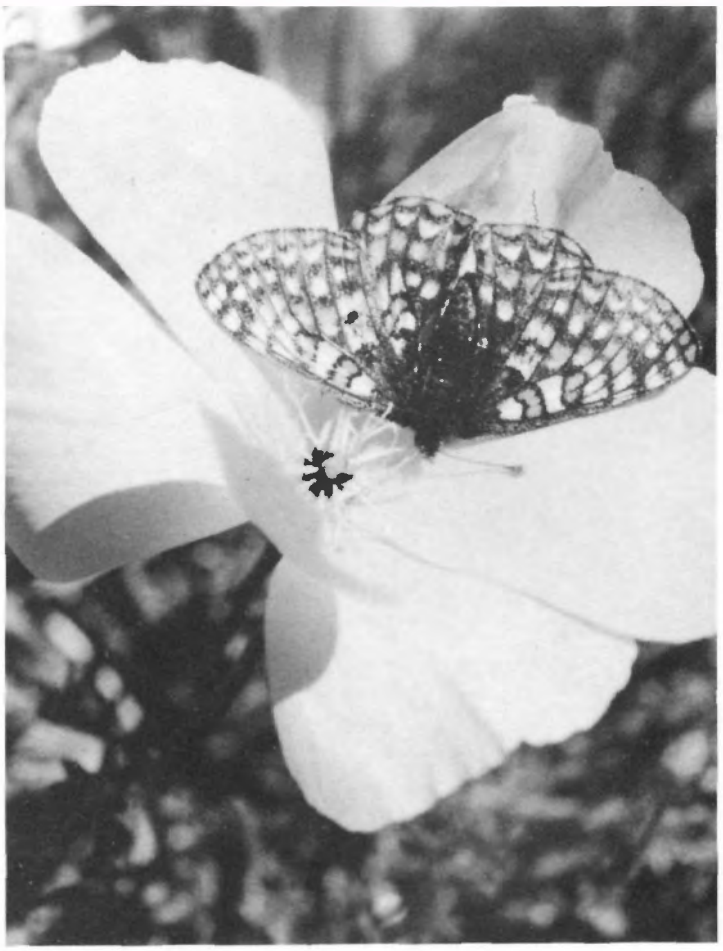
Habitat for Humanity and other such groups are working to solve environmental problems of the inner city, but their ultimate success will be decided by the people who live there. Will rich and poor come together to form a real community, helping each other to grow and flourish in a neighborhood that is as beautiful on the inside as the new homes are on the outside?

It may take a long time for some folks, but with hard work and dedication, it can be done. □

(DeVries, a sophomore at North Park College in Chicago, works part-time for Uptown Habitat for Humanity.)

A Victory for the Bay Checkerspot

by Karen Flagstad



Waste Management photo.

The Bay Checkerspot Butterfly still thrives on certain hill slopes in Kirby Canyon near San Jose, California, but loss of this habitat site could have meant extinction for this threatened species.

Thanks to the stalwart sponsorship of Stanford University researcher Dennis D. Murphy and his colleagues, *Euphydryas editha bayensis*, also known as the Bay Checkerspot Butterfly, has won protection under federal endangered-species legislation. On September 20, 1987, following deliberations that lasted seven years, the Bay Checkerspot was officially listed as a "threatened species" under the Endangered Species Act.

Seven years? That's right. It seems the case involved not only the fate of a vanishing butterfly, but among other things, the plans of two Fortune 500 companies and a major landfill proposed for the city of San Jose, California. As reported in *The Wall Street Journal*, one company, a defense contractor, sought to scuttle the proposed listing of the Bay Checkerspot on the grounds that it could compromise national security. Ultimately, the dispute turned on the issue of land use, since land containing habitat of a formally listed, protected species cannot be developed unless a plan for preserving the species and its habitat has been approved by federal authorities.

In fact the controversy over the Bay Checkerspot Butterfly might still be going on if Dr. Murphy had not succeeded in arranging a novel conservation agreement among three principal parties in the case: a prominent waste-disposal firm, Waste Management of California, Inc.; the city of San Jose; and the U.S. Fish and Wildlife Service, which administers the Endangered Species Act. Under this agreement, Waste Management has been able to proceed with an extensive landfill operation, while at the same time, habitat of the Bay Checkerspot is protected on the site of the landfill. In a number of ways, the agreement provides a model that could be helpful in resolving future conflicts between endangered-species protection and urban area development.

At one time, the Bay Checkerspot may have been the most widespread butterfly in central California. As recently as the 1950s, there were populations in five San Francisco Bay Area counties. Now, however, the only extant populations of this butterfly in the world survive in two of these counties, San Mateo and Santa Clara.

The habitat of the Bay Checkerspot is highly specialized and increasingly fragmented—a story that harks back two centuries. When early settlers came to California, they introduced certain hardy grasses and forbs that provided superior forage for their livestock. These imported plant species quickly grew to dominate California grasslands by "out-competing" many native plant species, including the host plants of the Bay Checkerspot: California plantain and Owls' Clover.

Over the last two to three decades, the Bay Checkerspot has been pushed to the brink of extinction by a combination of factors: the burgeoning development in the San Francisco Bay Area suburbs, the expansion of the freeway system that links them, and several years of drought in the area. Even without further encroachment on its habitat, Stanford scientists say the remaining San Mateo population of the butterfly has a doubtful prognosis for long-term survival.

This leaves the Kirby Canyon population in Santa Clara County as the best hope for the future of the species. As fate would have it, Kirby Canyon was selected by Waste Management, Inc., as the site for one of the largest landfills in North America.

Dr. Murphy petitioned for protected status for the Bay Checkerspot under the Endangered Species Act in the fall of 1980. Waste Management was then seeking clearance from authorities for its Kirby Canyon landfill. Early on, it looked like an either-or situation: either

E. S. Ross photo.

Waste Management of California, Inc., has set aside, as a permanent preserve for the Bay Checkerspot Butterfly, 250 acres of existing habitat on slopes near its landfill operation. Restoration of additional habitat on adjacent slopes is also part of a threatened-species protection plan jointly developed by the firm and the city of San Jose.

save the Bay Checkerspot Butterfly and forego the landfill, or proceed with the proposed landfill and sacrifice the species. Then Waste Management broke the ice by inviting Murphy over to inspect the site of the proposed landfill.

Murphy's findings paved the way for the negotiated agreement that enabled landfill plans to proceed without significantly disturbing the habitat of the Bay Checkerspot. In his assessment, the area that the proposed landfill would disturb (467 acres) represented only about 15 percent of the total butterfly habitat at the site (3,365 acres). Second, the landfill operation would disturb no more than 150 acres at any one time. Third, the butterfly survived best on the cooler, north- and east-facing slopes of Kirby Canyon, at some distance from the main landfill activity site; thus, the landfill could be expected to disturb only five to nine percent of prime habitat.

Proceeding as if the butterfly were already a listed species, Waste Management and the City of San Jose designed a plan to assure that the new landfill would not jeopardize the Bay Checkerspot population. As part of the program, the Kirby Canyon Habitat Conservation Trust Fund was created, and Waste Management deposits $50,000 annually into this fund for conservation of the butterfly. Other aspects of the program include:

- Continued research to monitor survival patterns of the butterfly
- Habitat management that includes controlled livestock grazing as part of a pattern that favors the host plants of the butterfly
- Restoration and revegetation requirements in the course of landfill operations
- Acquisition of additional Bay Checkerspot habitat in the vicinity of the landfill
- Efforts to reintroduce the butterfly into unoccupied, but suitable habitat patches near the landfill.

The plan was approved by the U.S. Fish and Wildlife Service on June 15, 1986, well over a year before the butterfly was formally recognized as a threatened species under the Endangered Species Act. As a result, Waste Management of California has not only been able to proceed with its landfill operation in Kirby Canyon but has received considerable favorable publicity as an ecology-minded company as well.

And the Bay Checkerspot Butterfly has become the company mascot. □

(Flagstad is an Assistant Editor of EPA Journal.*)*

Environmentalists on the Farm

by Roy Popkin

Three American farm families won awards last year from the National Endowment for Soil and Water Conservation for their accomplishments in comprehensive agricultural resource management and pollution abatement. EPA Journal profiles their outstanding environmental success stories:

Steve and Kevin Craun built this concrete tank in front of the barn to store manure from their 150 cows. Keeping animal waste out of nearby streams helps protect the Chesapeake Bay miles away.

Eugene and Sue Shapland

Eugene Shapland might be described as "the conservation farmer's conservation farmer." An infant when the drought of the 1930s turned western Kansas into a Dust Bowl, he grew up hearing about how the stifling heat and prairie winds turned Lane County farms into blowing dust. Today, he and his wife, Sue, are raising crops, beef, and hogs on 5,550 rolling acres near Dighton, Kansas.

Much of their land was first farmed by Shapland's father and grandfather, and he hopes the farm will be taken over by his four sons some day. In 1954, when he was 17, Shapland planted his first wheat crop. Keeping the land continually productive and profitable is not easy; the Shaplands manage to do so using innovative and environmentally sound farming methods.

"My grandfather came here from Illinois in 1920, a few years ahead of the big drought. This area was one of the worst hit in the midwest," he says. The 5,550-acre farm sits on small hills; its somewhat sandy soil is subject to wind and water erosion."If we get two or three inches of rain, the soil starts to wash away."

To prevent erosion and preserve the soil—in an area where some neighboring farms are so eroded they produce little or nothing in the way of crops—the Shaplands have minimized run-off by terracing and contouring every acre on which crops are grown. The use of stubble mulch tillage helps prevent prairie winds from blowing away the topsoil. They were among the first in the area to plant sorghum and milo close together, a simple practice that has a number of conservation advantages. The additional rows provide additional forage for the cattle, reduce the soil area exposed to wind erosion, and catch more snow in winter.

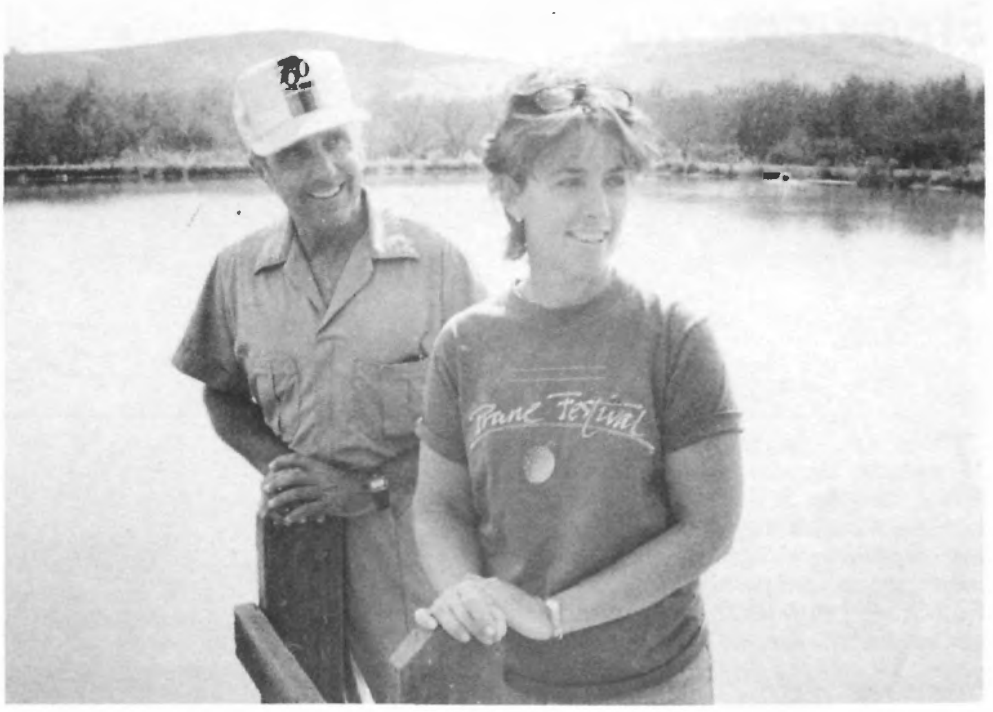
In addition, the Shaplands use cattle manure as natural fertilizer for their crops and cross-fencing and rotation grazing to prevent erosion from overuse of the pastures. They have put 380 acres in the federal Conservation Reserve Program to preserve land for future generations.

"Soil and water conservation is a high priority with us," Shapland says. "We budget money for conservation every year, even when the farm economy is bad. From a financial point of view, you have to look at soil and water conservation as survival."

In developing their own conservation practice, the Shaplands have been well served by information from the USDA Extension Service and the local Soil Conservation Office (SCS). Sue Shapland was an "Earth Team" volunteer with the SCS and is now president of its auxiliary. The Shaplands are active leaders and award-winners in 4-H Club programs, and Eugene has been vice chairman of the Lane County Conservation District, chairman of its Education Committee, and a member of the board of the Farm Bureau and the local Agricultural Stabilization and Conservation Committee.

Shapland earned the Goodyear Conservation Farmer Award in 1979. The Shaplands do have followers among the farmers in their area but, says Shapland, "There are many who don't want to change their ways. Every year, they just plant their wheat the same way they always did. They really should be looking at what's going on around them. If you want the land to survive, you've got to have a lot of conservation irons in the fire."

(Continued on next page)



Pete and Susan Carr by the irrigation pond on their California farm. In addition to strict water conservation, the Carrs use a wide range of practices that include collecting and reusing pesticides and fertilizers, protecting wildlife, and preventing soil erosion.

Yube-Sutter Appeal-Democrat photo

Steve and Kevin Craun

For the Craun brothers, conservation farming is a family heritage that has been handed down through the generations. On a century-old farm on the rocky slopes of Virginia's Shenandoah Valley, they are using modern conservation farming methods to protect their soil and reduce pollution of the Chesapeake Bay, hundreds of miles away. They are the fourth generation of Crauns to raise crops and livestock on 565 rocky acres in Bridgewater, Virginia, a tiny Rockingham County community in the northwestern part of the state. Steve, his wife, June, and brother Kevin, are following a conservation tradition that began with their grandfather, Daniel Craun. "When the first Craun came to this valley in 1890, the few farmers around would plow up any field where something would grow." Kevin says. "But our grandfather was very conservation-minded. He started the family tradition."

The Craun's limestone-studded farmland—increased by purchase and rental over the years—does not include a single flat field, but their soil is top-grade. To assure the continuing integrity of their soil and water while assuring the farm's profitability, they have had to plan carefully and act accordingly.

They practice contour stripcropping on the gentler slopes and use winter crops on all sloping ground. Grassed waterways prevent erosion and absorb water from hillsides and depressions through which rainwater or irrigation runoff flows. Ground-clinging vines on the steepest slopes hold soil in place, and conservation tillage is practiced where their corn, alfalfa, clover, and rye have been planted.

Grandfather Daniel constructed an extensive water break and sediment trap in a gully through which most of the farm's water flows. As he removed stones from the hillside fields, he dropped them into the gully. Now the trap is 75 feet long and 12 to 15 feet tall. "You can drive over it in a tractor," says Kevin. In heavy rains, it traps sediments, including fertilizers, which can add half a foot to its height.

One of the most significant conservation endeavors undertaken by the Crauns is a half-million gallon manure-handling and storage system that holds animal wastes so they can later be used at an optimum rate.

This form of fertilizer control is used in conjunction with regular soil, manure, and tissue testing to determine nutrient balance, which prevents over-fertilization and, with a sharp eye on irrigation rates, keeps excess out of the farm's run-off.

As the anti-erosion farming practiced by the Crauns helps preserve their tillable soils, it also helps protect the Chesapeake Bay at the far end of the Shenandoah Valley watershed and drainage basin. Manure storage, run-off and sediment control and other techniques used in Bridgewater (on the other side of the Allegheny Mountains from the Bay) are partially funded by the Chesapeake Bay program, in which the Crauns and many of their neighbors participate. The Crauns also are active in Young Farmers, the Shenandoah Holstein Club, and the Rockingham County Farm Bureau Association.

The family inheritance of soil and water conservation is regarded as important to the future. Says Steve, "From the experiences of past generations, we have seen the necessity to protect and conserve our water and soils so our descendants will have a farm to enjoy. It is imperative also that soil and water be protected on a global scale to provide adequate food and fibers for the constantly growing population of this planet."

Pierre and Susan Carr

Pierre (Pete) Carr has no family farming tradition behind him, and it is unlikely that future generations will follow in his footsteps. But he himself has an outstanding record of conservation farming. The San Franciscan, who went into farming 20 years ago, farms 450 acres near the town of Sutter on just about the only high ground close to where the Feather, Yuba, and Sacramento Rivers come together. It is a fertile agricultural area.

Carr's farm is on an area of volcanic uplift rising above the flood plains below, 150 feet higher than Yuba City, 10 miles away. He grows 65 acres of almond trees and was one of the first ranchers in the Sacramento Valley to irrigate his orchards with the drip irrigation method pioneered in Israel. (He traveled to the Middle East to learn how the method works.) The system delivers a trickle of water through six "emitters," or drip spouts, each of

which soaks about a 5-square-foot area. In the summer heat of the Sacramento Valley—without flood-plain level irrigation from the rivers—he has found trickle irrigation a major source of water conservation and related financial savings.

"Wildlife habitat enhancement" is one of the things for which the Carrs received a national award. Around some of the emitters he has built small bowls—he calls them "two-gallon reservoirs"—to catch extra water for the birds and other wildlife that live or hide in nearby brush piles or hedgerows of wild roses and blackberries he has planted. He planted the roses and berries in rows designed to create special corridors for pheasant, quail, and other birds. Carr says the flowers and the presence of wildlife make the farm a prettier place in which to live and raise a family.

Conservation tillage on his dryland grain fields minimizes soil erosion and reduces his fuel costs by cutting tractor passes from four to two.

On the lowest point of his land, Carr has built a tailwater recovery system to collect and store irrigation run-off, and the fertilizers and pesticides it contains can be used again. He estimates that he saves about 20 to 30 percent of the water and energy costs he might otherwise have faced.

When the Carrs took over the farm 20 years ago, "It was a wreck," he recalls. "We've made a good living on it except for the recent farm crunch, and I see it as my retirement account, even though none of my three children is interested in being a farmer."

Pete Carr is a past president of the Sutter County Resource Conservation District and the County's Museum Commission. □

(Popkin is a writer/editor in EPA's Office of Communications and Public Affairs.)

The Optimism of the Green Guerillas

by Barbara Reed Earnest

Community gardeners are the ultimate optimists. They plant today for tomorrow, working in rubble-cleared lots, often in devastated neighborhoods.

When Kim Mulcahy plants his herb garden or strawberry patch at the Liz Christy Bowery-Houston Garden in Manhattan's troubled Lower East Side, he is improving the environment by making a beautiful oasis. It is a place where the air is cleaner, the temperature is cooler in summer, the wind is calmer, and life thrives.

The garden is located on a busy intersection that is teeming with Bowery life. Yet nestled behind an attractive iron and wood fence is this little emerald jewel. Neighbors and gardeners from the area come to cultivate hundreds of varieties of flowers, vegetables, trees, and shrubs. Bees buzz in beehives; frogs, fish, and turtles swim in a pond; figs ripen on the vine; and a dawn redwood reaches to the sky. Children play and learn about plants, gardeners barbecue, neighbors drop by to paint, to read, to relax.

It wasn't always like this. Fifteen years ago a small group of volunteers, led by community activist Liz Christy, began to remove the bricks and garbage on the site. As they planted and built up the soil—often by hauling manure from the local police precinct's horse stables—people began to notice and to ask how they, too, could improve a lot near their home.

It was from this band of fighters, who indeed fought for every inch of green space they created, that the Green Guerillas came to be. Today the group still holds the same values dear. While they once lobbed seed "grenades" made of old Christmas tree balls filled with soil and wildflower seeds, they now give away tens of thousands of seeds to community gardens every year.

More than 250 volunteers garden with

Christmas trees are returned to the soil as mulch by the Green Guerillas.

Barbara Earnest photo.

Manhattan's troubled Lower East Side is home to the Green Guerilla's first project, the Liz Christie Bowery-Houston Garden. The garden was started 15 years ago.

the Green Guerillas now, spreading its work all over New York City. Volunteers consist of environmental specialists, computer programmers, students, the retired, accountants, and homemakers. They are people from all walks of life with certain things in common: a love of open green space, and a desire to work in the soil, get their hands dirty, and watch the gardens grow.

Last year the Green Guerillas were able to give more than $214,000 directly to the community in the form of donated plants and donated volunteer technical-assistance time. This is almost double the organization's annual budget! Its staff of only three, with occasional part-timers, is able to do this because of the outpouring of help from volunteers and contributors.

Collecting and recycling plants is one of the group's major activities. Terrace owners on Park Avenue, the Farm and Garden Nursery, the Native Plant Center, Rockefeller Center, the Council on the Environment, the New York Flower Show, many individual landscape companies, and the Bowery-Houston Garden all donate plants, bulbs, trees, shrubs, soil, containers, or tools.

These gifts are then distributed at fast-paced and lively plant giveaways at the Bowery-Houston Garden's holding area. In a space of only about 20 square feet, the giveaway area is typically heaped to overflowing. Assistant Director Phil Tietz sends postcard invitations to more than 450 community gardens, senior centers, AIDS resource centers, block associations, homeless shelters, and schools with which the Green Guerillas work.

On a given weekend in the spring and again in the fall, the gardeners come for the plants. They come with shopping carts; they come on the subway, on bicycles, in borrowed cars and vans, with many hands to help carry the precious plants back to their gardens. The Green Oasis Garden, the 6th & B Garden, and El Jardin del Paraiso from the Lower East Side arrive with bikes and cars. Mother Theresa's Missionaries of Charity from Brooklyn and the Bronx also arrive. (Last March, when former Green Guerilla director Tessa Luxley told one of the sisters that one of the plants she'd selected was not likely to survive, the sister said sweetly but firmly, "It'll grow for us.")

It was from this band of fighters, who indeed fought for every inch of green space they created, that the Green Guerillas came to be.

Other arrivals: the West Side Community Garden; 52 People for Progress, and Eubie Blake Gardens from the Bronx; Harlemites Garden Beautiful; Magnolia Tree Earth Center from Brooklyn; and the Bell Park Vets Retirees Association in Queens. They all take home things they could not afford to buy: precious plants that will enrich their neighborhoods and their environments.

Providing technical assistance is the Green Guerillas' other key contribution. Volunteers make site visits and help with garden design, planting, support, group organization, and even pest control. (Green Guerillas have bicycled the Lower East Side, broadcasting lady bugs, and they have even given away praying mantis egg cases for natural pest control.)

At regular workshops, information is distributed on a wide variety of topics such as how to:

- Start a community garden
- Build a pond, with directions from Board Chairman Andy Reicher, who has built several
- Cultivate a wildflower meadow, with tips from Board member Patti Hagan, who has established a meadow across the street from City Hall in soil so hard that a pick axe was required to plant the first seeds
- Prune trees, with former Green Guerilla director Tim Steinhoff, who has taught many professional-level workshops
- Garden on rooftops, with recent experience at the Bailey House AIDS Resource Center, where a new rooftop garden is being built by the Green Guerillas.

Other major projects at some unusual sites have resulted in successful greening as well. The Green Guerillas have pioneered a recycling project with the city's Department of Sanitation by delivering chipped Christmas tree mulch to gardens all over the city.

Last January, Green Guerilla Marghretta McBean rode "shotgun" with a driver and dump truck, delivering 63 truckloads of fragrant pine mulch to 25 community gardens. Parque Tranquilidad, the Bronx Frontier, the Gateway National Recreation Area, and Riverside Valley Community Garden, among others, all benefited from a protective, enriching layer of mulch in their gardens. This resulted in more than 500 cubic yards of potential landfill that did not end up in waste dumps.

In 1987, the Green Guerillas built a raised-bed garden at the Charles H. Gay Shelter for Homeless Men on Ward's Island under the direction of Green Guerilla Terry Keller. They have continued to garden with the residents and staff at the shelter. For the last two years, the Green Guerillas have conducted eight-week horticultural job training courses on-site and located jobs for the men.

Ken Schles photo, Green Guerillas

But with all of these successes, there still are some problems the Guerillas must face. Some housing advocates claim that there is not enough room for both housing and gardens. (There is, and a house in a densely packed, "greenless" environment is not a home.) Vandalism has occurred. Most importantly, gardens have little or no guarantee of permanency. Land lost now cannot be regained.

Some of the options for protecting the gardens that the Green Guerillas and the other support groups helping community gardens have found include: long-term leases through the city's gardening agency, Operation GreenThumb; outright purchase of land with the help of groups such as the Trust for Public Land; transfer of the land to the Parks Department; and new construction that incorporates gardens into final plans.

But permanency is not easy to achieve. Individual gardens and technical-assistance groups, such as those already mentioned, plus the Cornell Cooperative Extension and the Regional Plan Association have to work together to gain support—and each garden is different. In one instance, a group representing 32 gardens formed a coalition on the Lower East Side to save gardens facing major construction plans for their neighborhood. The Green Guerillas have a full-time staff member, Sandi Anderson, working on the project, and the gardeners are finding strength together.

Gardeners provide New York City with services it can no longer afford. They enrich and improve the environment now and for the future. For example, one tree alone can filter up to 60 pounds of pollutants from the air each year. The gardens are a precious resource that need to be preserved if New York is to be a liveable city in the future.

Although the time to save open land is running out, there is still hope. Community gardeners and concerned New Yorkers can help secure a green future for the city by joining and supporting groups like the Green Guerillas. □

(Earnest is Director of the Green Guerillas in New York City.)

When Chickens Die Young

by Lee Blackburn

With America's growing cholesterol consciousness, the poultry industry is enjoying tremendous success. As more chickens are being raised, however, one fact of life has become an environmental headache for poultry farmers: 55 of every 1,000 chicks born do not live to market maturity. For farmers with flocks numbering more than 100,000 birds, efficient, sanitary disposal of the dead birds can be a costly and difficult problem.

The most common current methods of disposal—incineration and burial—have health and environmental implications that make them less than ideal. Incineration of poultry carcasses causes local air pollution. Burial can result in serious ground-water contamination.

In 1985, when Dennis W. Murphy joined the University of Maryland Poultry Science Department, the need was clear: "The Delmarva Poultry Industries told us that finding better methods of disposing of dead birds was a top priority." Murphy's job was to find those methods.

A friend, an organic gardener, suggested composting. Murphy picked up a couple of books on the subject and began to look at ways to make a suitable compost from materials readily available on farms. All that was really needed were sources of carbon and nitrogen capable of supporting microbial action-producing temperatures in the 130- to 145-degree Fahrenheit range.

Chicken farms have an abundance of manure, or "cake," and dead birds; both are sources of nitrogen. And surplus straw or hay can provide carbon.

As Murphy explored composting, he defined five specific criteria that had to be met before composting could be a viable disposal method:

- The mixture must be capable of producing sufficient heat
- It must stimulate microbial action and rapidly decompose soft tissue from the chicken carcasses
- The composting process should be inoffensive to the senses
- The procedure must produce a high-quality fertilizer
- The whole operation must be easily built, maintained, and operated by farmers at low cost.

Murphy has had requests for information about poultry composting from 40 states . . . .

In 1986, Murphy began the year and a half trial-and-error process of developing the composting mixture. He came up with a perfect medium for thermophilic (heat-loving) bacteria: heat-generating microbes that are non-pathogenic (and in fact antagonistic to human and animal pathogens) and occur naturally in manure.

Murphy's system uses a simple two-stage batch compost. First, materials are weighed so that an exact "recipe" can be followed. Manure is layered with dead birds and straw in a mixture of one part straw, 10 parts dead birds, and 10 parts "cake" by weight. Then, water is added for a moisture content of about 55 percent. Chemically, this yields a carbon-to-nitrogen ratio of about 23 to 1 and generates temperatures up to 145 degrees Fahrenheit. The batch is turned once before it is used as fertilizer.

The process was tested for effectiveness and health implications. While the process is not designed to be capable of neutralizing quarantinable diseases, common pathogenic organisms—bacteria and viruses—do not survive the composting process.

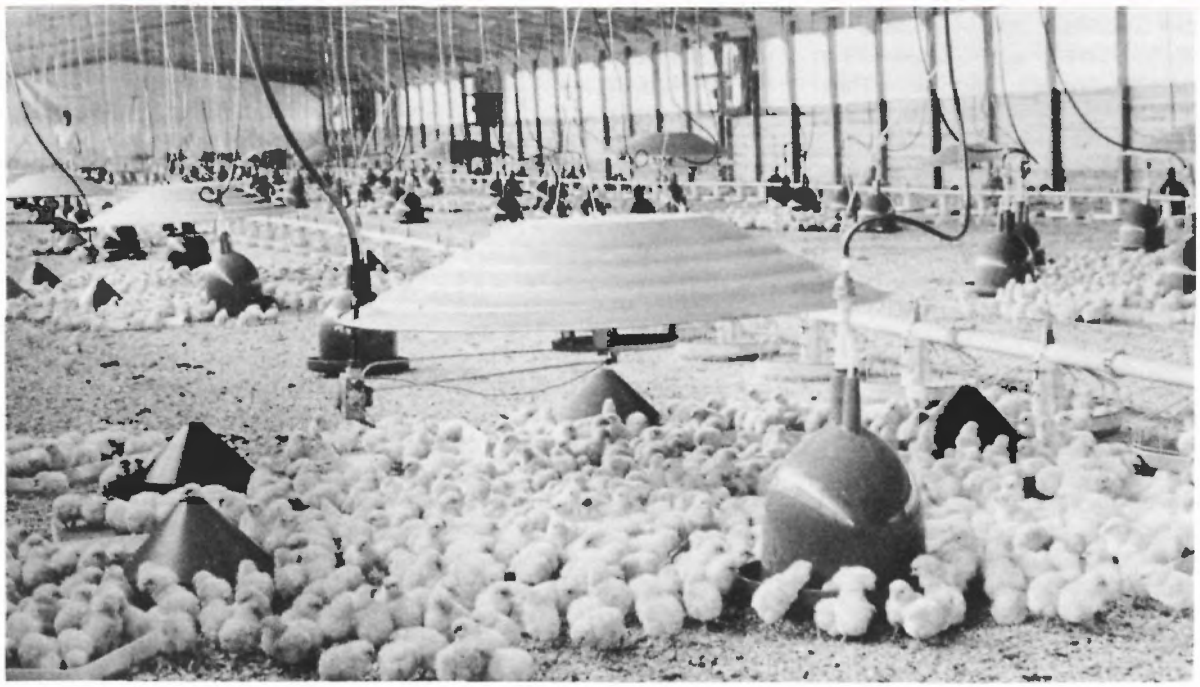
After the composting mixture was developed, the next task was to design a composter that the average farmer could build and maintain with a minimal investment of money and time. A concrete pad and a roof are essential to prevent run-off and leaching into the soil.

Once the composter was thoroughly tested, composting was judged to be a viable alternative to burning and burial of dead birds. It was time for a premier demonstration, one that would yield plans that could be used by farmers across the nation.

When Daniel Palmer of the University of Delaware Cooperative Extension Service visited some of the demonstration farms in Maryland, he was convinced that the method would work in Delaware. With the help of the U.S. Department of Agriculture, the U.S. Soil Conservation Service, and Delaware's Agriculture Department, Palmer developed plans for a full-scale test demonstration.

Farmer Edward Dutton, Jr., of Millsboro, in Delaware's southern agricultural belt, was interested. Dutton has a large farm, with more than 100,000 chickens. He also has a supply of straw and farm equipment capable of moving large quantities of compost. For around $4,500 in material costs, Dutton built a composter capable of handling the 1,000 pounds per day of dead birds and manure generated by his farm.

With its concrete pad and permanent frame and roof, Dutton's composter should easily last 15 years or more and save him about $3,000 per year in incinerator fuel costs alone.



Delmarva's broiler houses typically hold 20,000-25,000 birds. Because roughly 55 of every 1,000 do not live to maturity, efficient, sanitary disposal of the dead birds is an environmental challenge.

Poultry Digest photo.

While more than 40 dead-bird composters are currently operating, Dutton's is the first controlled test demonstration. If all goes well, it may yield a standard model that can be exported to similar farms around the country.

Murphy has had requests for information about poultry composting from 40 states—in fact, from all of the poultry-producing states. Alabama, California, Louisiana, Michigan, New York, and Virginia, as well as Maryland and Delaware, have initiated composting projects through their cooperative extension services.

Because poultry composting appears to be a means of preventing pollution, EPA Region 3 will be assisting with further work to refine the process and will also assist in the necessary technology transfer when the time comes.

Moreover, Region 3 has awarded the nation's first non-point source program implementation grants to Delaware. Some of this money is earmarked to help farmers develop and implement better management practices, such as composting, that will help reduce non-point source pollution. In Fiscal Year 1990, through the Inland Bays program, the Region also is directly contributing $27,500 to two formal studies of the composting technique.

As Murphy sees it, the method in use at the Dutton farm is cheap and simple, but further refinements are possible. He also feels that education is needed before composting goes into widespread use in the poultry industry. "You can't cut corners," he says. "Our methodology is not foolproof. Composting must be done and managed carefully and properly."

The Soil Conservation Service in Maryland is in the process of approving model plans and literature and has produced a video tape showing how the Dutton operation works.

The tape is available for $5.00, along with other information, and can be obtained from Dennis Murphy (LESREC), Route 2, Box 229A, Princess Anne, Maryland 21853. □

(Blackburn is a Public Affairs Specialist in EPA's Region 3 Office.)

STATE AND LOCAL ACTIONS

Introduction by Sally Shipman

Sometimes we don't know what we have until we lose it. Years ago the air was clean, the creeks clear, and landfill space plentiful. The environment got scant attention. We treated our world as if we had a spare in the closet.

A recent poll has shown that today the environment is people's number one concern. Why? Because we are finding out the hard way that we cannot take our natural resources for granted.

Can local governments solve their own environmental problems? The answer is yes, states and localities can find solutions and they can do so with reduced government dollars; moreover, they *must* find their own solutions.

There is definitely a need for "cheerleaders"—people to call attention to compelling problems and motivate other people to take initiative. While neighbors may talk among themselves, someone must galvanize people to take action to solve a problem. Knowledge is a powerful tool, but enthusiasm and commitment provide the impetus for action.

Once a problem has been recognized, the real work begins. Leadership is vital at this point. Leadership is the ability to take action before a problem becomes an emergency. Such leadership can come from individuals or groups and is often a grassroots effort.

Money to fix the problem is certainly important, but a committed grassroots approach often can find innovative ways to use human energies to accomplish the necessary tasks.

For instance, in Austin we are recycling our sewage sludge as soil for city parkland and playfields. An unused byproduct from one city department has been transferred to another city department to enhance the beauty of our parkland for everyone. One of the following articles explains what we are doing and why (p. 21).

In this collection of stories about innovative solutions around the United States, some common threads can be found. Many environmental problems are solved through individual and group initiatives that save money and protect the environment at the same time—a "win-win" situation for everyone.

One such win-win situation is the successful effort of Seward, New York, to find an affordable solution to a very difficult sewage-treatment problem, cutting dollar outlays and pollution at the same time (p. 17).

Illustrating the spark of concerned people at the local level, citizens pulled together in Clinton, New Jersey, after many homes were found to have elevated radon levels; local leadership played a strong role, and a high percentage of residents had their homes tested for radon and took remedial steps where necessary (p. 19). In Queen Village, Philadelphia, one citizen's inquiry led to an innovative recycling program that thrives on community participation (p. 23). The approach is so effective it is being adopted elsewhere.

Meanwhile, as described in another article, a home-grown solution to water scarcity has bloomed in the Los Angeles, California, area where a municipal water district reclaims wastewater for use in irrigation and recycles its sludge as a soil conditioner used in agriculture (p. 28). The district's motto, "total beneficial reuse," seems to speak not only to municipalities but to all levels of government in an age of mounting pressure on vital resources. In the eastern United States, a locally inspired regional board has turned pollution around in one of the New Jersey's most popular recreation lakes (p. 24).

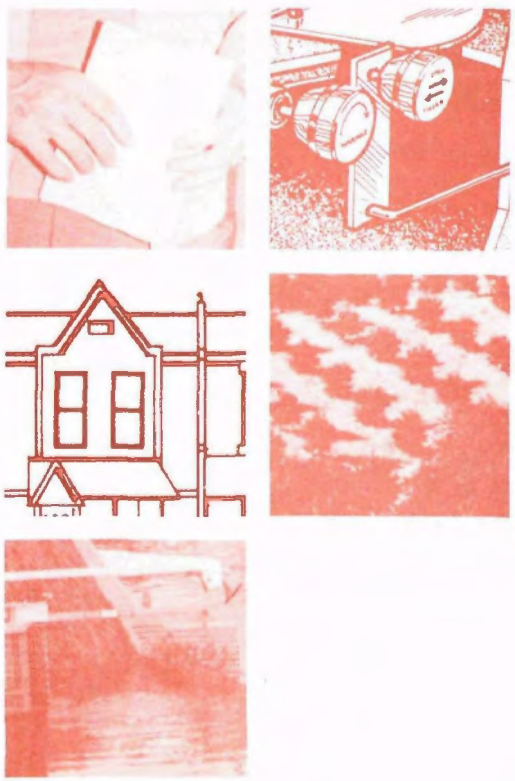
Another home-grown solution: A story describes how the state of Oregon worked with researchers and woodstove makers to achieve a breakthrough in stove design that made possible a national agreement for the control of this pollution source (p. 26).

The ideas and impetus for solutions indeed are working their way up from the bottom.

Why should localities take the initiative regarding the environment? As mentioned above, federal and state funds are dwindling. Second, when localities solve their own problems, a sense of civic pride emerges from taking things into their own collective hands and finding a solution. The willingness of people to solve their own problems is an index of civic pride. Third, who knows better than the residents of a city or community what resources are available and what is the most effective and economical solution for their particular area?

Theodore Roosevelt once said, "Do what you can, with what you have, where you are." This motto applies to all challenges that localities face, from the environment to the economy. Although economic prosperity is certainly a pertinent issue in today's society, a flagging economy can be brought back to its feet without enormous long-term damage. Once environmental quality is lost, it may be gone for generations. It is up to us, as individuals and communities, to protect and continually enhance the environment because after all, we have only one world. □

(Shipman is Mayor Pro Tem of Austin, Texas.)



A New Answer to an Old Problem

by Betty Ford

The stench of sewage that often pooled in their backyards plagued residents in the hamlet of Seward beginning in the 1950s. The problem: failing septic systems that served the hamlet's 44 homes, some dating back to 1870. The sewage created not only a health hazard but declining property values in this moderate-income farming community of 200 residents. The town of Seward nestles in the rolling country of northeastern New York, 40 miles west of Albany.

Most of the problems came not from the septic tanks themselves but from clogged drainfields constructed in clay soil that did not "perk" well. The systems, installed over the years as indoor plumbing came into use, were failing because the drainfields couldn't absorb and treat the liquid conveyed to them through pipes that extended from the septic tanks. In a suitable soil, bacteria and oxygen help purify the liquid as it seeps through the soil to the ground water.

The town of Seward repeatedly tried to solve the problem, but high-cost proposals and lack of money stymied their efforts. Several temporary solutions proved unsuitable. One was the system in use by 1986: Sewage flowed from the septic tanks to open ditches in residents' back yards, with the untreated liquid discharged to West Creek.

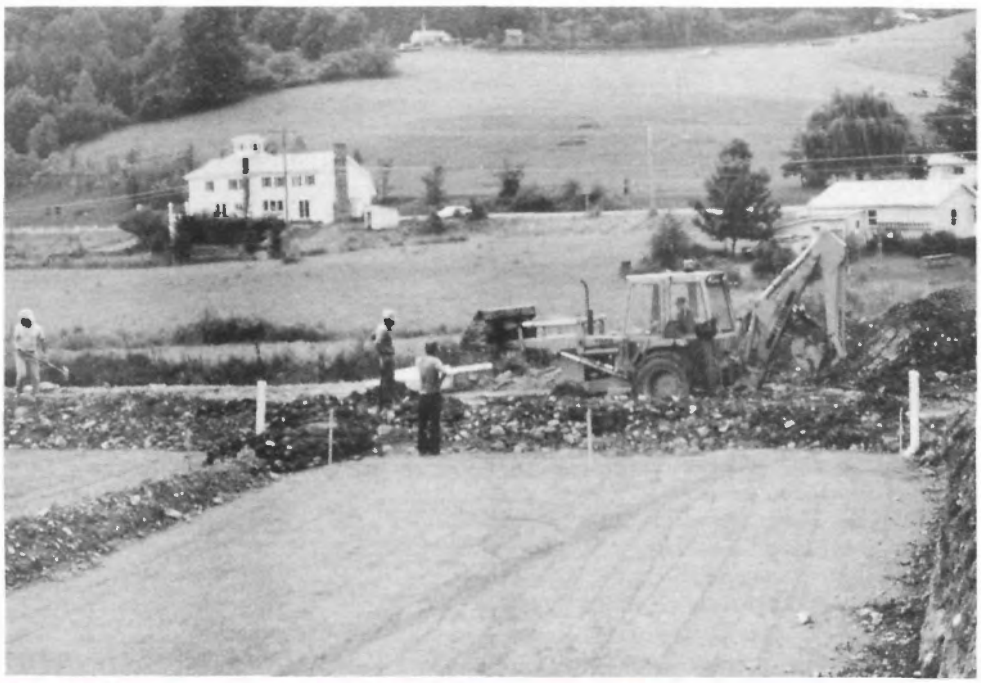
Pressure to correct the problem came from the residents themselves. Among other things, the open ditches posed serious health hazards to neighborhood children. Residents could not sell their homes, and most residents saw the situation as an affront to community pride.

Anxious to improve the hamlet's quality of life and restore property values, local officials in 1986 turned to New York State's Self-Help Support System for advice. This pioneer grass-roots support program, underway since 1983, helps small communities help themselves. When a town needs to build or improve water or wastewater projects, Self-Help calls for local citizens and town employees to perform many functions the community otherwise would pay outsiders to do. The program provides on-site training and technical assistance to help communities perform these tasks. Key to success is a community "spark plug" who assumes responsibility to see that the project is completed.

Under the leadership of since-retired Seward Town Supervisor Carl Barbic (the "spark plug" for the project), the community worked with the New York Department of Environmental Conservation's Diane Perley for months to come up with an acceptable system and a way to pay for it.

Perley, the project's senior engineer and now chief of the department's Self-Help section, provided extensive on-site training and guidance to the town's elected officials, staff, and citizens. Subjects ranged from low-cost wastewater technologies, financing, plant operation, and regulatory requirements on how to set up adequate user-charge systems and form a sewer district. One-on-one training included teaching a local citizen to test the quality of the effluent after treatment.

Joining Perley as part of the team was Jane Schautz of the Rensselaerville Institute in Rensselaerville, New York, a private educational and research institution that cosponsors the Self-Help program. Schautz stressed a basic self-help concept: The project needs



Seward's town crew built a buried sand-filter sewage system. Users pay an annual fee of $250—a marked savings over the estimated $1,250 that another system would have cost each resident.

Galvanized by state support, virtually the entire community sprang into action.

overwhelming community support from preplanning through construction. The community came through.

Galvanized by state support, virtually the entire community sprang into action. Citizens and government units donated valuable services and materials. A volunteer newsletter kept community interest alive with detailed reports of planning and design. Schoharie County's health department did the sanitary survey and evaluation of existing septic tanks and drainfields. A local resident surveyed potential facility sites; the two-acre site finally selected was donated by a local bank employee. Residents granted property easements for sewers.

A Soil Conservation Service geologist tested soils of potential drainfield sites, which were excavated by town crews operating a county backhoe. A local official working with the state Department of Environmental Conservation assessed the project's likely environmental impacts, including odors and possible land-use concerns. The newly formed volunteer Seward Sewer Committee, headed by Barbic working with Perley, weighed the advantages of various treatment systems while sewer district boundaries were determined using local tax maps. The sewer committee and Perley also drew up the user-charge system and the necessary sewer use ordinance. The committee's work allowed the town's engineering consultant to produce the preliminary engineering report and the final design of the wastewater treatment system at the bargain cost of $7,000. Barbic estimates the town saved $5,000 to $6,000 in engineering fees alone.

With technical training from the project's engineer, town highway and construction crews built the project and the access road with the town's newly purchased backhoe and a borrowed bulldozer, hauling sand and other building materials. Contracting and recordkeeping were done by town staff.

The result is a buried sand-filter system completed in September 1989, two years after construction began in August 1987. It consists of conventional eight-inch gravity sewers that lead from residents' homes to one of four central septic tanks. Effluent is conducted from the community tanks through six-inch, small-diameter sewers to six community sand-filter beds that cover a total area of 64 feet by 200 feet. Here the effluent is treated and then conveyed via six-inch gravity sewers to a central discharge point in West Creek. Sand filters are a proven technology that provide a high level of treatment at low construction and operation costs. The discharged effluent exceeds Clean Water Act treatment requirements.

Self-Help saved the community $355,000, with a final project cost of $175,000, a 69-percent savings over the originally estimated $530,000 for the same project. Instead of the unacceptable $1,250 annual user charge originally projected, user charges were slashed to $250 a year. Fred Esmond of New York State's Department of Environmental Conservation estimates most communities, through Self-Help participation, can reduce project costs by at least 30 percent. Some communities, as Seward shows, can save much more.

Financing came from a short-term, three-year interim loan from the New York State Self-Help revolving fund financed by the Ford Foundation. As required by the fund, loans must be repaid in full after the project is completed. Loan paybacks then go back into the fund for loans to other communities. The community will refinance the project next summer with funding from either New York's EPA-funded state revolving loan fund or municipal bonds.

The stench of sewage is gone now from residents' back yards in the hamlet of Seward. A sense of pride pervades the community as Seward's neighbors voice approval and new respect for the hamlet and its people, and parents no longer worry about their children falling into sewage ditches. Real-estate values have increased. Citizens express relief and a sense of well-being with their smoothly functioning wastewater system and its reasonable user charges.

The town's atmosphere is different, too. According to Barbic, Self-Help has brought the entire community together. He voices unqualified gratitude to the state Self-Help support staff and the assistance and encouragement they provided.

Perley returns the compliment. "The Seward project shows how government can work with a community to make a wastewater project possible," she says. "It was a pleasure to work with Seward's people because their enthusiasm and hard work carried the project through."

So far, 18 New York State communities have completed Self-Help water or wastewater projects, and 37 communities have projects underway. Since the Self-Help program began, the Self-Help team has traveled the state talking with 144 communities who have expressed interest in the program. □

(Ford is a writer/editor in EPA's Office of Municipal Pollution Control in the Office of Water.)

Editor's note: A "Self-Help" handbook is available from the Rensselaerville Institute, Rensselaerville, New York 12147 (telephone: 518-797-3783).

Facing Up to High Radon Levels

by Ann Fisher

In March 1986, a Clinton, New Jersey, resident tested his home and found an extraordinarily high radon level: 1,000 picoCuries per liter (pCi/l, which is a standard measure of radon). He called the New Jersey Department of Environmental Protection. The next day, the state confirmed the reading and began testing other homes in the Clinton Knolls development of about 500 people. Many of the homes had elevated levels of this naturally occurring gas that can cause lung cancer, clearly indicating a radon problem in this small town of 1,900 residents.

Many communities have been apathetic about this recently revealed health threat. A few have reacted angrily, demanding that the government reduce their radon levels. But Clinton confronted and solved its radon problems. Its story provides lessons for communities facing radon or other environmental health threats.

The Clinton discovery came only about a year after the public and government agencies began to be aware that naturally occurring radon could build up to dangerous levels in homes. Scientists were uncertain about just how dangerous such a level might be, and government agencies were scrambling to find ways to reduce indoor radon levels inexpensively and effectively. No federal standard had been set below which radon exposures would be considered "safe." Instead, various groups had proclaimed their own safety thresholds, ranging from 2 pCi/l to 30 pCi/l—all of which are much lower than the 1,000 pCi/l found in Clinton's "discovery" house.

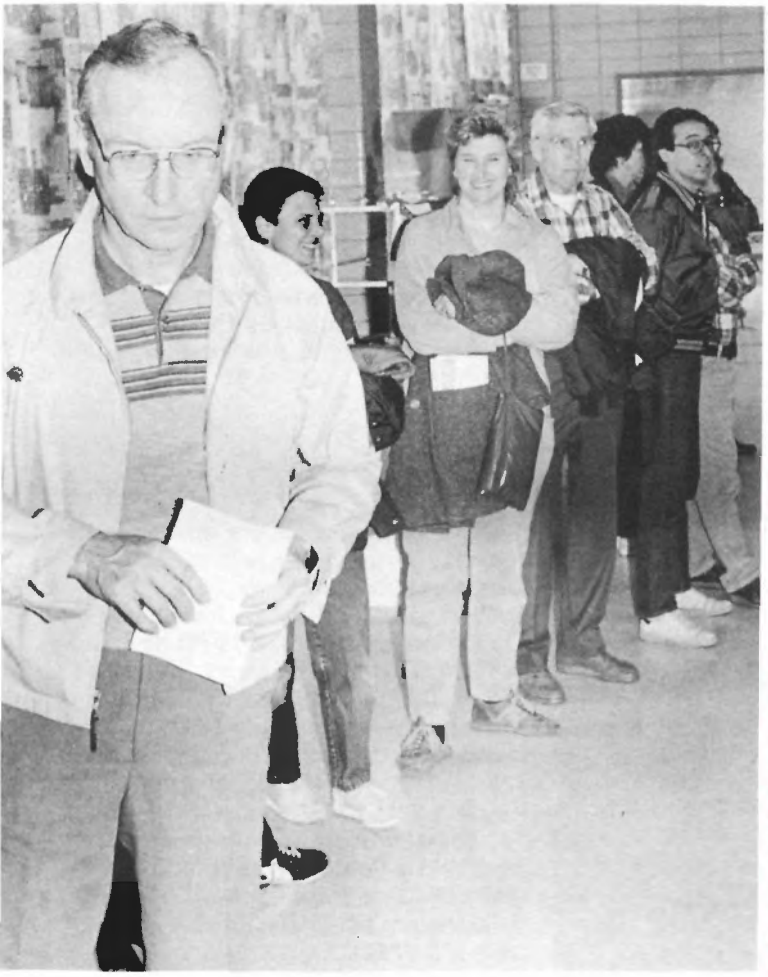
Clinton mobilized quickly. Local and state officials treated radon as a serious problem and worked together to provide information and assistance to the community. State officials relied a great deal on Clinton's mayor, Robert Nulman, because he understood the community's concerns.

At public meetings Nulman provided an opportunity for "what had to be said," according to state official Donald Deieso, "and he fully supported everything we were saying." Nulman helped to keep public discussions focused on the facts. In turn, Nulman found his job easier because state officials maintained daily contact, gave him home phone numbers, and briefed him before going to the press. State and local officials were thus able to work together as an efficient team.

Officials from New Jersey's Departments of Environmental Protection and Health held a public meeting with Clinton residents and several smaller, "invitation-only" meetings with homeowners (to protect confidentiality). The smaller meetings gave neighbors a chance to share their experiences. The strategy was to keep Clinton residents informed, because the worst enemy is fear of the unknown.

Their collaboration with the mayor helped state officials anticipate homeowner concerns—even those not related to health—and they took them seriously. For example, neither state agency's mandate includes property values, but part of the reason for confidential radon readings was

Hunterdon County Democrat photo.



Residents of the Clinton Knolls neighborhood in Clinton, New Jersey, were shocked to find that the limestone cliffs on which their homes were built were loaded with radon. Test kits were distributed at a large public meeting; then residents lined up to turn in results. Most residents have now had their homes treated and retested with satisfactory results.

community concern about property values.

Likewise, *before* announcing which homes would be part of EPA's demonstration project for reducing radon, state officials carefully explained that homes would be selected on the basis of radon levels *plus* a clearly defined list of other variables. Ten homes were selected, and 20 more were provided with detailed diagnostics for reducing their radon levels. The state also arranged for assessments of homes in addition to those selected for the demonstration project.

The mayor's leadership was complemented by the technical expertise of New Jersey's Department of Environmental Protection. In particular, Gerald Nicholls, a radiation physicist with teaching experience, gave credibility to the team's activities. According to Nulman, "He talked in plain language and brought things to our level." Meetings often were scheduled for Saturday mornings so that people could bring their children instead of having to hire baby sitters. That timing also demonstrated commitment on the part of the government officials. "People said 'Thank you for coming up here on a Saturday,'" Nicholls noted. "It was as if we had donated something."

The public meetings had two major messages. The "bad news" was that radon can be a serious problem. Testing kits were distributed at the large public meeting to encourage people to test for this problem. The "good news" message was: You can do something about radon; there are mitigation methods that are affordable and effective. Officials wanted to calm those who seemed overly concerned, yet "wake up" those who were not taking action. As Mayor Nulman said, "If you don't get your house checked, then you should get your head checked."

Scientific uncertainties about the extent of the health risk presented a challenge. Judy Klotz of the Department of Health put the risks in perspective by saying that scientists felt far more confident about the risks of radon than the risks posed by many of the substances in New Jersey's drinking water. She also stated ahead of time, "We can't tell you exactly what your individual risk is." Mayor Nulman took a pragmatic perspective: "This is one of the few environmental hazards that you can do something about. Why ignore it? Why not remove all doubt?"

Another reason Clinton reacted so constructively was that official responses were timely. For example, the EPA team examined 56 houses within five days, then reported the results at a homeowners' meeting within several days. Within nine months of the initial discovery, officials announced that radon levels in all 10 homes in the demonstration project had been reduced to less than 4 pCi/l, the action level announced by EPA in August.

Mayor Nulman willingly shares his own personal experience with radon. Just after the big wave of publicity about radon in Clinton, he was in the process of buying a home. He included a radon testing clause in the purchase contract. The test results showed 130 pCi/l, substantially above the guidelines then available. He contacted a noted radon reduction contractor, who gave him a mitigation estimate of $900. The seller of the house agreed to pay for the mitigation, which took less than a day.

The bottom line is that the residents of Clinton calmly went about testing and reducing radon in their homes.

One step was to seal the sump pump opening in the basement. The other step involved drilling two four-inch holes in the basement workshop, installing a pipe in each hole and a low-energy fan to draw soil gases through the pipes and vent them outside the garage. Retesting showed that the radon level had been reduced to about 1.5 pCi/l. Thus, Nulman can attest to the fact that radon is a problem that is fixable and not especially expensive.

Not everything went smoothly in the Clinton case. For example, the reporters, not government officials, convened the first press conference by confronting officials outside the mayor's office. It is a delicate balance to decide when to release information early enough to satisfy people's need for it, and yet not so early that it will be reversed by more data. The media coverage tended to be sensational and included TV interviews in front of homes with "For Sale" signs that had been posted before radon there had become an issue. With encouragement by both the town and the state, however, the media did come back and report on how Clinton had solved its radon problem.

The bottom line is that the residents of Clinton calmly went about testing and reducing radon in their homes. State officials report that all homeowners known to have more than 20 pCi/l readings have taken steps to reduce their radon levels. Many of those with lower initial radon readings also have taken action.

Regarding property values, there was some initial reluctance to acknowledge the existence of a potential problem, followed by a slow-down in sales. However, real estate agents noted that the regional housing market was very slow during that period, too. Prices never really went down, and the market has rebounded for the entire area.

There is still some concern that not all Clinton residents potentially at risk have tested their homes or taken mitigation action if their readings were high. Relatively little information is available on just how many tested and took remedial action, because these procedures were handled privately.

In the Clinton Knolls development, where the discovery house was located, there was much more action than in the rest of the community. As Clinton physicist and reporter Jim Draughtman said, "I think all of us played 'It's a fixable problem' too hard. What we're saying now is that everybody in this county ought to test; I think we probably should have been saying that from the start."

Mayor Nulman feels that his town has learned that radon is a temporary problem, comparable to termites. Most Clinton residents have peace of mind, knowing they are safe because they tested (and took mitigation steps if their radon levels were high). He says, "That's one crisis that is happily in our past." □

(Fisher is Manager of EPA's Risk Communication Program.)

Editor's note: Readers are invited to consult Alerting the Apathetic and Reassuring the Alarmed: Communicating about Radon Risk in Three Communities *(NTIS PB 89-148258/AS) and* A Citizen's Guide to Radon *(OPA-86-004, August 1986). The first document is available from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (telephone: 703-487-4690). The second is available from EPA's Public Information Center (PM 211-B), 401 M Street, SW, Washington, DC 20460 (telephone: 202-475-7751).*

Putting Sludge to Work

by Maureen McReynolds

Standing at Auditorium Shores Park in the mid-summer heat of Austin, Texas, one wonders how the grass has survived at all, let alone withstood the impact of thousands of dancing feet. But it has survived—with the help of an additive called "Dillo Dirt," a soil conditioner and fertilizer produced by composting sewage treatment plant sludge.

Located in the heart of the city, Auditorium Shores Park is a popular gathering spot for the people of Austin. The park slopes down from the City Auditorium, in limestone walled terraces, to the south bank of Town Lake, the portion of the Colorado River that graces downtown Austin. A heavily used Hike and Bike Trail follows the shore on both sides of the lake.

Across the lake from the park, and in clear view, lie the central business district, the state capitol complex, and the tower of the University of Texas. The Park-and-Ride stop for the downtown "Dillo" shuttle is nearby.

During the spring and summer months, numerous festivals and outdoor concerts are held at this expansive park site.

The highlight of the long, hot Austin summer is AquaFest, with its nights of music, dancing, and good times. Until the schedule was cut back to weekends only in August 1989, AquaFest was held on 10 consecutive nights, and in its aftermath a dry, beaten wasteland was left where the grass used to be. The intensive pounding was routinely followed by extensive irrigation in an attempt to reestablish the grass cover.

In the summer of 1988, the staff of the City Parks and Recreation Department made a breakthrough toward easing their maintenance job at the Park. They reasoned that the addition of a slow-release, low-percent nitrogen fertilizer would not "burn" the lawn in the summer heat and coupled with watering, would provide the winning formula for "lawn tonic."

When Dillo Dirt was selected for this job, the Parks and Recreation staff had already had some experience with the city's sludge product.

Austin's Water and Wastewater Utility had begun experimenting with turning sludge into a beneficial product early in 1987. The first successful batch of compost was used to help establish a tree farm at the sludge treatment plant that spring. In the fall of 1987, the utility invited the Parks and Recreation staff to begin using the newly manufactured compost called Dillo Dirt.

The name was suggested by Andrew P. Covar, Director of Regulatory Affairs and Quality Control for the utility, in honor of the nine-banded armadillo, or "dillo," the unofficial mascot of the city of Austin. This docile, nondomesticated animal, found in rural parts of central Texas, is fond of rooting in gardens. It has become a symbol of Austin's relaxed lifestyle, which emphasizes enjoyment of the outdoors.

Since the metal content of sludges is often a drawback for use in vegetated areas, the low metal content of the

City of Austin photo.

Following the annual Austin AquaFest, the landscape of Auditorium Shores used to look a lot like a wasteland. Now, with the help of Dillo Dirt, the grass survives the trampling it receives. Dillo Dirt is a soil conditioner and fertilizer made from composted sewage treatment plant sludge.

Austin sludge is a distinct advantage. Utility Pretreatment Manager Jack Gatlin considers the sludge composition as evidence of the success of Austin's pretreatment program, which limits the metals and other chemicals that can be discharged by businesses and industries into the sanitary sewer.

The Parks staff were impressed but hesitant. What about public acceptance? What about health safety? "They were pretty concerned," says Compost Manager Jim Doersam. "They envisioned a slimy, smelly sludge. No amount of talking about it or showing them the data seemed to convince them. What really did it was a tour of the plant."

As the Parks staff learned firsthand, the compost is generated by a complex process of "cooking" the sludge from the sewage treatment process. Sludge is the solid material that remains after secondary treatment of wastewater. Approximately 50 dry tons of sludge are transferred daily from Austin's treatment plants to a central processing facility. Initially, the sludge is stabilized in large tanks that operate in the absence of oxygen (anaerobic digesters). The concentration of volatile materials is reduced during this phase; also reduced is the potential problem of attracting nuisance insects and animals, such as rodents, when the sludge is turned out into drying basins.

When the sludge leaves the digesters, it is still fairly liquid. It is then air-dried in open concrete basins, where it is turned or mixed on a regular basis by a tractor-mounted horizontal auger. As it dries, the sludge begins to thicken. Once an adequate density has been achieved, about 50 percent of the sludge is applied for agricultural use on land near the drying basins.

Dry bulking agents are added to the remaining sludge to begin the actual composting process. The bulking agents used by Austin are all waste products which might otherwise be sent to the sanitary landfill. They consist primarily of wood chips from the tree trimming for electric utility power line clearance work.

The mixture of sludge and bulking agents is formed into piles and arranged in six-foot high rows for ease in turning. The temperature of each row is monitored daily to ensure that sufficient heat is generated to destroy harmful bacteria which might remain in the sludge. The composting materials must be turned a minimum of five times and temperature of more than 55 degrees Celsius maintained for at least 15 days in order to reduce harmful bacteria to minimal levels. Steam rises from the piles as the rows are turned with the auger.

The Parks staff were impressed but hesitant. What about public acceptance? What about health safety?

After curing and screening out larger wood chips, the compost is ready for land application.

The Parks Department cautiously began experimenting with Dillo Dirt in landscaped areas of the parks system in 1987. The first test was at the Rose Garden. Doersam recalls that the local health department was also concerned when the compost was first used in the parks. "They came out and watched the Rose Society apply the first compost, and that made everyone nervous!" says Doersam. But fears began to subside as the flowers thrived.

The next big test of the compost came when the city's soccer fields were treated in the summer of the following year. Parks and Recreation staff were concerned about the acceptability of the treated sludge in play areas of the parks. The ideal time for testing the product was at the end of the soccer season when active outdoor recreation was already limited by the summer heat.

A farm manure spreader was used to deliver measured quantities of composted sludge to the fields. The compost was then worked into the existing soil and watered. Positive results were evident within two weeks.

Soccer enthusiasts were delighted. Many commented on the mild, musty odor the first couple of days after application, but there were no genuine complaints. Newspaper reporters for the sports section of the largest daily in Austin, the American-Statesman, and the University of Texas newspaper, the *Daily Texan*, praised the work. The stage now was set for even wider park use of the beneficial sludge product.

Staff of both city departments were eager for new opportunities to use the compost. The post-AquaFest application was a fortunate choice. It provided a successful demonstration project for staff of both departments and the general public. Since that summer, Dillo Dirt has been used in many other parkland situations. In addition to its successful use on Austin city parkland, Dillo Dirt now is marketed at local garden supply stores. Vendors buy the compost in bulk from the utility for retail sales to their customers.

"We are really pleased with Dillo Dirt," says Jim Rodgers, Program Manager for Metropolitan Parks. "You can really tell the difference, at Auditorium Shores, where it was applied and where it wasn't. We need to go back and finish the job this year. We could take all they make for our baseball fields and other park areas."

When asked about the decision-making process that led to using Dillo Dirt as fertilizer in the parks, Rodgers remarked with a smile: "It's cheap, it's organic, it's got some nitrogen, and, frankly, when the Water and Wastewater Utility staff said they would deliver and spread it, that did the trick!" □

(Dr. McReynolds is manager of Water Quality and Environmental Assessments for the Austin, Texas, Water and Wastewater Utility.)

In Philadelphia's Queen Village, community spirit has made block-corner recycling successful. Block coordinators find residents who are willing to have their street corners used as pick-up sites each Saturday. Then reminder signs are posted.

A Neighborhood's Creativity

by Robert W. Pierson, Jr.
and Gregg Sekscienski

Alyce Campisi was committed to recycling. Her Queen Village neighborhood in Philadelphia had a recycling, drop-off project that collected recyclables every Saturday at a local schoolyard. Residents dropped off their glass, aluminum cans, and newspapers at the school, and the neighborhood group sold the recyclables to National Temple Recycling Center. The money generated from the sales was used for other neighborhood projects.

But Alyce had a problem. She was elderly and needed help hauling her recyclables to the school. So she called the Queen Village Recycling Committee. A committee member suggested that Alyce take the recyclables to the corner of her block; the committee would be glad to send someone to pick them up.

Alyce told the committee that other people she knew had the same problem. The committee had an idea: maybe routine block-corner collecting of recyclables would make more sense than operating a centralized drop-off project. That way, people could simply take their recyclables to the nearest street corner instead of making a trip to the school.

The committee contacted Philadelphia's new recycling office, which had just started organizing pilot, curbside-collection (house-to-house) recycling programs for certain city neighborhoods. The city was interested in the block-corner pickup program and agreed to supply a city truck and crew to the neighborhood twice a month on Saturday mornings. In December 1985, bi-weekly, block-corner pickup began.

It was a success. The first collection route serviced 12 blocks. Within a few months, 46 blocks and 1,200 homes were participating in the neighborhood's voluntary recycling effort. By 1987, 100 tons of recyclables per year were being collected. And in October of 1989, the collection was increased from bi-weekly to weekly.

The success of this community's home-grown recycling program stems from an effective social network among the residents of the neighborhood. Each block must have a block coordinator. Among other things, the block coordinator is responsible for finding a corner resident willing to tolerate a pile of newspapers, glass, and aluminum cans for several hours every Saturday morning.

Coordinators are also responsible for distributing start-up flyers and follow-up reminder leaflets on their blocks. The reminders continue for four to six months—until the recycling habit "takes." The recycling committee provides these publications to the block coordinators. Committee members also write articles about recycling—including schedules and tonnage reports—for the monthly community newsletter.

The block leaders and residents are the backbone of the program, but the cooperation among the residents, the Queen Village Neighbor's Association, and the city has added to the block-corner program's success. The program has been successfully implemented, with the city's assistance, in six other Philadelphia neighborhoods.

Queen Village's recycling program is also more efficient and less costly than curbside, house-by-house pickup—the most common form of municipal recycling today. The block-corner collection crew picks up 730 pounds of recyclables per labor hour (travel time to the buyer included). The hourly yield in the city's curbside collection program

is 180 pounds of recyclables. This translates into a per-ton collection cost for block corner pickup that is one-fourth the cost of curbside recycling.

The block-corner method's high efficiency is the result of the far fewer stops required. The truck stops only once for the 30 to 150 homes assigned to each corner. During the several-minute stop, the driver can help load the recyclables. In curbside collection, the driver only drives; others do the loading. Block-corner collection makes full use of a crew's labor potential.

And there are tangible benefits to the community. With its recycling income, the Queen Village Neighbor's Association has awarded block-improvement grants for tree planting, community garden fencing, and a park planning and maintenance program. The grants, averaging $500 each, provide a visible payoff to recyclers for their participation.

Block-corner recycling may not work everywhere. But in Queen Village and other Philadelphia neighborhoods, it is a proven success.

A detailed handbook on setting up a block-corner recycling program is available for $5 from Robert W. Pierson, Jr., at Rogers, Golden, & Halpern, Inc., 1216 Arch Street, Philadelphia, Pennsylvania 19107. □

(Pierson is a senior planner with the planning and engineering consultant firm of Rogers, Golden, & Halpern in Philadelphia. Sekscienski, a journalism student at the University of Maryland, is an intern with EPA Journal.*)*

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Take It Up with the Board!

by Bud Cann

UMI photo.

Sparkling blue water. Excellent fishing. Fresh mountain air and beautiful sunsets. Located in northern New Jersey, Lake Hopatcong is easily accessible for residents of the Northern New Jersey-New York City metropolitan area.

Ironically, the same features that make the largest fresh-water lake in New Jersey such a popular treasure led to its near-demise as a recreational water body. But a regional planning board has been able to reverse this trend.

The 2,700-acre lake and its environs have long been a popular destination. At the turn of the century, wealthy socialites, avid fishermen, and others seeking respite from city life traveled to the lake for recreation. There were day-trip excursion trains from New York City and Jersey City; lakefront hotels accommodated those who wanted to stay longer.

Later the automobile brought increasing numbers of visitors and residents to Lake Hopatcong, especially after nearby Interstate 80 provided a high-speed link to cities and jobs. Ultimately, the area became a Northern New Jersey-New York metropolitan area suburb.

Not surprisingly, pressures from increasing numbers of visitors and residents began to stress the lake and its surrounding watershed. Water quality declined as lake cottages, with septic systems designed for intermittent summer usage, were converted to year-round residences. In addition, new construction increased dramatically. Roads and stormwater drainage systems were expanded without much consideration for their impact on the environment.

As early as 1959, Lake Hopatcong showed signs of increased weed and algal growth. Chemical herbicides were used to clear the way for fishing and boating. Fishing clubs and community associations became concerned over the visible decline in water quality.

But jurisdictional boundaries and lack of a cohesive approach presented significant obstacles to action. The shoreline of Lake Hopatcong cuts through four municipalities: Hopatcong Borough, Jefferson Township, Mount Arlington Borough, and Roxbury Township. The lake itself is bisected by two counties, Sussex and Morris. And the State of New Jersey owns much of the lake bottom. Thus, management of the lake as a natural resource required the agreement of four municipalities, two counties, and the state of New Jersey—a formidable bureaucratic task.

Modern weed harvesters cut down on the herbicides needed to curb the underwater growth in Lake Hopatcong.

Enter the Lake Hopatcong Regional Planning Board, formed in 1962 to address the problems of Lake Hopatcong and to begin seeking answers to those problems. Its members were appointed by the respective jurisdictions that have a vested interest in the lake. Current members include: a local businessman who is an expert on water chemistry, a representative of the area's marina operators, an attorney with special expertise in environmental and municipal law, and a town councilman. The board has no paid full-time staff. To get things done, it relies largely on the resources of member governments.

Initially, the board made slow progress, but even in the early years it provided an important forum where problems could be discussed. Then, with the passage of the Clean Water Act and EPA's Clean Lakes Program, the pieces began to fall into place.

In 1982, the Lake Hopatcong Regional Planning Board applied for and was awarded EPA funding to conduct a diagnostic study of Lake Hopatcong. The study results indicated that 80 percent of the nutrient input to the lake came from stormwater run-off and septic system leachate; the rest came from a variety of sources.

As part of the report, a restoration and management plan was developed which included a combination of specific remedial measures together with institutional arrangements for dealing with all of the water-quality problems of Lake Hopatcong. The plan, which stressed the importance of coordination among the seven governmental entities involved, provided the framework for a successful Lake Hopatcong restoration project.

The plan also stressed local involvement as critical to success in improving and maintaining water quality in Lake Hopatcong. Local zoning and planning were highlighted as key management tools to reduce current loadings and minimize future deterioration of water quality. Individual municipalities were encouraged to manage land use within their boundaries to reduce impacts on the lake. The result was a friendly competition in which municipalities tried to outdo each other in management and restoration initiatives.

At this point, with a published and formally accepted plan, the regional planning board won a second grant from EPA's Clean Lakes Program for the purpose of implementing provisions of the plan. Not all of these grant funds were used because local funds were made available, and the engineering plans originally outlined in the grant proposal were substantially expanded. However, the award provided crucial impetus in the implementation of a plan that quickly exceeded its original bounds

The result was a friendly competition in which municipalities tried to outdo each other in management and restoration initiatives.

Proceeding with the implementation phase, the board initiated a pilot stormwater control project and purchased two aquatic-weed harvesters to be used in Lake Hopatcong. The pilot stormwater control project quickly expanded into a complete reconstruction of the stormwater system in the designated area. The Borough of Hopatcong and Sussex County increased the scope of an existing road repair project to include construction of a series of small underground detention basins for passive stormwater treatment. This work cost roughly $500,000 and was jointly funded by the New Jersey Department of Transportation, Sussex County, and Hopatcong Borough.

The mechanical harvesting of aquatic weeds has also been successful. The project has resulted in dramatically decreased use of herbicides in the lake and has the widespread support of Lake Hopatcong residents and visitors. More than two million pounds of vegetation are mechanically harvested from the lake each year; this also removes approximately 10 percent of total annual phosphorous load.

There have been other successes. Working with member municipalities, the board has promoted environmentally sound management practices that apply to new construction projects within the watershed. The board has also successfully sponsored a number of new or revised municipal ordinances, such as critical-area zoning for sensitive areas like flood plains and wetlands. For new construction projects around the lake, minimum setback requirements have been established. Fifteen years ago, none of the municipalities had such regulations.

Progress has also been made in controlling septic system inputs to the lake. Funds from Housing and Urban Development (HUD) block grants have been given to local residents to repair or replace failing systems. A permit system has been proposed for the regulation of individual septic systems.

The Lake Hopatcong Regional Planning Board deserves credit for taking on a large, complicated task that otherwise would have gone undone. Their stewardship has paid off in the conservation of a very important local resource. □

(Cann is Lakes Management Coordinator with the New Jersey Department of Environmental Protection.)

Answering a Burning Question

by John F. Kowalczyk

For the last three years, woodstove sales in Oregon have been restricted to units certified as meeting stringent air-pollution control requirements. On July 1, 1990, a similar national program will be implemented by EPA.

Since when have woodstoves, long-time friend of humankind, required stringent pollution controls? How did the necessary woodstove pollution-control technology develop? How well do the new controls work?

Throughout civilization, wood has been a primary heating source. Wood is still abundant in the United States, where about 33 percent of the land area is forested, with every state having some forest land. Wood remains inexpensive in most parts of the world, and in contrast to many consumer items, it is a renewable resource.

The technology of wood heating has evolved slowly. Open fires outdoors gradually evolved into open fires indoors and eventually into open fires indoors within a fire protection shell. The latter, the so-called fireplace, is still a traditional fixture for aesthetic and recreational purposes in many modern houses.

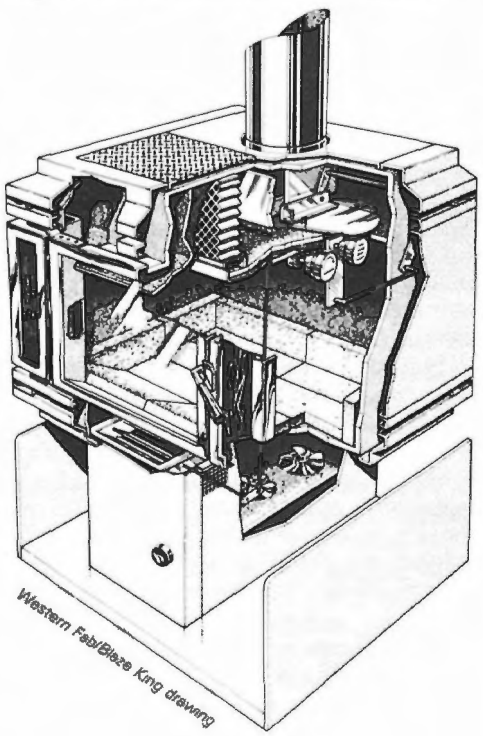
A major development in wood heating occurred in the mid-18th century when Benjamin Franklin invented the freestanding metal fireplace commonly known as the Franklin stove. This design offered longer burn time between refueling because of a somewhat restricted combustion air supply and increased heating efficiency (compared to fireplaces) because of its several exposed metal surfaces. Modern testing has indicated that the Franklin stove was about 30-percent heating efficient, or six times more efficient than fireplaces, which average about 5-percent efficiency.

Woodstoves followed the basic Franklin design through the 19th and well into the 20th century. Then in the mid-1960s, the villain of air pollution appeared. About this time, the so-called air-tight woodstove design, credited by some to the Fisher Stove Company, appeared. This design had the ability to totally restrict the combustion air supply, thereby providing even longer burn times between refueling.

It also provided increased heating efficiency because it slowed down the passage of combustion gases through the stove. The air-tight woodstove particularly appealed to the public because the stove's restricted heat output allowed it to be used like a central furnace that did not overheat the modern weatherized home.

Unfortunately, the air-tight woodstove substantially increased air pollution compared to its predecessors. This went unnoticed by air-pollution regulatory agencies for a time, as did the massive increase in sales of air-tight stoves as a result of the world energy crisis in the mid-1970s.

By the late 1970s, the Oregon Department of Environmental Quality noticed a rapid worsening in particulate air quality levels at numerous monitoring sites throughout the state. At first this was puzzling. A downward trend had been expected due to substantial restrictions imposed on industrial emissions as a result of federal Clean Air Act requirements.



The new generation of woodstoves, illustrated in this cut-away drawing, emits 50 to 70 percent less particulate matter than did the older, air-tight stoves.

State-of-the-art airshed studies were launched to identify the cause of the problem. With the aid of the Oregon Graduate Center, a chemical "fingerprinting" technique was developed to trace the particulate back to its origin.

The results of this effort were at first unclear. Much of the chemical constituent of the particulate appeared to be a tar-like substance of organic carbon similar to that of cigarette smoke. Industrial and commercial fuel combustion was first suspected, but carbon dating, now being used as an analytical technique in air pollution studies, indicated the material was from a non-fossil fuel. Wood was the only possible source. Oregon's large wood products industry was then suspected, but after extensive emissions inventory work, the unbelievable became believable: Residential wood heating was found to be the largest source of particulate emissions in most urban areas of the state.

In less than a decade, increased emissions from residential woodstoves had more than negated reductions achieved through industrial control. On some high-pollution days in Oregon communities, chemical fingerprinting attributed more than 70 percent of the particulate in the air to wood heating.

Air-pollution problems from residential wood heating were soon identified in other areas of the United States, from last-frontier cities in Alaska to plush ski resorts in Colorado. Almost

Oregon Department of Environmental Quality photo.

Wood smoke hangs over an Oregon community. Particulate emissions from residential woodstoves will be substantially reduced in Oregon and elsewhere by certification programs now being implemented.

as quickly as the problem was identified, efforts sprang up to discuss and study it. Early on, there was a certain skepticism about the extent of the problem, and the prospect of regulatory action was controversial—almost as controversial as gun control in some circles.

First efforts of the Oregon Department of Environmental Quality to deal with the woodstove problem centered on development of a standard emissions test procedure so that the relative emission performances of different stove designs could be accurately identified. Such efforts had not been pursued in the past, and the little emissions test data that existed were not comparable.

With the aid of an EPA grant and the help of OMNI Environmental Services, a small industrial emissions-testing firm, a suitable test procedure was developed. Testing conducted by OMNI and others revealed some startling facts about woodstoves. Air-tight units, being more heating-efficient than their predecessors—they are about 50-percent efficient—emitted particulate at a rate up to six times higher than conventional fireplaces, and up to three times higher than Franklin-type woodstoves.

Nationally, more than 12 million households were found to have woodstoves, and sales had rapidly grown to about one million units per year by the early 1980s. Apart from the issue of particulate emissions, this meant that residential wood heating accounts for most of the carcinogenic polycyclic organic emissions from all stationary sources in the nation.

When the alarming facts about woodstoves became known, the woodstove industry took action to begin solving the problem. A few manufacturers in this relatively small cottage industry (totalling some 300 manufacturers in the United States) saw great business potential in the marketing of cleaner-burning appliances.

Blaze King of Walla Walla, Washington, and Jotul of Norway developed the first of a new generation of woodstoves that reduced particulate emissions from 50 to 70 percent compared to the average air-tight stoves. This work was aided by Corning Glass Works, the largest manufacturer of automotive pollution control catalysts, when one of their engineers took a catalyst home and successfully adapted it to his woodstove.

Heating efficiency of the new-generation woodstoves increased as well, up to about 75 percent, and chimney fire-causing creosote deposits were also substantially reduced. The latter was important to consumers and insurance companies, since along with the astronomical increase in woodstove air pollution, there had been an almost corresponding increase in serious and even fatal home fires related to woodstoves.

The rest of the story follows the traditional regulatory approach in terms of pollution-control efforts. In 1983, the Oregon legislature authorized the nation's first certification program for new stoves, with a goal of solving woodstove pollution problems in an effective and publicly acceptable manner and regaining airshed space for industrial growth and development.

Some other state and local governments adopted the Oregon certification program or promoted cleaner-burning stoves with tax credits or low-interest loans. Finally in 1986, under legal pressure from the Natural Resources Defense Council to regulate polycyclic organic matter, EPA agreed to develop a national woodstove certification program using a fast-track regulatory negotiation process. At this point, the Wood Heating Alliance, the national woodstove trade association, took the unexpected but welcome approach of supporting a national certification program.

Within a half-decade, a new generation of woodstoves was developed, marketed, and incorporated into state and federal regulatory programs. This seemingly impossible task could not have been achieved without the voluntary and highly motivated efforts of researchers, laboratories, stove manufacturers, and regulatory agencies. To date, more than 250 woodstoves have been certified. Even woodstove manufacturers in foreign countries saw opportunity in the certified woodstove, and at least 17 foreign models have been certified from countries including New Zealand, Germany, and Italy.

Has the woodstove air-pollution problem been solved by certification? In contrast to the motor-vehicle industry, where representative vehicles are tested for certification after 50,000 miles, woodstoves are tested for certification as brand new commodities. Researchers and regulatory agencies are interested in determining the performance of certified stoves in the home. A practical and accurate test method has been developed, and results from three separate studies indicate that certified stoves are achieving roughly two-thirds of their certified reduction in emissions. Lack of durability in critical stove components has been a major factor in this subpar performance.

Regulatory agencies and woodstove industry representatives are talking about the prospect of developing a stress test to weed out durability problems. Whether this effort needs to be incorporated into a regulatory program remains to be decided.

Woodstoves may never be the innocent companions they once were, but through collaborative efforts of many individuals and organizations, a friendship has been rekindled. □

(Kowalczyk is Air Planning Manager for the Oregon Department of Environmental Quality.)

Applying the Conservation Ethic

by William D. Ruff

Like many parts of California, the greater Los Angeles area lacks a local water supply. Water to meet daily needs is purchased from the Metropolitan Water District of Southern California. This water is imported, through aquaducts, from northern California, where its source is melted snow.

Water has always been a limited resource in California, and droughts are cyclical occurrences. Thus, as population continues to increase in most areas of the state, it is difficult to overstate the importance of water conservation and recycling. As early as 1928, the state constitution encouraged water reclamation efforts. More recently, in 1977, the state legislature passed a law that prohibits the use of drinking water for irrigation where suitable "reclaimed" water is available.

Eventually, the district hopes to sell 100 percent of its reclaimed water.

Located in northwestern Los Angeles County, in the Santa Monica Mountains, the Tapia Water Reclamation Facility is owned and operated by the Las Virgenes Municipal Water District and its Joint Venture Partner, the Triunfo County Sanitation District. As its name implies, the facility specializes in the reclamation of wastewater for purposes other than drinking water and the recycling of sludge as a soil conditioner for use in agriculture. Its goal is "total beneficial reuse," and in 1988 the Tapia facility was a regional and national winner of EPA's "award of excellence" for its achievements in the beneficial recycling of treated effluent.

Las Virgenes Municipal Water District photo.

Twenty-four years ago, the Tapia Water Reclamation Facility started out with a capacity to process about 500,000 gallons of sewage per day. Currently, the plant is capable of transforming 10 million gallons daily into water that is suitable for irrigation. This water meets the stringent standards for body contact set by the California State Department of Health Services, and it is environmentally safe for use not only in agriculture but most landscape and ornamental settings.

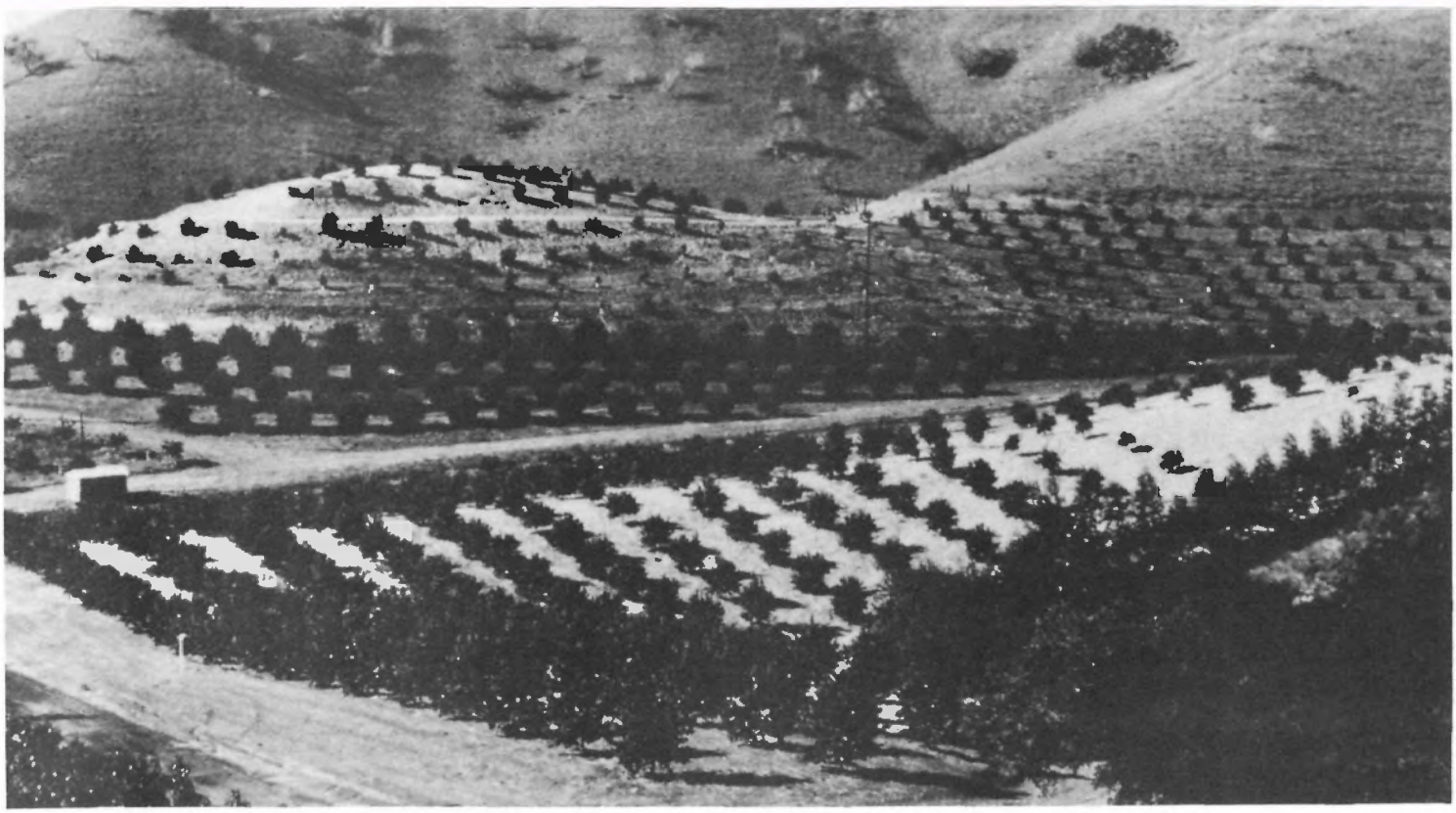
Basically, the process used by the Tapia Water Reclamation Facility is an accelerated, augmented version of nature's own process of cleaning and recycling wastes. In addition to biodegradation, filters and disinfection are used to help the process along.

Not only water, but also all treated sludge generated by the Tapia facility is beneficially recycled. The sludge is used as a soil conditioner on a 91-acre farm site at Rancho Las Virgenes, two miles north of the Tapia plant. With the help of a tractor, a subsurface injection method is employed to introduce the sludge into the soil. Crops grown in these sludge-enriched fields include corn, oats, and barley for fodder, as well as sod.

Currently, the Tapia plant draws wastewater from an area of approximately 120 square miles that includes western Los Angeles County and eastern Ventura County. Among the users of the treated, reclaimed water from the Tapia facility: Calabasas Park for its golf course and greenbelt areas and the nearby cities of Agoura Hills and Westlake Village.

The Las Virgenes Municipal Water District encourages customers to use reclaimed water by keeping its cost at 75 percent of the cost of potable water. Moreover, large new developments are required by the district to install dual water systems with separate pipes for potable and reclaimed water; the reclaimed water is then used on the premises for landscape and ornamental purposes. For comparatively large developments, the district will provide support by putting up 50 percent of the cost for a system to deliver reclaimed wastewater. Smaller customers are eligible for loans which can be repaid over an extended period of time along with their water bills.

While the demand for reclaimed water tends to vary with the seasons, overall reclaimed water sales and use have increased significantly in recent years. Eventually, the district hopes to sell 100 percent of its reclaimed water.



Las Virgenes Municipal Water District photo.

Tapia's reclaimed water is safe for agricultural, landscape, and ornamental uses.

Surrounded by state and county park lands and rural properties, the Tapia plant is situated in an environmentally sensitive area. A stream that runs adjacent to the plant flows approximately two miles through state park grounds to the Malibu Lagoon, ultimately discharging into the Pacific at Surfrider's Beach.

For the past six years, the plant has been discharging its excess treated wastewater into Malibu Creek, which would otherwise be dry in some parts for much of the year. Since then, steelhead trout have been sighted by residents, and these sightings have been confirmed by environmentalists and the Fish and Game Department. After an absence of about 20 years, the trout are starting to spawn again upstream in Malibu Creek.

It is an understatement to say that people are excited about the return of steelhead trout to Malibu Creek. The district is working with representatives of the Fish and Game Department and the State Parks system to develop a method of storing wastewater during winter months. The purpose of this project is twofold: to come up with a reservoir system that would enable the district to store reclaimed wastewater for subsequent use as needed and to maintain a relatively consistent water level in Malibu Creek. □

(Ruff is Water Reclamation Superintendent at the Tapia Facility.)

INDUSTRY INITIATIVES

Introduction by Tom Tomaszek

On April 22nd, 1990, we will celebrate the 20th anniversary of Earth Day.

This international event will help bolster our awareness of how fragile our home, the Earth, really is. Already, a feeling of social responsibility is being instilled in all of us regarding the environment and the role we must play in preserving it.

If we fail to take charge of our environmental problems, it has become apparent that our lives and those of future generations will be grossly altered. The change will not be for the better.

This feeling is not limited to environmentalists; industry is also concerned. There is no denying that sustaining and improving the environment must become an industry goal; otherwise, industry simply will no longer be able to achieve its profit potential.

If industry fails to take a leading role in helping to preserve the environment, its day-to-day operations will be heavily affected by two factors: regulatory agencies and consumers.

Concerned over the fate of the environment, government has passed increasingly stringent anti-pollution statutes and regulations aimed at diminishing the risk of environmental damage caused by industry. As a consequence of these regulations, many companies have been prompted to play a more active role by incorporating environmental goals into business strategies and plans. Concurrently, consumers have begun to demand social responsibility from industry by supporting those businesses that have taken the initiative on environmental preservation.

As a result, many industry leaders have entered this new environmental era as active participants in helping to improve our environment. My own firm, Plastics Again, is dedicated to making a viable business opportunity of recycling disposable polystyrene food-service packaging as an alternative to our current method of disposal: landfilling. Admittedly, we are affecting only a very small aspect of the environment. But if we all work together toward a better world, surely we will achieve this goal.

You are about to read a number of case studies of companies that have taken the initiative on particular environmental problems, without being "leaned on" by government agencies. I'm sure you will find these case studies to be thought-provoking and enjoyable. Furthermore, I believe you will draw the same conclusions that I have: Industry is made up of concerned citizens whose home, like yours and mine, is planet Earth. Therefore, increasing numbers of them are making honest efforts to make our home a better place to live.

The cases include both small firms and large ones—no one has a corner on taking the initiative to protect the environment. You will find an article about One-Hour Fireweed Cleaners, a dry-cleaning firm, located in Alaska, that has developed a system to stop generating pollution (p. 31). You will also find a piece about Clairol's California plant, where the managers have taken steps not only to control but to eliminate waste, adopting the goal of "zero discharge" (p. 39).

These two examples reflect the approach called "pollution prevention"—preventing pollution before it is generated.

Then there are articles about firms that have cracked some very tough environmental problems: In North Providence, Rhode Island, a jewelry-making firm, Fernando Originals, found a way to recycle all of its heavily contaminated wastewater, ending the need to pre-treat its wastes before discharge into the public sewer system and putting its regulatory compliance headaches behind it (p. 35). In Westley, California, the privately owned Modesto Energy Project has put into operation a system to convert used auto tires into productive energy, effectively addressing one of the nation's most stubborn solid-waste problems (p. 37). And I mentioned earlier the article about Plastics Again, which is processing and marketing used plastic food-service disposables (p. 32).

Then an article about the big clean-up strides at the McIntosh, Alabama, plant of CIBA-GEIGY, a large chemical producer—illustrates an important lesson for all of us: In this environmental age, industry can turn its image around, from the impression of foot-dragging to a new role as partner and, yes, pace-setter, in achieving environmental goals (p. 41). □

(Tomaszek is Manager of Recycling Operations at Plastics Again.)

The Enemy Isn't Us

by Jocelyn H. Woodman

At a meeting of the League of Women Voters in Anchorage, Alaska, the topic under discussion was environmental protection. "Dry cleaners are the enemy," someone said, or words to that effect.

The remark caught George Kelly by surprise. His name badge proudly identified him as then-vice president of One-Hour Fireweed Dry Cleaners. Moreover, he had always considered himself to be a community-minded businessman, certainly not a polluter who had earned a negative image.

This incident of five years ago prompted the management of One-Hour Fireweed, first, to take a hard look at the impacts of its own operation on the environment, and second, to take steps to alleviate those impacts through waste reduction and emissions control. One-Hour Fireweed is a small business, employing 28 people. Fortunately, the company had set some money aside for expansion purposes; these funds were diverted as an investment in pollution prevention.

He had always considered himself to be a community-minded businessman . . . .

International Fabricare Institute photo

Traditional dry-cleaning operations generate waste in both liquid and gas form. One-Hour Fireweed has devised methods to cut hazardous waste to zero and save money by reusing the solvent.

It should be understood that dry cleaning is not really "dry" since the process relies on a solvent (rather than water) as a means for cleaning clothes. The most popular dry-cleaning solvent is perchloroethylene (perc), commonly used in machines that resemble front-loading clothes washers. There are two main types of "perc" units. The dry-to-dry unit is the more modern type, in which clothes are cleaned and dried in the same unit. In the dry-to-wet unit, garments are cleaned in the unit but dried in a separate machine.

Both types of unit have filtering systems that continuously clean the solvent. Nevertheless, the dry-cleaning process generates waste perc in liquid form from the washing operation and also in the form of a gas during the drying operation and when machines are opened.

Traditionally, One-Hour Fireweed used carbon filters in each washing machine to purify the liquid solvent. When the filters were exhausted, they had to be disposed of. Because they were saturated with solvent, they were classified as hazardous waste. In Alaska, there are no approved hazardous waste management facilities; therefore, wastes have to be shipped out of state, at considerable expense to the generator (approximately $600 per 55-gallon drum). One-Hour Fireweed was disposing of approximately two 55-gallon drums of spent filters each month.

In the past, air from the dry-cleaning room was passed through large carbon absorbers to remove perc. When the absorbers were saturated, they were cooked down and perc was reclaimed. However, reclamation of perc in the process of cooking down the spent absorbers was not very efficient. Moreover, the absorbers are only about 70-percent effective at removing perc from the air, and if they are not changed promptly when saturated, this

percentage drops dramatically. The uncaptured perc is vented to the atmosphere, a practice that not only is harmful to the environment but also expensive to the company, considering the cost of solvent. (A 55-gallon drum of perc costs around $370.)

The air-emissions problem was remedied by installing an "aziotropic" cleaning unit in the dry-cleaning room at a cost of $12,000. Aziotropic conditioning sucks the air from the room and filters it through water. This moisture-laden air holds perc vapors, then is cooled to condense the vapors to liquid. When in liquid form, the perc sinks and can be separated from the water and recycled. This closed-loop system eliminates emissions completely by capturing all the perc in the air and reusing it.

The filter waste problem was somewhat more difficult to remedy. Because the filters constituted hazardous waste, disposal costs were very high. However, if the perc could be removed from the filters, they would be classified as non-hazardous waste and could be disposed of in a municipal landfill. A product was sought to remove the solvent from the carbon filters but was not available.

After much trial and error, One-Hour Fireweed designed its own filter-cleaning system. This filter-drying unit basically cooks the perc out of the carbon filters and captures it; 99.98 percent of the solvent is recovered. The filters now can be disposed of as ordinary trash, without the burden of hazardous waste designation. Further, solvent is reclaimed from the filters and is reused rather than discarded.

These two systems have resulted in zero discharge from the facility. Annual savings on solvent alone came to about $10,000 three years ago. In addition, savings between $10,000 and $15,000 a year were realized on shipment of wastes off-site, not including the labor saved on paperwork, recordkeeping, and other expenses.

The steps taken by One-Hour Fireweed did require some commitment of capital for a sizable payoff. However, the company testifies that little things can add up to big savings in the dry-cleaning business. Solvents used in dry cleaning are reactive and tend to rust pipes. Regular maintenance, including inspection for leaks and repair of pipes and gaskets, can save considerable expense.

What's more, local zoning laws are beginning to exclude businesses with undesirable air emissions in certain areas. To combat the rising costs of raw materials, waste disposal, and liability—not to mention negative public perception—it is advantageous for small businesses to actively pursue pollution prevention. □

(Woodman is an Environmental Engineer in EPA's Pollution Prevention Office.)

Turning Throwaways into Opportunity

by Tom Tomaszek

In the spring of 1988, two major plastics producers and a suburban Massachusetts school system embarked upon a major recycling experiment to determine whether recycling could be a viable disposal alternative for used polystyrene cups, plates, and trays. At stake were the future use and growth of plastics for food-service packaging.

America's growing solid-waste crisis has made it clear that disposable plastic food service containers no longer can be treated as garbage and added to other trash in municipal landfills. To seek a solution to the problem, Genpak Corporation of Glen Falls, New York, and Mobil Chemical Company of Stamford, Connecticut, joined forces to experiment with recycling plastic food-service disposables made from foam polystyrene (often mis-identified as "styrofoam," a trademark of the Dow Chemical Company). It was a good match: Mobil Chemical brought its size, its resources, and its technology to the experiment; Genpak brought its packaging expertise, its market position, and the flexibility and agility of a smaller organization.

Both companies make some form of such foamed plastic products as food-serving trays, bowls and cups, meat trays, and the fast-food take-out containers often cited as major causes of municipal waste stream glut. Both companies already routinely recycled their manufacturing scrap, so the basic technology for recycling polystyrene was in place. There was ready opportunity to begin recycling discarded polystyrene materials *if* consumers could be persuaded to separate such products from other disposables.

Beyond this big *if* were other challenges: to create the infrastructure needed to collect and transport the discards to a recycling plant; to adapt the technology to recycling source-separated used polystyrene; and, finally, to place the recycled materials into high-volume, high-value, end-product markets.

Plastics Again photo

From the sorting line, dirty plastic is fed into the grinding/washing unit.

Encouraged by positive public reaction to the possibility of recycling the polystyrene food-service items, the two companies launched a joint venture to determine the feasibility of meeting these challenges. Some kind of pilot project was in order.

Since school cafeterias use large quantities of plastic food serviceware, they were prime candidates for testing the source-separation concept. The critical question: would students really separate the recyclable polystyrene trays, bowls, cups, and cutlery from other cafeteria waste, if given the opportunity?

The Lexington, Massachusetts, school system volunteered to be an initial test site. To gain the enthusiastic cooperation of the students, a special source-separating station was designed that would make the segregating of recyclable food serviceware fun to do and recycling just as easy as discarding. At this unique station, used trays were stacked in a way that allowed efficient collection and storage.

In addition, Plastics Again, an experimental recycling firm created for the pilot project, hired a training specialist to present a short course on the solid-waste crisis and how students could become part of its solution through recycling. This presentation really turned the students on to the program. Within a week, recycling had become the lunchroom norm.

In addition to cutting cafeteria waste by almost half, this program also educated students to the importance of source-separation as an element of the overall recycling effort, since the same idea applies as well to the recycling of paper, aluminum, and glass.

Having shown that people would support recycling by source-separating their discards, the program engineers next had to come up with efficient, cost-effective ways of transporting the recyclable discards from the collection point to the recycling plant. Fortunately,

a collection infrastructure already existed within the recycling industry, so there was no need to create an expensive new fleet of company-owned trucks. Many states, including Massachusetts, have collection systems in which trucks are routinely dispatched to collect recyclable discards, such as beverage cans and bottles, cardboard, and office paper, on a regular schedule. The routes travelled by these trucks brought them close to sites where high volumes of source-separated polystyrene could be collected. It made sense for the pilot project to piggy-back this existing collection network.

In addition, the program engineers felt that participants would be willing to collect the used polystyrene feedstock and store it until they had accumulated sufficient quantities to warrant a normal pickup, provided they could do so without serious problems. It was decided that if a school collected a minimum of four cubic yards of feedstock, source-separated and bagged, it would be collected at no charge to them. At this point, the recycling effort made dollars as well as sense, since the school cafeterias would save up to 50 percent of their normal waste-disposal costs.

Once the problems of source-separation, collection, and transportation were solved, the focus of the project turned to the technology needed to convert the used food serviceware into valuable, marketable afterproducts.

For years Genpak and Mobil have recycled clean manufacturing scrap, so the only new technology needed was a process step that would wash the food residue from the recyclable polystyrene, a step that turned out to be more complicated than expected. After a few false starts, the engineers found that adding tempered water to the machine that chopped the used polystyrene would dislodge residual food debris, but development of a successful washing technique led to a new problem: drying the chopped material. The porous polystyrene acted like a sponge during washing, making drying very difficult. It took months of research and experimentation to solve the drying problem.

The process that was developed begins with collecting, inspecting, and feeding used food-service discards into a unit that chops and washes the polystyrene. The plastic is dried centrifugally, then the remaining water is mechanically squeezed out. The chopped, clean foam is tumble-dried in hot air and collected in a large bin for further processing. The dry foam is recycled in the same way as manufacturing scrap; it is melted and filtered in its molten state to remove any solid debris, stretched into long strands by an extruder, cooled, and formed into rigid, pea-size pellets which are boxed and readied for market.

Because there was already a built-in market for recycled manufacturing scrap, finding a market for recycled used materials proved to be our easiest objective. Several manufacturers contacted us about purchasing the recycled pellets, not only because they were slightly less expensive than new material but because growing numbers of consumers were seeking products made from recycled materials and would actually pay a premium for them.

All of the present production capacity is sold out; the demand far outweighs the supply.

All of the feasibility studies, cost analyses, technology research, and process development came together with the creation of the first Plastics Again recycling facility: a 21,000-square-foot plant in Leominster, which is strategically located in central Massachusetts, making it easy for the company to service all of New England and eastern New York State. With the successful completion of the permitting process, Plastics Again began commercial operation in June 1989.

At present, Plastics Again collects recyclable feedstock from more than 80 schools and industrial cafeterias. Among its sources are John Hancock Insurance, Wang Laboratories, Litton-Itek, and Travelers Insurance; recently the company began a massive consumer separation project that will involve every McDonald's restaurant in the Northeast. In addition, pilot programs are underway with area Kentucky Fried Chicken restaurants.

All of the present production capacity is sold out; the demand far outweighs the supply. Plastics Again has successfully used its feedstock to manufacture a variety of utility and commodity items such as re-usable serving trays, office desk accessories, combs, insulation board, and loose-fill protective packaging. The market is unlimited, and the only restriction on the use of recycled materials is that the Food and Drug Administration has not yet sanctioned their use for direct food containers.

Since Plastics Again is a regional facility and cannot serve the needs of other densely populated regions of the country, the plant—together with its technology and the experience gained over the last 18 months—has been sold to the National Polystyrene Recycling Company (NPRC). This company was formed by the eight major domestic manufacturers of polystyrene resin: Amoco, ARCO, Chevron, Dow, Fina, Huntsman, Mobil, and Polysar. NPRC plans to replicate the Leominster model in San Francisco, Los Angeles, Chicago, and Philadelphia by the end of 1990.

Looking further ahead, the company hopes to develop a national network of recycling facilities so that consumers throughout the country can recycle their disposable polystyrene materials. NPRC has set the goal of recycling 250 million pounds of polystyrene food service disposables annually by 1995. This represents over 25 percent of the available market.

This ambitious goal cannot be achieved without the support and willing participation of businesses, restaurants, and school cafeteria managers—and their customers. The solid-waste crisis is very real. Separating foamed polystyrene drink cups, hamburger containers, and other polystyrene products is a contribution everyone can make in battling the nation's solid-waste problem. □

(Tomaszek is Manager of Recycling Operations for Plastics Again in Leominster, Massachusetts.)

Eliminating Those Regulatory Headaches

by Thomas Uva

The Narragansett Bay Commission operates the Fields Point Wastewater Treatment Facility, located in Providence, Rhode Island. This secondary activated sludge treatment plant receives approximately 64 million gallons per day of residential and industrial wastewater discharged from homes and businesses in the cities of Providence, North Providence, Johnston, and small portions of Cranston and Lincoln, Rhode Island.

In 1981, almost one million pounds of heavy metals were discharged to the Fields Point plant from local industries. By 1984, the Commission—which was formed to upgrade and run the treatment facility and help protect the water quality of the Narragansett Bay into which it discharges—began its Industrial Pre-treatment Program to control the discharge of toxics into the sewer system. The first step: rigorous enforcement of existing federal and local discharge regulations. This would affect approximately 130 electroplating and metal-finishing firms, including Fernando Originals, Ltd.

Fernando Originals, located in North Providence, is a metal-finishing facility that manufactures fashion and costume jewelry. The company performs all aspects of the jewelry manufacturing process, from rubber mold casting of the metal to boxing the finished product.

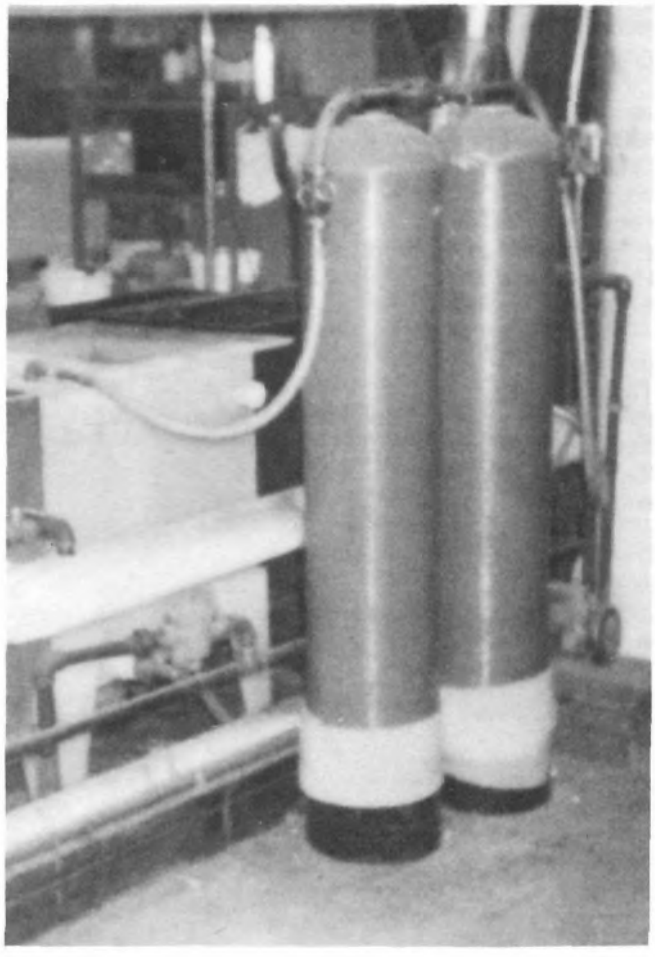
Following an initial inspection in 1985, Fernando Originals was required to conduct wastewater sampling. These sampling results indicated noncompliance with existing EPA standards.

In response, the company made significant changes to their existing equipment. They designed a system for their electroplating process lines to return rinsing solutions known as "drag-out" back into their plating tanks, thus reducing the need for an end-of-line pre-treatment system. They reduced the daily water use of the facility from about 13,000 to just under 10,000 gallons by installing flow restrictors on the rinse tanks. Finally, they installed a pH neutralization system to prevent the discharge of acidic wastewater into the sewer system.

Through these modifications, Fernando Originals achieved full compliance with the EPA's metal-finishing standards then in effect. However, more stringent, local standards set by the Narragansett Bay Commission were scheduled to take effect in 1987, and without an end-of-line pretreatment system, Fernando Originals was likely to exceed those standards.

In 1987, Fernando Originals installed an additional nickel-plating tank in its electroplating department and four large vibratory machines, used to smooth and clean metal. These additions left Fernando Originals with only one way to achieve compliance with federal and local discharge standards: installation of

Fernando Originals photo



Ion exchange columns at Fernando Originals, a jewelry-making firm, remove pollutants and return clean water to rinse tanks.

an end-of-line pre-treatment system.

In early 1988, the firm installed a conventional, continuous-flow system for pre-treating wastewater prior to sewer discharge. An electrolytic recovery unit was also installed to recover copper metal from drag-out tanks to reduce copper loading to the pre-treatment system.

Once this pre-treatment equipment was installed, Fernando Originals achieved compliance with established discharge standards most of the time. However, the system was very temperamental and maintenance-intensive. On occasion, the firm still exceeded discharge limitations, often due to technical problems: a faulty pH probe or a malfunctioning chemical metering pump. On these occasions, the company received letters from regulatory agencies threatening possible enforcement action and fines for violating discharge standards.

In addition to struggling to maintain compliance with discharge standards, Fernando Originals was required to routinely submit pH monitoring reports, compliance monitoring reports, solvent management plans, and spill control plans. It was also required to keep records pertaining to their pre-treatment system and plant operations.

Motivated by the desire to put compliance headaches behind him, Albert Davis, president of Fernando Originals, took a high-risk chance, and it paid off in a big way. In short, Fernando Originals now recycles *all* the process wastewater used in its facility and no longer has a process discharge to the sewer system.

In August 1988, Davis and his vice president, Antonio DiPippo, met with Thomas Brueckner, Pre-treatment Program Manager for the Narragansett Bay Commission, and me to discuss their plan to recycle all process wastewater. At the meeting, the designer of Fernando Originals' recycling system, Dr. Donald Kemp, of Kemp Associates, a Massachusetts consulting firm, explained a pre-treatment system that would employ various existing technologies, such as ion-exchange, evaporation, solids settling, filtration, cyanide oxidation, and pH adjustment. Following that meeting, we were skeptical, but hopeful, that the system would work.

Fernando Originals' pre-treatment system was installed and operational by November, less than three months after the meeting. And it was effective.

The owners of Fernando Originals also decided to expand the size of their facility when they installed the pre-treatment system. The size of the plating department was increased as new nickel-plating tanks were put into service with the already existing plating tanks: acid copper, cyanide copper, gold, silver, rhodium, and chrome. The size of the vibratory department was doubled so that greater volumes of metal could be smoothed in preparation for electroplating.

There are no more monthly reports to submit, productivity has increased, and plating efficiency has improved.

This increased size of the plating and vibrating departments has meant increased productivity for Fernando Originals. All process rinsing at this firm is now done in specially purified water. This reduces the percentage of items that have to be reprocessed. And although the size of the plating and vibratory department increased, water use dropped from 10,000 gallons per day to 200 gallons per day. The water was now being recycled within the system. The 200 gallons make up for evaporative losses and drag-out returned to plating baths.

A major concern of recycling the water used in the plating process is cross-contamination. Fernando Originals' rinse tanks have their own ion-exchange systems to avoid cross-contamination problems. Cross-contamination would ruin each plating tank, by mixing the organic compounds from one process with those from another—for example, nickel-plating organic compounds contaminating the copper-plating tank.

The system developed by Fernando Originals recycles water *within* each plating process. Each process recycles only its own water, so water from the nickel-plating tank, for example, never has a chance to contaminate the copper-plating process.

The pre-treatment process removes waste—known as regenerant—from the tanks and concentrates the waste in an evaporator. It is then disposed of as hazardous waste. When Fernando Originals' conventional pre-treatment system was in place, the hazardous waste disposal cost was approximately $1,800 per month. The monthly hazardous waste disposal cost increased to approximately $3,000 once the "zero discharge" pre-treatment system was installed, but this increase was primarily due to the increase in the size of the plating and vibratory departments. Fernando Originals has since installed a filter press to reduce the volume of waste shipped off-site for disposal. This reduced disposal costs to less than $1,000 per month.

Davis and DiPippo weren't satisfied with recycling just the wastewater from their electroplating and vibratory processes. They went one step further and installed a chiller to recycle the cooling water used in the facility's trichloroethylene degreaser and freon drier. The degreaser and drier used approximately 6,500 gallons of water per day. Now this cooling water is *entirely recycled*.

These gentlemen had heard all the rumors about reusing water in plating rooms. They had heard about the possible cross-contamination problems and the likelihood of poor quality finishes on the plated products. But they successfully solved those problems and now know such recycling is possible with good engineering, ingenuity, and old-fashioned American know-how.

Installing the "zero discharge" system has paid off in many ways for Fernando Originals: Water and sewer-fee savings of 16,500 gallons per day from reducing flow, a discharge permit fee savings of $853 per year, and analytical fee savings of approximately $1,500 per year. There are no more monthly reports to submit, productivity has increased, and plating efficiency has improved. And the owners and workers can now get a good night's sleep because there is no need to worry about paying fines for violating the standards. On top of all that, the people at Fernando Originals have a good feeling about having done their part to help the environment.

The successful example of water recycling at Fernando Originals has not gone unnoticed. The company received the 1989 EPA Environmental Merit Award for Region 1. Moreover, many manufacturing firms in the Providence area are installing similar "zero discharge" systems, and so much interest has been raised on the subject

of industrial wastewater recycling by the local manufacturers that the Narragansett Bay Commission plans to hold a seminar on this subject soon.

Due to vigorous enforcement of its standards, the Commission estimates that only 142,254 pounds of metals will be discharged to its Fields Point Wastewater Treatment Facility in 1989. This is a reduction of 85 percent since 1981. With further recycling efforts similar to that achieved by Fernando Originals, we hope to reduce total metals loadings by an additional 20 to 50 percent. □

(Uva is Senior Sanitary Engineer with the Narragansett Bay Commission.)

Meltdown for a Tough One

by Gregg Sekscienski

Over the past 20 years, an immense, inky black sea has formed in the green, grassy hills of Northern California. The sea is not a natural phenomenon; it exists because of America's love affair with the automobile. People drive cars and cars need tires. And old tires have to end up somewhere.

In Westley, about 90 miles east of San Francisco, an estimated 40 million used tires have ended up in the country's largest tire pile. The tires are piled 15 to 20 feet high and completely fill a quarter-mile-wide rolling canyon for nearly a mile. Although this 800-million-pound pile of used tires is the nation's largest, tire piles are common throughout the country. The tire industry estimates that two to three billion used tires are stored in tire piles somewhere in the United States. And the used tire population continues to grow. Each year over 200 million more used tires are added to the piles.

Tire piles pose serious environmental and public health threats. For example, mosquitoes breed at 4,000 times their natural woodland setting rates in the stagnant water that collects in tire piles. But the greatest danger of a tire pile is that it will catch fire, burn uncontrollably, and pollute the ground and atmosphere. A tire pile containing an estimated seven million tires caught fire in Winchester, Virginia, in 1983. It burned for eight months. Emissions from the fire were visible 200 miles away. EPA spent $1.2 million under the Superfund program to contain and remove the oily residue created by the burning tires.

The tires in the Westley, California, pile are also burning, but with a difference. They are being burned as fuel in the only "whole-tires-to-energy" plant in the country, and the world's largest. The $40 million Modesto Energy Project, owned and operated by the Oxford Energy Company through two

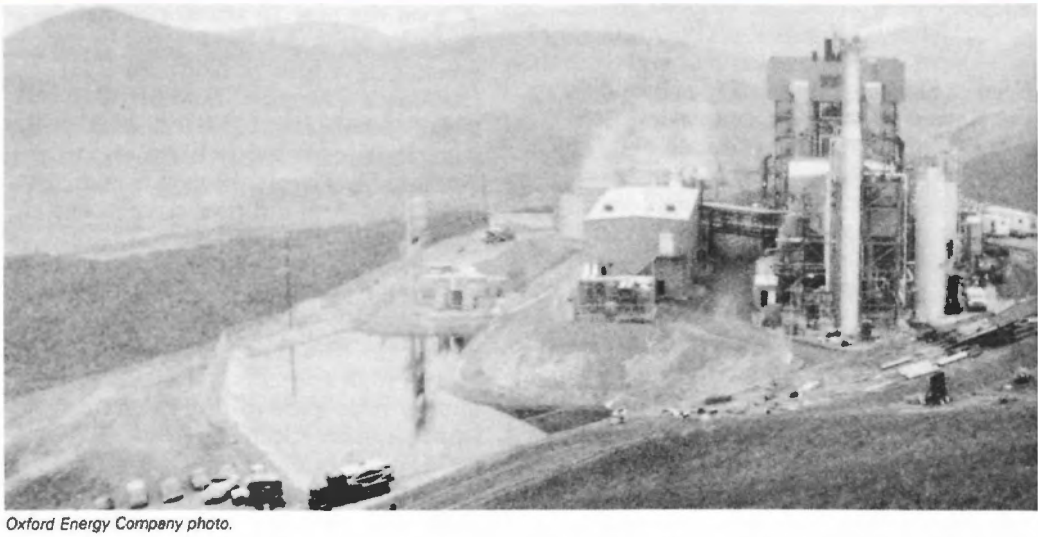
Eric Sander photo, Gamma Liaison

What do you do with 40 million tires? The Oxford Energy plant in Westley, California, burns them and recycles the by-products of the combustion and emissions-control process. The plant meets California's air quality requirements.

subsidiaries, began operation in 1988. The project can cleanly burn 4-1/2 million tires per year, providing power to 15,000 households.

Tire-derived fuels have been tried on a smaller scale elsewhere in the world, but the Modesto Energy Project is apparently the first to operate successfully on a large scale. A few critical factors are working in favor of the Modesto project. First, a 40-million-tire stockpile ensures the plant a 10-year supply of fuel. Second, California's Alternative Energy Law rewards plants that produce power from alternative sources by guaranteeing long-term revenue for the energy. And third, recovery methods for the by-products of tire combustion allow much of the waste to be sold and used in other ways, instead of landfilled.

The project can cleanly burn 4-1/2 million tires per year, providing power to 15,000 households.



Oxford Energy Company photo.

The whole-tires-to-energy process used by the Modesto project is a highly complex process first developed in West Germany in the early 1970s. Enhanced and refined, it ensures complete combustion of the tires. The process starts with a computer. The computer weighs the tires, then feeds them into the plant's combustion chamber at a peak rate of 800 per hour. Here the tires are incinerated by 2,500-degree Fahrenheit heat. (Tires produce about the same amount of heat, pound for pound, as high-grade coal and have three times the energy value as municipal solid waste.) Although the average tire ignites at 600 degrees F, the 2,500-degree temperature is needed to completely incinerate the tire and destroy dioxins, furans, and hydrocarbons—by-products of the combustion process that would otherwise harm air quality.

The tire-combustion chamber is located at the bottom of an 80-foot-high boiler. As the tires burn, their energy is released as heat. This heat turns the water running through pipes in the boiler walls into high-pressure steam. The steam is forced through a turbine, spinning it. A generator linked to the turbine produces power: power that is sold to the Pacific Gas & Electric Company, one of California's largest public utilities. The steam, after passing through the turbine, is piped through a cooling system. It condenses to water and is returned to the boiler to be heated again.

The plant uses three pollution control systems to reduce emission levels. At the top of the combustion chamber the rising gases from the tire incineration are injected with ammonia. This reduces the amount of nitrogen oxides released to the atmosphere by converting them to nitrogen and water. Nitrogen oxides would otherwise contribute to "smog." The emissions then pass through a fabric filter "baghouse," removing 90 percent of the fine particulates still in the gases. Finally, the gases flow through a "scrubber." The scrubber mixes the gases with a lime mist to remove sulfur compounds, producing gypsum.

During the incineration and filtering processes, waste by-products are created. These materials are separated and reused. For example, steel slag that remains from the steel belts and wires in the tires is sold to the cement industry. The particles that the baghouse filters out—called baghouse ash—are mostly zinc oxide, which can be used for zinc production. The scrubber-produced gypsum is used as an agricultural supplement.

The Modesto Energy Project is turning an environmental hazard into an environmental success, supplying energy and reusable goods by recycling a previously wasted and undesirable resource, the tire. And it does so within California's air quality guidelines, considered among the strictest in the nation.

As long as the love affair between Americans and their cars continues, used tire disposal will remain a problem. The Modesto Energy Project is one approach to solving that problem. □

(Sekscienski, a journalism student at the University of Maryland, is an intern with EPA Journal.)

Why Not Zero Waste?

by Jocelyn H. Woodman

Waste tires can be transformed into an excellent, high-BTU fuel. The Westley plant burns up to 800 tires per hour. The resulting power is sold to the Pacific Gas & Electric Company.

When it comes to hair-care products (hair color, hair spray, shampoo—you name it), Clairol is a household word. Clairol products are manufactured by blending chemicals in batches, and they are bottled on-site. All equipment must be thoroughly rinsed between batches to avoid "cross-contamination" among products, and this generates large quantities of wastewater.

Clairol's plant in Camarillo, California, handles about 20 percent of its national production volume, employing 79 people. In 1985, when the local disposal facility was abruptly closed to liquids, the Camarillo plant was producing an average of 1,000 gallons per day of waste rinsewater that required disposal off-site. As a consequence of the closing, transportation and disposal costs skyrocketed from $0.25 to $1.50 per gallon. The company was thus confronted with the need for a waste-reduction program; to remain competitive in the industry, it was necessary to come up with an innovative program to deal with the waste problem.

In January 1986, Clairol's Camarillo plant adopted a "zero-waste program" aimed at eliminating off-site disposal by 1991. All employees were encouraged to participate in the program, and each process was studied for its contribution to the waste stream.

An inventory of the plant was conducted, and sources of waste were identified in every operation. Most of the waste is created in the rinsing of pipelines and mixing equipment. The first rinse of a piece of equipment generates wastewater that is highly contaminated with the chemical. This water cannot be washed into the municipal treatment system, so Clairol must pay to have it disposed of off-site. The rinsewater from subsequent rinses is more diluted and can go down the drain to the municipal sewer.

Because a great deal of raw material and final product was being discarded with the wastewater, Clairol referred to the waste as "liquid gold" to emphasize the amount of money being thrown away. For instance, when the cost of purchasing city water was added to the value of discarded product and the charge for hauling wastewater off-site, the total cost for each gallon of waste requiring off-site disposal came to $33.00.

The manufacture of Clairol's various hair-care products begins when 20 different raw materials are unloaded into storage tanks. The chemicals then are transported through 5,000 feet of pipe to a mixing area where the products are blended in mixing tanks. From here, products are piped to holding tanks, where they await packaging. Bottling in plastic containers is the final step. Changes were made at each stage to reduce the amount of waste.

Transfer pipes used in the first phase of the operation to unload chemical shipments into tanks must be cleaned between chemicals to prevent contamination. The old way of doing this was simply to run water through the pipes and let it spill onto the floor. Since the floor became contaminated with chemicals, the floor was then rinsed, and all the rinsewater washed down the drain.

This clearly required more water than necessary to get the job done. The system was modified to direct the rinsewater into a container rather than onto the floor, thus eliminating the need to wash down the floor. This simple change saved 87 gallons per day of contaminated water.

Other changes were made in the mixing area, where Clairol's 200 different formulas are blended. Procedures were more strictly enforced

as to the duration rinse sprayers could be left on, alcohol cleaning solutions used, and other routine activities. Batches of dye were run in "shade sequence," meaning that light-colored batches were followed by dark batches, or batches of a single color were run together so the tanks required less rinsing in between. The net reduction of wastewater in this operation was 168 gallons per day.

After the product batches are made, the material is piped to a holding tank to await bottling. The piping and tanks must be kept very clean to guarantee the purity of the product. Previously, the lines were flushed with large quantities of water; this wasted all the product that adhered to the inside of the pipes, and an innovative system was developed to reclaim it.

Total waste generation has dropped more than 70 percent since 1985, saving the company more than $500 million.

The new system uses a foam ball propelled through the pipe by air to collect product from the wall of the pipe; basically, the material is pushed through the line and reclaimed at the outlet. Some rinsing is done as a finishing step. This system, which cost $50,000 to install, has reduced waste by 395 gallons per day and saved $240,000 per year.

Finally, the product is transferred to the packing area. Because bottles are filled and then labelled, a defect may be discovered on a label after it is already glued onto a bottle. Originally this meant that the whole bottle had to be discarded, including its contents. A different glue was substituted and the labelling system changed so that, when necessary, bottles can be relabeled when they are full. Further cost reduction was accomplished here.

The facility manufactures these plastic bottles on-site, and the "zero-waste program" applies to this process as well. The number of defective bottles, such as those with pinholes, has been reduced, cutting down the amount of waste in the filling operation. Scrap plastic is sold to a recycler who makes plastic piping and other products from it.

Total waste generation has dropped more than 70 percent since 1985, saving the company more than $500 million. The only capital outlay was for the foam ball cleaning system, which quickly paid for itself. Furthermore, the concentrated wastewater that still must be disposed of is being sold to an oil recycler who blends it with other components and sells the blended mixture as bunker fuel. The Camarillo plant accomplished all of these improvements without compromising the quality of the product.

Clairol solved its waste disposal problems at Camarillo primarily by motivating employees to examine and improve their operations, and there may be a lesson in this. Improvising a waste-reduction program based on understanding the way people do their jobs, and the many ways in which waste is generated, can be extremely effective. Clairol has demonstrated this strategy with its "low tech" approach to combatting waste. □

(Woodman is an Environmental Engineer in EPA's Pollution Prevention Office.)

Thinking Environmentally

by John Mincy

Earlier this year, CIBA-GEIGY's McIntosh, Alabama, plant (a primary site for pesticide and specialty-chemical production for almost 40 years) was selected as winner of a local Audubon Society award for environmental achievement. What did the McIntosh plant do to earn this award? Among other things, since the late 1960s, we have been working on the development of methods to curtail the output of waste that requires treatment.

A three-part strategy is the basis for achievements in environmental management at our McIntosh plant.

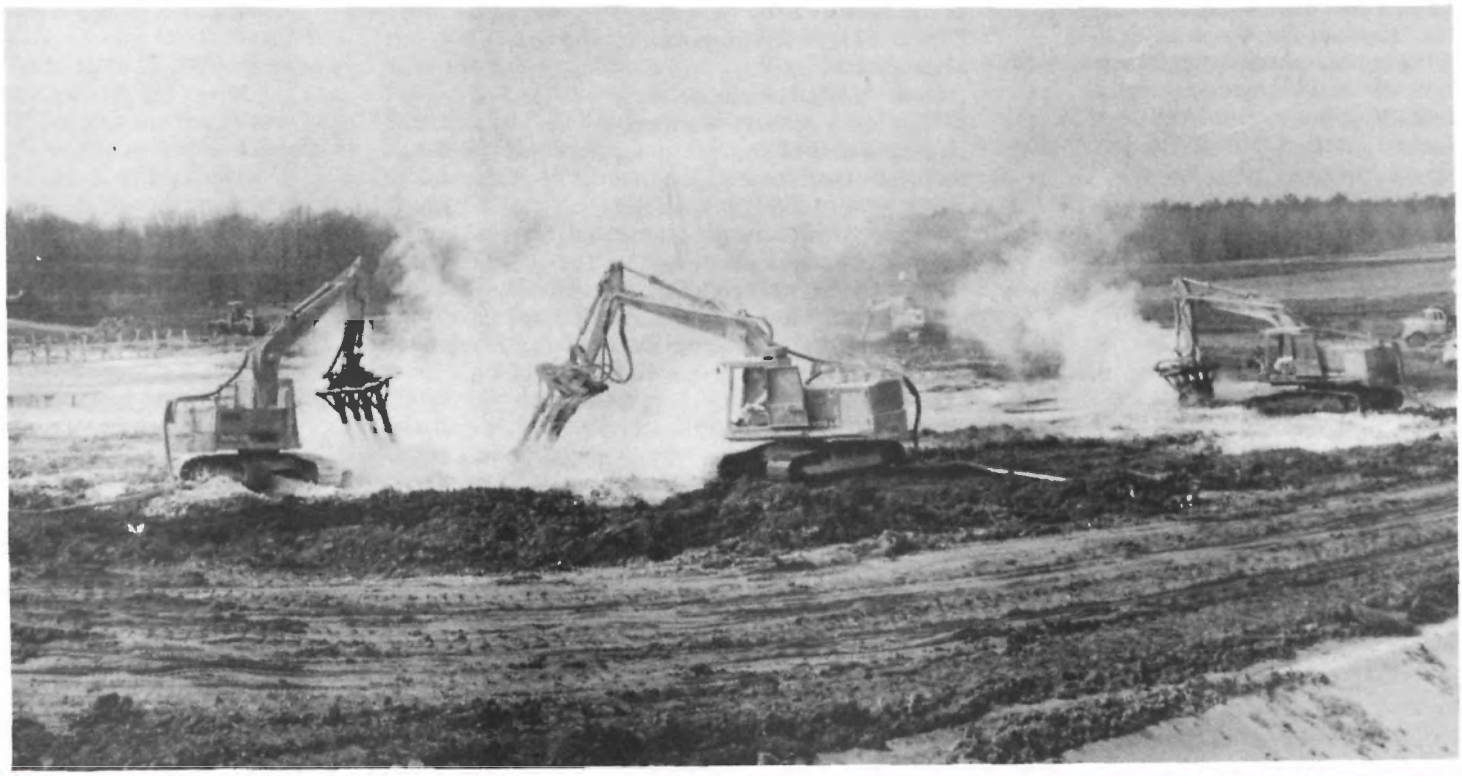
- Wherever possible, waste streams are reduced or recycled at the source in the manufacturing process.
- If waste reduction or recycling is not possible, biological treatment or high-temperature incineration is used to destroy wastes, wherever feasible.
- Land disposal is used only as a last resort.

This strategy got its start when company management launched an intensive review of waste-reduction opportunities. Each of our units was required to carry out and document in detail a review of every manufacturing process from the standpoint of potential waste-reduction options. They were then asked to develop and implement both short- and long-term action programs to reduce waste—especially at the source.

As these programs moved forward, certain patterns of change emerged. Such changes included: tightening operating controls; improving the manufacturing processes themselves; and developing fundamentally new processes or technology. Examples of specific waste-reduction achievements made within the framework of the plant's action programs include:

- Eliminating many of the wastes in the production of fluorescent brighteners intended for use as detergent additives
- Reducing or eliminating wastes in non-manufacturing processes; for example, eliminating spent solvents from maintenance painting

CIBA-GEIGY photo



Specially equipped backhoes inject pulverized "quick-lime," a stabilizing agent, into wet sludge. This makes the sludge solid enough to be compacted and removed to the new above-ground landvault at CIBA-GEIGY's plant in McIntosh, Alabama.

• Refining the process of production for synthetic dyes, resulting in less waste and higher yield.

CIBA-GEIGY McIntosh is particularly proud of the startup last year of a new, above-ground activated sludge wastewater treatment system—one of the country's most modern and efficient. The system represents a capital outlay of more than $70 million. The facility includes two massive 3.6-million-gallon treatment tanks and an above-ground holding facility that is larger than a football field.

But the most outstanding advantage of the system is that it is above ground. Formerly, federal- and state-approved liquid-waste procedures called for storage in ponds lined with packed clay. However, new government regulations have changed these procedures. Current storage tanks are built over clay bases, but with a difference: several layers of leak-detection and protective equipment are embedded in a polyurethane liner that is placed between the packed-clay base and the concrete bottom of the storage tank. This system allows CIBA-GEIGY to monitor and detect any breach of the tank so that corrective action may be taken before any of the liquid can escape into the environment.

With the highly advanced technology that has become available in the past few years, nothing is left to chance, including the possible contamination of rainwater run-off on our premises. Tanks are used to collect the first inch of rainwater that falls on the plant site; this captures any possible contamination. In addition, "washdown" water from manufacturing units is collected in a unit sump and then transferred to the treatment area in a collection system that is above ground.

Once landfills were the only option for storage of solid waste; today's technology at the McIntosh plant boasts an above-ground landvault designed with leak-detection systems.

As part of the plant's efforts to control wastes at their source, one of our agricultural manufacturing units has developed a three-step process that significantly reduces the amount of process water that requires treatment. First, the effluent is diverted to a neutralization tank, where it is treated to achieve a pH level of about 7. It is then filtered through a series of screens to remove solid matter. Finally, the effluent is filtered through a three-bed carbon-adsorption system to remove any remaining particulate matter. This waste needs no further treatment, and the total load going to the current biological treatment system is thus reduced.

With the highly advanced technology that has become available in the past few years, nothing is left to chance . . . .

The entire $1.8-million facility is constantly monitored by three computer-controlled analyzers to ensure that all effluent surpasses the standards set by EPA and the Alabama Department of Environmental Management.

In the past, iron sludge was a by-product regularly produced by the Dyestuffs and Chemicals Division of the McIntosh plant and stored in an above-ground landvault on the premises. Now, a newly completed $2.2-million dedicated catalytic hydrogenation unit significantly reduces the amount of iron sludge generated by the division. The new process was developed by the plant's own Technical Department, and it has been found both economically and environmentally feasible.

These are just a few of the environmentally beneficial technical strides made at CIBA-GEIGY McIntosh. The plant can also claim other, more aesthetic accomplishments. For instance, for the past 20 years, we have maintained a wildlife refuge on our 1,500-acre site in the southwest Alabama woodland, where deer, turkey, quail, and other species abound. We have also been in the forefront of efforts to preserve the Eastern Bluebird, an endangered species.

In addition to the Audubon Society award, the McIntosh plant also has reason to be proud because in 1989 our workplace became one of just 64 in the United States to receive the STAR award from the Occupational Safety and Health Administration for commitment to worker safety and health.

At CIBA-GEIGY McIntosh, we are committed not just to keeping the pace environmentally, but to setting it. The plant has not yet achieved all of its environmental goals by any means. But we are on the road to success, thanks to a dedicated work force of more than 1,300 employees and the corporate backing of people who value our positive environmental achievements. □

(Mincy is Manager of CIBA-GEIGY's McIntosh, Alabama, plant.)

Appointments

Elliott

Wilcher

Clay

Martin

Virbick

E. Donald Elliott is the new General Counsel of EPA. The General Counsel is EPA's top lawyer.

Elliott has been a law professor at Yale Law School since 1981. From 1976 to 1980, he was an associate with the Washington, DC, law firm of Leva, Hawes, Symington, Martin, and Oppenheimer. He has taught at the Georgetown University Law Center and the University of Chicago Law School.

Elliott served as a clerk to U.S. District Court Judge Gerhard Gesell from 1974 to 1975 and to U.S. Circuit Court Judge David Bazelon from 1975 to 1976. He was a University Fellow of Resources for the Future and currently serves as Vice-Chair of the American Bar Association Administrative Law Section's Committee on Separation of Powers.

A 1970 graduate of Yale University, Elliott earned his law degree in 1974 from Yale Law School. He has been a consultant for the Carnegie Commission on Science, Technology, and Government, the Federal Courts Study Committee, and the Administrative Conference of the United States.

The new Assistant Administrator for Water is **LaJuana S. Wilcher**.

Wilcher previously served at the Agency from 1983 to 1986 as a Special Assistant to the General Counsel and as an assistant to the Deputy Administrator. From 1986 to 1989, Wilcher was a law partner with Bishop, Cook, Purcell, and Reynolds in Washington, DC, specializing in environmental law and litigation.

Wilcher served as Special Assistant to the General Counsel at the U.S. Department of Agriculture in 1983. From 1980 until 1983 she was a litigation attorney with the law firm of Reynolds, Catron, and Johnston in Bowling Green, Kentucky. During the summers 1974 to 1978, she worked as a Naturalist/Interpreter at Mammoth Cave National Park in Kentucky.

Wilcher earned her bachelor's degree in biology from Western Kentucky University in 1977 and her law degree from Salmon P. Chase College of Law, Northern Kentucky University in 1980.

Don R. Clay is the new Assistant Administrator for the Office of Solid Waste and Emergency Response at EPA.

Clay has been the acting Assistant Administrator for the Office of Air and Radiation for the last year. Previously, he served as Deputy Assistant Administrator for the Office of Air and Radiation. From 1981 to 1986, Clay was the Director of the Office of Toxic Substances and served one year as the acting Assistant Administrator for the Office of Pesticides and Toxic Substances during that time.

Prior to joining EPA, Clay held several other senior-level management positions with the Consumer Product Safety Commission and the Food and Drug Administration. He was awarded EPA's Administrator's Award for Excellence in 1983, the Presidential Meritorious Executive Rank Award in 1987, and the Distinguished Presidential Rank Award for continuing excellence in government management in 1988.

Clay is a registered professional engineer and holds two degrees in chemical engineering from Ohio State University.

John C. Martin has been reappointed by President Bush as Inspector General of EPA.

Martin has served in the same position since 1983. He was Assistant Inspector General for Investigations at the Department of Housing and Urban Development from 1981 to 1983.

From 1976 to 1981, Martin served as an FBI Supervisory Special Agent. He joined the FBI in 1971 as a Special Agent. He is currently on the board of directors of the Federal Law Enforcement Training Center in Glynco, Georgia, and was a past president of the National Association of Federal Investigators.

An alumnus of the University of Maryland and Kings College, Martin is also a member of the President's Council on Integrity and Efficiency, the Society of Former Special Agents of the FBI, the International Association of Chiefs of Police, and the Association of Government Accountants. He was awarded the Meritorious Executive Award in 1985.

EPA's new Deputy Inspector General is **Anna Hopkins Virbick**.

Virbick served as Acting Deputy Inspector General from August 1988 to August 1989, and as Assistant Inspector General for Management and Technical Assessment from 1986 to August 1989. She joined EPA's Office of Inspector General in 1983 as Director of Technical Services Staff.

Prior to joining the Agency, Virbick served in the Department of Housing and Urban Development's Office of Inspector General. She

Belaga

Hanley

Strock

Wayland

began her federal career in 1965 as an auditor with the U.S. General Accounting Office.

Virbick is a member of EPA's Human Resources Council and Chair of the Office of Inspector General's Human Resources Council. She earned a bachelor's degree in business administration at West Virginia Wesleyan College, a master of public administration degree from American University, and a master of education degree from Marymount University. She is also a graduate of Harvard University's Senior Managers in Government Program.

Julie Belaga is the new Regional Administrator for Region 1, headquartered in Boston.

Belaga is currently an adjunct lecturer on public policy at the Kennedy Graduate School of Government at Harvard University and was a Fellow of the Institute of Politics at the Kennedy School of Government in 1987. She has worked as a television consultant and political analyst at WTNH, an ABC-TV affiliate in New Haven, Connecticut.

From 1976 to 1986, Belaga served in the Connecticut House of Representatives and was Assistant Minority Leader from 1976 to 1982 and Deputy Majority Leader from 1982 to 1984. While serving, she was instrumental in developing Connecticut's coastal area management laws, safe drinking water laws, hazardous waste management service, and the state's Resource Recovery Authority.

Belaga earned her bachelor's degree in education from Syracuse University in 1951. She taught elementary school in Quincy, Massachusetts, in 1952 and 1953.

Edward J. Hanley is the new Deputy Assistant Administrator for the Office of Administration and Human Resources Management.

Since 1984, Hanley served as Director of the Office of Information Resources Management. He jointed EPA in 1979 as the Director of Management and Agency Services.

Hanley was President of Manor Home Center, Inc., from 1976 to 1979. From 1970 through 1976, he was a Vice President and Partner of Lewin Associates, Inc., an energy and health-care consulting firm.

A graduate of Colgate University of a bachelor's degree in political science, Hanley first joined the federal government in 1965 as a Presidential Management Intern with the Post Office Department.

The new Assistant Administrator for Enforcement and Compliance Monitoring at EPA is **James S. Strock**.

Strock served at EPA previously as a Special Assistant to the Administrator from 1983 to 1985. He joined the U.S. Office of Personnel Management as General Counsel in 1988 and served as Acting Director for May and June of 1989.

From November 1986 to January 1988, Strock was a Senior Associate of the Denver law firm of Davis, Graham, and Stubbs, counseling on environmental law, litigation, and administrative and legislative representation.

Strock worked on the staff of the U.S. Senate Subcommittee on Environment and Public Works as Special Council, is a member of the Board of Advisors of "Toxics Law Reporter," and is an adjunct fellow of the Center for Strategic and International Studies. He earned his bachelor's and law degrees from Harvard University and did post-graduate work at Oxford University.

Robert H. Wayland III is the new Deputy Assistant Administrator for the Office of Water.

Previously, Wayland was the Deputy Assistant Administrator for EPA's Office of Policy, Planning, and Evaluation. From 1985 to March 1987, he was a Special Assistant to the Administrator and Deputy Administrator.

Wayland joined the Agency in 1974 as a congressional liaison. He was awarded EPA's Gold Medal for Exceptional Service for formulating and successfully pursuing enactment of the Federal Pesticide Act of 1978.

Prior to joining EPA, Wayland was a legislative assistant to Congressman Charles M. Teague and assistant to the general manager of the National Transportation Safety Board. A 1972 graduate of George Washington University, he served on the staff of Senator George L. Murphy for four years while in school.

Pat Marrin cartoon.

Back Cover: A winter scene.

Photo by Steven Hassur.