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Financing the Next Generation of Wastewater Treatment

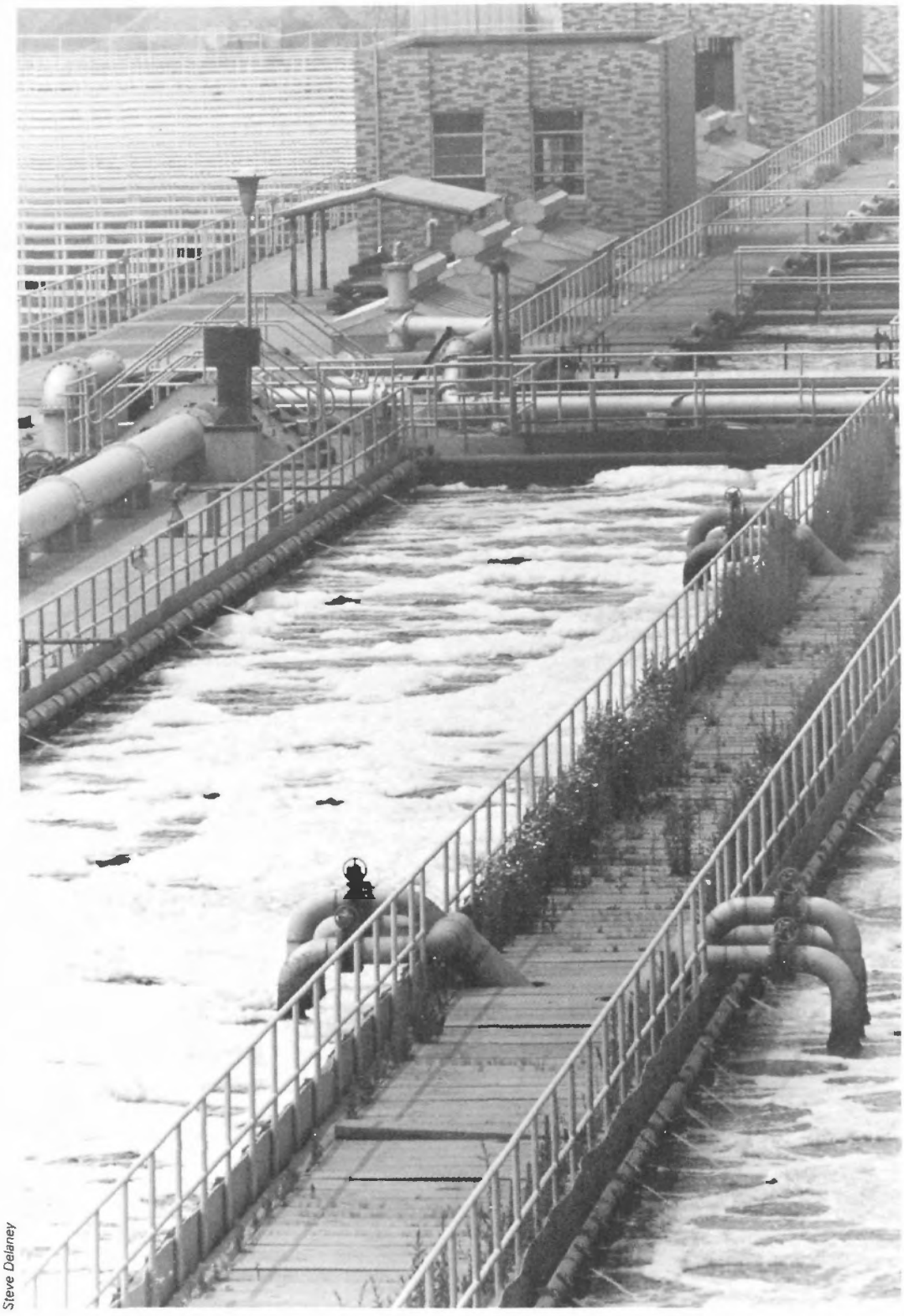
Financing the Next Generation of Wastewater Treatment

The question of how to pay for the treatment of municipal wastewater might seem mundane. But because it involves one of the country's biggest sources of pollution, it is a major environmental matter. In this issue, *EPA Journal* explores the subject.

Lawrence J. Jensen, EPA's Assistant Administrator for Water, describes the challenges as the nation enters a new era of paying to treat municipal wastewater.

Two articles describe trends already underway in states and communities toward new ways of paying wastewater treatment costs, and a third article describes innovative wastewater treatment methods that often accompany alternative financing. Another article chronicles how municipal wastewater treatment bills have traditionally been paid as the nation has undertaken to clean up its waters. A final piece describes EPA's policy of insisting on compliance by cities with Clean Water Act requirements in treating their wastewaters.

Other articles in this issue of the *Journal* concern EPA's scrutiny of radiofrequency radiation, and the recent sampling of some Western U.S. lakes to determine effects from acid deposition. The question of how to communicate environmental risk to the public is discussed by Milton Russell, EPA's Assistant Administrator for Policy, Planning and Evaluation.



Steve Delaney

Aeration basin for an activated sludge facility, where wastes are aerobically converted before being discharged.

Rules to be proposed soon for regulating emissions from new wood stoves are explained.

The issue concludes with two regular features—Update and Appointments. □

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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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Front Cover: A clarifier, where clean water is floated off in the wastewater purification process and other materials drop to the bottom as sludge. Photo by Mike Mitchell, Folio, Inc.

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The Challenge of A New Generation Of Wastewater Treatment

by Lawrence J. Jensen

When the Clean Water Act became law in 1972, the state of our nation's water was cause for public anger, agitation, and even alarm. Water quality had deteriorated so badly that it threatened our health, disrupted our recreation, and arrested our commercial and industrial efforts.

Given these conditions, it is not surprising that there was broad popular support and bipartisan consensus when Congress passed the Act, even though it instigated a massive federal grant program called Construction Grants. Americans saw in the Act a commitment to reversing a pollution trend and reviving our nation's literal life blood. And today, 15 years after it became law, we can look on the accomplishments forged under the Act's statutory and financial provisions with real pride—and a sigh of relief.

Over the last 15 years, more than $60 billion in federal, state, and local dollars have been invested in the nation's wastewater treatment infrastructure. Of this, over $44 billion has been in federal grants to municipalities for the construction, operation, and maintenance of municipal wastewater treatment facilities. Federal dollars were also spent to beef up water quality institutions and programs at the federal, state, and local levels. Thanks to these expenditures, we now find thousands of dedicated water quality professionals throughout the country.

More importantly, because of these expenditures, we can also speak of what is bureaucratically called "significant Clean Water Act compliance." The translation is far more exciting, far more encouraging than what that jargon conveys. What it means is that we have purchased with federal, state, and local dollars real improvements in the quality of the water—and thus in the quality of life for millions of people in thousands of communities across the country.

We are justifiably proud of these past accomplishments. But our work to restore and protect our waters is far from complete.

We must protect our past investment in clean water. It would take no more than a few days, perhaps a few hours, for all the gains of the past 15 years to be lost if our treatment infrastructure shut down. This startling conjecture points out the importance of protecting the clean water gains we have made by assuring adequate operation and maintenance of that infrastructure. At the same time, we are facing new challenges in the areas of continuing population growth, unconventional new pollutants, and a changing federal role.

The common denominator across all these challenges is dollars, for clean water momentum will not continue without financial commitment. And the words "financial commitment" will not always evoke images of federal grants and subsidies.

Look at the Clean Water Act reauthorization proposals considered by House and Senate conferees this past session of Congress. While the House, Senate, and Administration legislative proposals varied in the duration of the construction grants phaseout period and the overall amount of funding, they all advocated the ultimate elimination of federal funding for construction grants. They all affirmed that the management and financing of wastewater treatment systems is the rightful province of state and local government. And, in light of the recent veto of the Clean Water Act reauthorization, we at EPA will do all we can to help the 100th Congress produce a fiscally responsible bill that provides for a smooth phaseout of the federal construction grants program.

The eventual phaseout of the construction grants program does raise important questions. Does the phaseout mean that all treatment needs have been financed? Of course not. In a growing society, there will always be new treatment needs. Does the phaseout signal the passing of our nation's commitment to clean water? To this question there can be only one answer: no.

Obviously there will be pitfalls in these uncharted times beyond the construction grants era. Like the mythical mariner, some states and localities are reluctant about sailing forward, fearing the Scylla of the 1988 clean water compliance deadline and the Charybdis of decreased federal funding. The 1988 date is firm and, as the Clean Water Act suggests, municipal compliance with the Clean Water Act is not contingent on receiving federal funds. But as the mythical mariner was motivated by benefits beyond the pitfalls, so there will be benefits for states which strike out boldly into the de-federalized era.

Some have already discovered benefits. The number of communities using innovative, self-reliant methods to meet their wastewater needs is growing. Many that have chosen to proceed without federal funding have been able to realize substantial savings over comparable federally financed projects, thus making the grants tradeoff worthwhile. Notable advantages have included cheaper and faster construction, ability to select local design preferences, greater responsiveness to economic growth, fewer procedural requirements, enhanced flexibility to address future changes, and greater certainty as to the timing of services to customers.

Naturally, these ventures have required new techniques and technologies. But because dollars are the greatest challenge lying ahead, I have been most impressed with the flourishing innovation in the financial arena. Currently, 16 states have operational revolving loan programs capitalized at the state level and six states have active bond banks; another 19 states are either studying alternative financing programs or have proposed legislation for them. No one can question that these trends are positive.

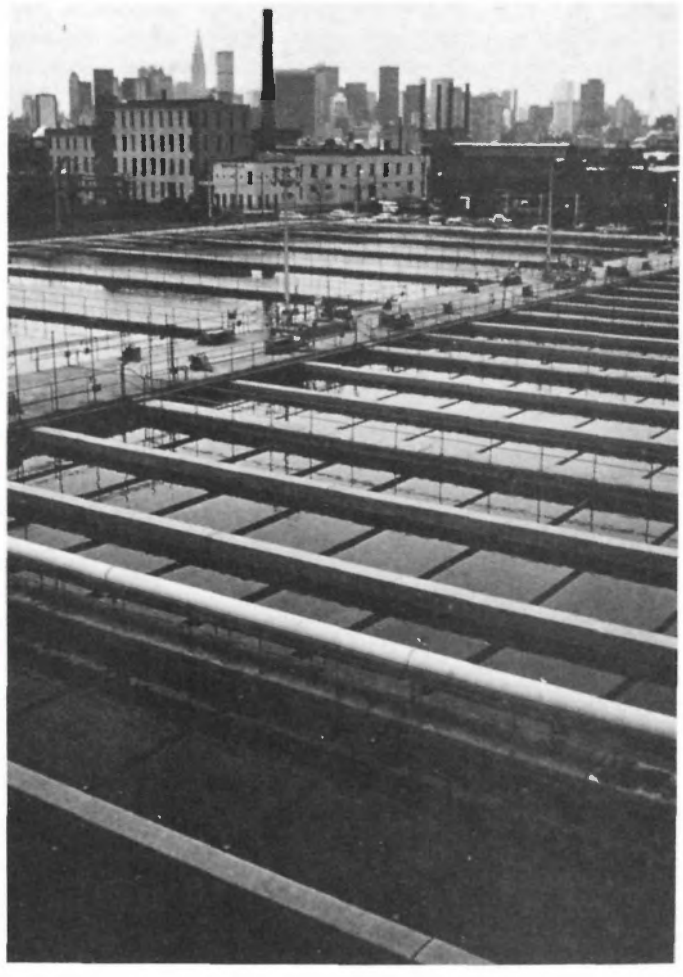
Let me turn to one final element in the clean water equation— the individual. Greater emphasis on local financing will likely lead to higher and more realistic fees for wastewater services. This means that users—you and I—will have to be more willing to pay for clean water. Public opinion polls suggest that we are. They suggest that we expect clean water and that we are willing to pay more for our water-related community services in order to ensure that we will always have a usable supply. I find this encouraging, for the days when we could take clean, plentiful water for granted are rapidly drawing to a close.

The Clean Water Act of 1972 added "fishable and swimmable" to our environmental wish list. With sewage treatment finally joining the roster of essential municipal services, that wish is on its way to becoming reality. □

(Jensen is EPA's Assistant Administrator for Water.)

State Innovations For Paying The Wastewater Bill

by James Werntz
and Margherita Pryor



An example of the large, mechanically complex treatment system that big cities require. Wastewater treatment facilities are a major investment for a community of any size.

Documerica

The 1981 Clean Water Act amendments clearly signaled that the age of federal largesse for sewage treatment plant construction was ending. The level of funding for the construction grants program was nearly halved. But the reduction of federal funds has not changed the federal treatment requirements. EPA has made it very clear that the Agency intends to enforce compliance deadlines even if municipalities haven't obtained federal money to build the treatment plants. To take up the slack from the impending phase out of federal construction grants, many states are accelerating their efforts to establish and implement alternative financing programs. The increase in state institutional capability to finance wastewater treatment facilities will play a critical role in helping communities attain and maintain compliance with the Clean Water Act.

Wastewater treatment facilities are a major infrastructure investment for any community, with the average cost for a new treatment plant varying markedly with community size. (See Figure 1.) The one-time investment per household of four persons ranges from approximately $1,400 for a one million gallon per day (mgd) plant to $400 for a 100 mgd plant. The more than three-fold difference in per capita costs is due in part to economies of scale; the cost of a large city plant is shared by a greater number of people, thus lowering the cost per capita.

What does this mean for communities caught between the compliance deadlines and the funding crunch?

One major development is that many cities and towns are scrambling to arrange independent project financing and relying more heavily on state alternative funding programs. In the past, local public works financing was fairly straightforward. Municipalities either financed from current revenues (pay-as-you-go), raised the money through bond issues, or established special assessments for particular projects. But with estimates of infrastructure improvement needs ranging from billions to trillions of dollars by the next decade, pay-as-you-go may be out of reach for most communities. Increasingly, states are responding to local demands for financial assistance by establishing programs such as bond banks and revolving loan funds to improve local government access to credit.

Figure 1

Capacity	Approximate Population Served	Total Costs*
1 mgd	10,000	$3,487,000
100 mgd	1,000,000	$96,051,000
10 mgd	100,000	$18,302,000

m.g.d. = million gallons of wastewater per day.

*Assumes secondary treatment plant costs only (no collectors or interceptor sewer lines.

Government **bonds** are basically interest-bearing IOUs to purchasers, secured either by the general taxing power of the issuing government or by "dedicated" sources of revenue such as sewer and water user charges. Most of the state bond programs act as intermediaries between municipalities and the national bond market. In many cases, the state itself issues bonds and then loans the proceeds to municipalities. This substantially lowers the interest costs to municipalities, particularly small ones, because the state's high credit rating typically allows borrowing at lower interest rates. Borrowing costs for municipalities are lowered even further through the use of the state's supervisory and administrative capabilities, and through saving the costs of underwriting and marketing bond issues. Many state programs further increase the financial impact of available monies by using instruments such as bond insurance, loan guarantees, and interest rate buy-down.

Continued to next page

(Werntz is a Policy Analyst in the Office of Municipal Pollution Control of EPA's Office of Water. Pryor is Contributing Editor of EPA Journal.)

Bond banks or bond pools typically aggregate the bond issues of several municipalities into a single state bond issue to be sold on the national market. The interest rate paid on the bonds becomes the rate that municipalities must pay the bond pool for their loan.

Revolving loan funds are another way of making a fixed sum go further. Beginning with an initial appropriation of "seed" money to the fund, loans are made available for specific purposes such as municipal treatment plant construction. The loan repayments, including interest, go directly back into the fund to be used for other loans, thus continuously recycling a limited money supply. Depending on the interest rates charged on its loans, the fund can maintain and even increase its purchasing power.

Revolving loan funds are currently one of the most popular new financing tools; 35 states are either operating or considering the establishment of such programs, either alone or in conjunction with other funding approaches. Legislative appropriations often are used to capitalize these programs, but several states use revenues from specific taxes such as dedicated sewer and water, excise, mineral severance, inheritance, and even tobacco taxes.

The unique infrastructure needs and priorities of each state lead to considerable diversity in how it packages its assistance to municipalities. Some state programs restrict their assistance to municipalities with poor, or no, credit ratings; others base their assistance on such factors as affordability of the project, public health benefits, and potential for economic development. There are also less restrictive programs that fund projects on a first-come, first-serve basis, relying only on the municipality's ability to repay. All the programs, however, try to prevent defaults by emphasizing strict measures to anticipate potential loan repayment problems. The advantage of these alternative state programs is that each has been creatively tailored to address specific state needs.

Ohio, for example, uses state-issued revenue bonds to finance a revolving loan fund. Starting with an original appropriation of $100 million from the state legislature in 1969, Ohio's Water Development Authority has financed 435 projects with a total construction cost of over $1.8 billion—a return of almost 20-to-1 on the initial investment. Officials attribute its success to several factors, of which one of the most basic is the enforcement of timely loan repayments. In 17 years, only one community has failed to make a semi-annual repayment on time. In that case, the Authority sued immediately and obtained a court order requiring the community to raise its utility rates.

Also important to Ohio's success is its ability to take advantage of sophisticated financing techniques, its "fast pay" program for contractors, and its policy of charging interest rates based on current market rates, not the rates at which the Authority borrows. Most important, however, is the simplicity of the program for local governments. From an application to a check in the bank can take as little as one month from a community's initial contact with the Authority.

Wyoming's Farm Loan program also features minimal red tape and turnaround time. Wyoming has a strong grant program funded by royalties from the coal and mineral industries, and a revolving loan program funded by an initial state appropriation of $100 million. Although the state constitution prohibits the issuance of general obligation bonds, the Farm Loan program is empowered to issue revenue bonds. Since it began in 1974, the revolving fund has loaned over $62 million for water and wastewater projects and the grant program has awarded more than $127 million, with all repayments deposited in the loan program account. Funding has ranged from $50,000 for adding chlorination systems to an existing facility to $30 million for a complete treatment plant. While the program offers no formal technical assistance services, the funding review staff does try to help communities develop systems appropriate to their local needs and resources.

As in Ohio, Wyoming officials credit the success of their program to its simplicity and accessibility to communities. The Farm Loan program coordinates project financing with several agencies, including the Wyoming Water Development Commission, the Farmers Home Administration, and EPA. The program makes an effort to minimize the reporting and administrative burden on the participating communities. In addition, the program's ability to match loans and grants from various sources has encouraged communities to fund improvements that they might not have considered otherwise.

Some of the most innovative programs recognize that many municipalities need technical as well as financial assistance, and several states have developed comprehensive advisory programs to help communities plan and build, as well as finance their wastewater treatment facilities. Such programs are usually geared to improving communication among state officials, municipal officials, and operators of wastewater treatment facilities; increasing municipal awareness of the fiscal impact of proposed facilities; and coordinating requirements of potential funding sources.

Tennessee offers loans and grants for wastewater treatment construction, but it also encourages communities to consult with the University of Tennessee's Municipal Technical Advisory Service. Consultants from the university advise local officials on grant and loan planning and application, wastewater project management, financial management, and utility administration. Since it began in late 1984, the program has helped over 100 Tennessee cities, leading to the award of 100 separate state and EPA wastewater grants.

The State of **New York** has also recognized that advice is sometimes worth more than money, especially for small, rural communities without the labor or financial means to maintain complex treatment plants. The New York State Self-Help Support System assists such communities in developing appropriate, locally affordable solutions to their wastewater problems. Co-sponsored by the New York Departments of State, Environmental Conservation, and Health, and the Rensselaerville Institute and the Ford Foundation, the program provides the nuts and bolts expertise for small towns to "do it themselves". Advice includes showing town officials how to assess their problems and develop simple solutions; how to serve as their own general contractors; and how to maximize the use of local resources. The program has even developed a step-by-step guide to self-help entitled *The Self-Help Handbook for Local Government Officials.*

The need for workable methods of financing wastewater treatment projects in the absence of adequate federal dollars is inducing states to establish innovative financial and technical advisory programs. Federal, state, and local responsibilities are being redefined, and the states are clearly preparing to take the lead role. □

Some Communities Move Ahead Without EPA Dollars

by Roy Popkin

Thousands of communities will need new or improved wastewater collection and treatment systems before the end of this century. Many will need to construct new facilities or replace or upgrade existing facilities by 1988 if they are to meet the Clean Water Act compliance deadline. The cost of providing for all these needs is estimated to be in the tens of billions of dollars. For most of these communities—whether the problem is near-term compliance with the 1988 deadline or whether it is providing for long-term delivery of service to citizens—there is the all important question of how to pay for the needed planning, construction, and operation and maintenance of the new or expanded waste treatment facility.

Thousands of communities will need new or improved wastewater collection and treatment systems before the end of this century.

In the past, many communities delayed action until they received federal grant assistance. Such delays resulted in continued pollution and higher costs. Now, given efforts to reduce federal spending and to increase state responsibility, it is clear that there simply won't be sufficient federal grant funds to finance every town's needs. Now that town officials realize that many communities will not receive grants, more and more communities are finding alternate ways to solve their wastewater problems and to fund the needed construction. They are finding engineers who know how to "think small."

They are finding innovative ways to financing the projects. They are spending less than they might have if they'd had to meet all of the procedural requirements that go with federal funding. They are educating their sewer system customers to pay higher but reasonable fees for the service and they are looking more aggressively for supplement revenues and ways to reduce operating costs. Most importantly, they are assuring their communities of a continued supply of clean water and making an important contribution to local economic growth and development.

(Popkin is a writer/editor in the EPA Office of Public Affairs.)

- **Auburn, AL**

On September 12, 1986, this bustling university town dedicated the H. C. Morgan Water Pollution Control Facility, one of two brand new treatment plants that replaced an inadequate system that was designed in 1958. Since going on line, the new system has met Clean Water Act treatment and discharge standards and has been praised by the State of Alabama for cleaning up the area's polluted streams and for benefiting Auburn's economy. City Manager Doug Watson told the *Birmingham News*: "We could not have accomplished so much so quickly had we relied on federal funding. Speaking of the cost to the consumer," he added, "we had to double our sewer rates (from 96 cents to $1.92 per thousand gallons, but the alternative, under traditional financing, would have meant tripling our sewer rates."

Auburn's solution? Privatization. The city began planning for a new treatment system 12 years ago. The wastewater flow was more than the city's northside plant could handle, and the pump stations delivering wastewater to the southside plant were deteriorating. Raw sewage was backing up into homes or overflowing into and polluting area creeks. Despite the obvious need for system improvements, Auburn was low on the state's EPA funding priority list.

In 1983, the City Council began to look for alternative funding sources. The option that seemed most attractive was to hire a private firm to finance, build, and own and operate the new plants. The following February, a Sewer Privatization Review Committee was appointed to examine proposals submitted by various firms and to recommend one to the council. Metcalf and Eddy, a Boston-based firm, was selected. The firm undertook the job of building a $35 million system, which included 25 miles of interceptor sewers, and selling tax-exempt bonds to pay for construction. The sewer rates, which have to be approved by the city, are to pay off the bonds and cover operating costs. The bonds were sold, and a 25-year sewer service contract was signed in December 1984. Both new plants were finished and on line by July 1986.

Public support for the privatization effort was obtained by the Sewer Privatization Review Committee. The chairman of this committee presented a slide show depicting the polluted streams to local organizations and to the news media reporting Auburn's water problems. What's more, developers, seeking zoning changes so they could build, kept running into problems related to inadequate sewer service. This added more pressure to support improvements.

The need for action was further demonstrated by denials of rezoning

Dr H C. Morgan

In 1974, while city workers tried to repair a broken pump at the sewage pumping station in Auburn, AL, raw sewage poured into a town creek.

Jeane Makone, Opelika Auburn News

Present at the dedication of the new wastewater treatment plant in Auburn, AL, on September 12 were, l to r, Auburn City Councilman Dr. H.C. Morgan; Auburn Mayor Jan Dempsey; EPA Region 4 Administrator Jack Ravan; and Ben Rawls, president of the firm that built the system.

applications because of inadequate sewage treatment capacity. As a result, developers whose proposed projects were put on hold rallied behind the Sewer Privatization Review Committee.

Over the life of the Metcalf and Eddy contract, Auburn expects to save $25 million. According to Auburn Mayor Jan M. Dempsey, the project is "working out fine. The company is meeting all of our expectations. The plants both went on line as scheduled. And, even before they started up, we received a refund of $35,721 representing money the company had saved while operating our old plants during the construction period. We're using part of that money to landscape the area where the old northside plant was and turn it into a park. We think privatization is the way to go."

The mayor was echoing city manager Watson, who in March 1985 wrote, "on a national scale, Auburn's experience in this public-private partnership may prove to be a model in the rebuilding of the infrastructure needs of communities."

Even though EPA had granted no money to Auburn for the project, the September dedication was attended by Region 4 Administrator Jack Ravan. He said EPA must continue to enforce the standards in the Clean Water Act even if federal construction funding is halted, and predicted that during the next five years "representatives from more than 1,000 cities from across the country will come here to see what Auburn has done." Since the conception and realization of the Auburn privatization project, the tax benefits arising from such projects have been severely curtailed. However, the investment and engineering community is expected to develop new concepts that will result in the continued viability of privatization for a variety of communities.

- **Camden, NY**

"We never really thought about federal money for improving our wastewater treatment system," says David Barker, Superintendent of Public Works for the village of Camden in Central New York State. "We pursued state money for a while but found the cost of just applying for and getting the money would add considerably to the cost of meeting our needs." What they did, instead, was redistribute resources and use village employees for project labor.

Camden, a small agricultural/industrial center in Oneida County, has a population of about 2,700. Its wastewater collection system, built in 1925 and upgraded in 1973, consists of preliminary treatment, an oxidation ditch, and discharge to the west branch of Fish Creek. The sludge treatment process was recently upgraded to handle increased solids.

In 1983, the treatment plant needed a new boiler to heat the control building. Instead of just installing a new boiler, Barker and his staff found a more efficient way to heat the building and save fuel oil costs. They used a geothermal heat pump, designed for taking heat from ground water, to extract heat from the effluent. Department of Public Works (DPW) employees installed the system. They believe the estimated annual savings of $900 to $1,100 should pay back the cost of the municipal work force by the end of 1987.

Then, in 1985, the wastewater treatment plant began producing more sludge than the system's three open drying beds could handle. Working with a local wastewater equipment sales representative, the village treatment plant operator looked at the alternative sludge dewatering technologies that were available to small plants such as Camden's. To see how a screw feed sludge press would work as compared to a belt feed press, they rented a portable one for a week, then ordered two screw feed sludge presses and a pre-fab building to house them. Again, Camden DPW employees did the installation at a net savings of approximately $140,000 in capital costs. Time lost from other DPW work was minimized, Barker says, by using the crews "mostly on days when the weather wouldn't let them work outside."

The improved plant has a capacity of 800,000 gallons per day (gpd), higher than its normal 750,000 gpd average flow, and the new sludge system provides secondary benefits in that the old belts are being used for additional drying capacity. At the same time, Camden is getting what Barker calls, "younger sludge," which may not have as much copper in it as the older output. This, in turn, may lead to sale of the sludge or its use for fertilizing local parklands.

- **Johnson City, TN**

This Appalachian mountain community wearied of waiting to reach the top of the state's priority list and took advantage of a "pollution crisis" in neighboring Bristol to gain public support for funding a multimillion dollar upgrading and expansion of its sewage treatment system.

The Johnson City Knob Creek plant was not in compliance with its permit in 1983/1984, and the town's management felt it could no longer delay needed improvements. At the same time, its Brush Creek plant was approaching capacity, and they wanted

to head off future problems. An additional factor was that the EPA wastewater treatment plan for the area designated Johnson City as a regional wastewater facilities provider. As a result, there was a growing demand for wastewater service from residential and industrial developers. Inflation had increased design costs while the city waited for federal funding, and it was obvious federal project requirements would probably increase the costs even further. To add to the pressures to move ahead, Johnson City was under a state commission compliance order directing that its system be brought up to state-enforced standards.

Coincidentally, pollution problems and state enforcement actions in nearby Bristol created negative publicity about wastewater treatment in the entire tri-city (Bristol-Johnson City-Kingsport) area. Johnson City's pride and desire to protect the community against the kind of environmental notoriety that could slow or stop development and growth fostered support for doing what was necessary as soon as possible and funding the costs from city resources.

According to city manager John Campbell, "We were able to start at the best possible time for obtaining low bids. The area was construction-hungry. We wound up spending $9 million. We completed the improvements in 15 months, giving the city system increased capacity and enabling us to annex additional growth areas. We saved a lot of money by moving quickly."

The construction was funded by a combination of bond issues, tax revenues, and increased sewer rates. "A good education campaign created a supportive community attitude," Campbell says.

- **Louisa, VA**

Louisa is a typical rural Virginia comunity located not far from Charlottesville. Although its population is only about 1,000, growth and development are accelerating both in and around the city. New shopping malls, industrial parks, and a nursing home have moved into the area. A nuclear power plant is just a few miles away. In 1982 the prospect of this growth led the town leaders to build new treatment plant and sewer extensions as an inducement to potential developers. Since federal funding prospects were dim, the town financed the project itself. Louisa was joined in the venture by the county, which needed adequate sewer service for an industrial air park outside the Louisa town limits.

An engineer experienced in designing small community projects helped the town and county design a 200,000 gpd oxidation ditch to supplement the existing 75,000 gpd trickling filter. The state of Virginia approved the recommended low-cost options.

The cost of providing for all these needs is estimated to be in the tens of billions of dollars.

The city manager, Gary Hart, became a self-made creative financier. "The first thing you do when you're looking for money is talk to the money experts," he told a Baltimore seminar on Small Community Wastewater Technology in November 1985. "You contact bankers, loan agents, brokers, and get them to bid for your business."

Louisa's share of the $1.2 million dollar cost was funded primarily with a $750,000 Farmers Home Administration (FmHA) loan at 9.5 percent. But FmHA doesn't provide funds while construction is in progress; Hart needed upfront money. He found short-term loans at six percent and manipulated them down to a net of three percent. In addition, connection fees were collected in advance from potential new residential, shopping center, and industrial park customers, providing $125,000 for engineering and other costs. And, because town meetings and other educational efforts prepared Louisa for increases in the sewer rates, Louisa began gradually increasing the monthly bills even before the new system was fully completed, Hart told the Baltimore seminar. "We'd had a public meeting and our customers had accepted the fact that we did need to spend the money on the sewers and treatment plant. And most of them were ready to pay for it with higher rates."

Westboro, WI

This tiny central Wisconsin wood pulping and farm community was under pressure from the state's Department of Natural Resources because 70 percent of the septic tanks used by its 200 residents were failing. The failures threatened the community's health and underground well water supply. When the problem first became a matter of community concern in 1974, the cost of installing even a small conventional sewer and treatment system would have been more than the entire assessed value of the community. Nevertheless, it was unlikely that federal construction funding would be available.

Engineer Richard Otis, then with the University of Wisconsin, studied Westboro's problem and came up with a less expensive solution: a small-diameter pipe gravity sewer system linking all of the community's septic tanks to a soil absorption field. When the new system was hooked up in 1977, the cost turned out to be about a third less than Westboro would have paid for the kind of conventional system used in larger cities. Because Westboro had the help of an engineer who knew how to "think small," the community had that much less to fund through the FmHA and can pay it back through users' fees.

The variety of approaches used by this small sample of communities in meeting wastewater treatment needs illustrates that there are attractive, workable options to communities in lieu of dwindling EPA construction grants. Each community can evaluate best its particular circumstances and needs as well as the talents and capabilities it has on hand. Whether the answer is innovative financing for a conventional system or reassessing the problem and financing a lower cost conventional or alternative technology, local governments increasingly are mustering their own technical expertise and resources and are finding affordable and effective solutions to local problems. □

Trying Simpler Ways To Treat Wastewater

by Peter Shanaghan
and John Flowers

Stinson Beach, California, a small, coastal community where management of on-site wastewater treatment systems is improving water quality.

Alternative financing is one factor in developing local and state self-sufficiency in wastewater treatment; alternative technology is another. Wise technology choices can help reduce capital costs, thus expanding financing options, and also help to reduce operation and maintenance costs. Together, sensible financing and technology keep a community's wastewater treatment costs affordable.

Proper planning and technology choices are especially critical in small communities. A limited tax base, relatively low per capita income, and difficulties in the bond market all limit how much those communities can afford to spend. Small communities also face the problems of dispersed populations and limited technical and managerial expertise. But, despite these problems, many towns are meeting their wastewater challenges successfully—not with sophisticated processes, but by adopting the KISS philosophy (Keep It Small and Simple).

Some small communities, for example, are finding that on-site wastewater systems under community management can be a cost-effective option. Such systems were once viewed as second-rate; now they are recognized as an alternative to centralized treatment that can provide excellent, reliable service at reasonable cost.

Septic tank/soil absorption systems, for example, have remained the most popular form of on-site treatment. The advent of low-flow home plumbing fixtures and modified soil absorption methods, however, has greatly increased their reliability and long-term usefulness; the new methods also offer hope that failing systems can be renovated and retained for use. One new system uses a small pump to periodically disperse septic tank effluent under pressure to the soil absorption field. Not only does this make better use of the entire absorption area; it allows the area to dry out between doses, thus improving system performance.

Stinson Beach is a good example of on-site wastewater systems under community management. An isolated coastal community of about 1,800 north of San Francisco, Stinson Beach was having a problem with polluted ground water due to failing on-site systems. In the mid-1970s, the town formed an on-site system management district to repair failing systems and regulate all on-site wastewater disposal. The plan also included a program of water conservation to reduce wastewater flow. Since then, continuous monitoring of streams and ground water has shown significant improvement in water quality. Yet, the cost of the program was less than a third of the cost of a conventional wastewater collection and treatment system.

Wise technology choices can help reduce capital costs and also operation and maintenance costs.

For those small communities where on-site system management is not feasible, other options are becoming available, including alternative sewer systems and treatment facilities. Depending on conditions, these facilities can be decentralized, serving clusters of homes with localized problems, or they can serve the entire town.

Alternative sewers are usually plastic pipes, smaller in size than conventional concrete sewers and installed at shallow depths. The smaller size and shallow depth are possible because each household's wastewater is pretreated on site before going to a central facility. Some systems also use small on-site pumping units to help transport wastewater through the sewers to the treatment site. Various designs have been developed to reduce the cost of sewering in rural areas where conventional sewer costs can amount to 80-90 percent of the capital costs of a wastewater system.

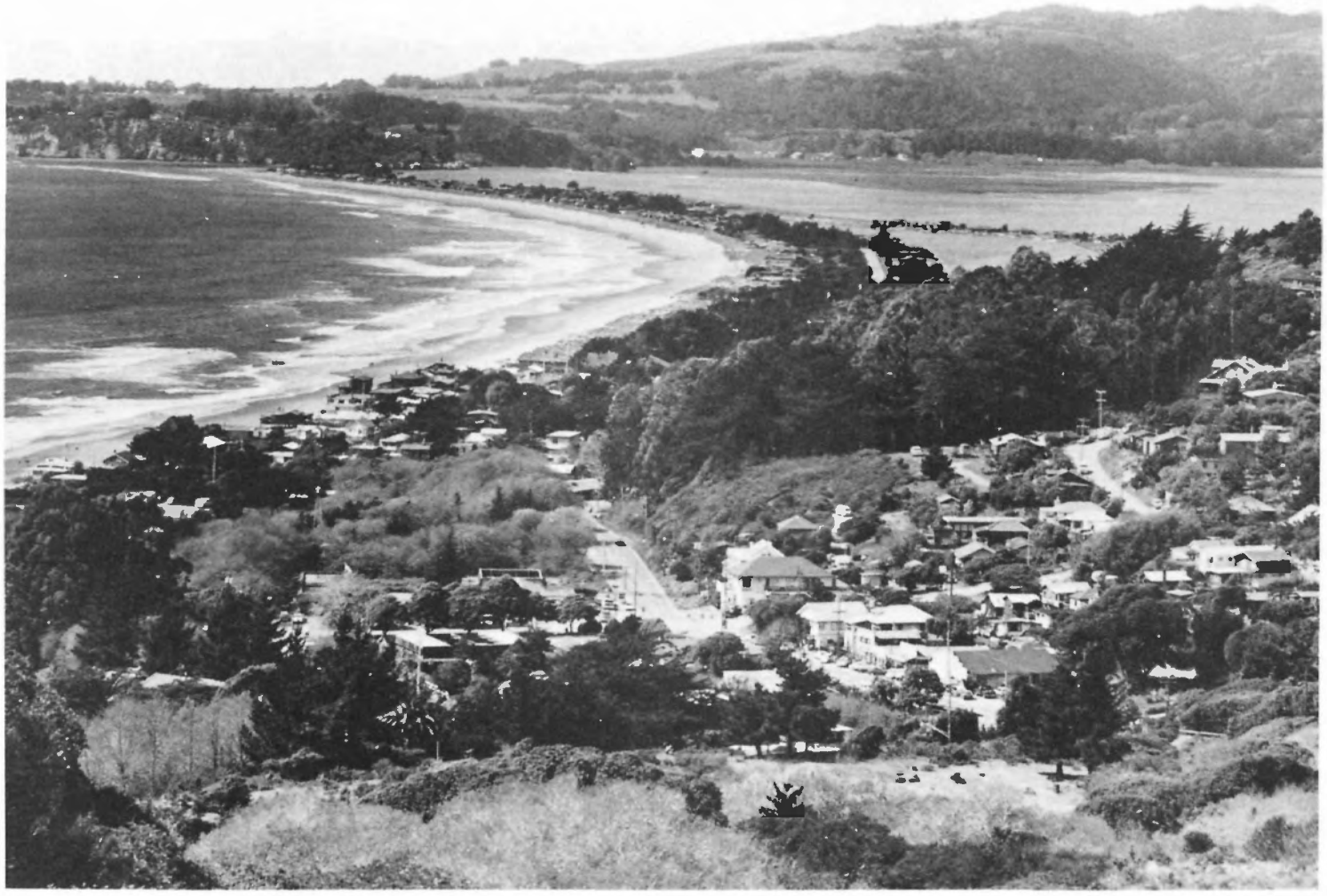
Variable grade effluent sewers are another emerging system. Developed in Australia in 1968, these sewers carry septic tank effluent from individual homes to a common treatment site. Sewers can be as small as 1-1/2 inches in diameter and are laid at shallow depths. In many instances, they can follow the contour of the land and even traverse small hills. Since almost all solids settle out in the septic tank, sewer clogging is rarely experienced, even in low spots.

In addition to their low costs and ease of maintenance, these systems are also very simple to install. Only shallow, narrow trenches are needed, and these can easily be dug around trees and buildings so as to minimize disruption to the landscape. Simple clean-out devices take the place of costly manholes.

Maysville, Ohio recently installed 17 miles of variable grade sewers to serve 770 homes. The two-inch plastic sewers run through residential back yards, carrying effluent from individual septic tanks to a neighboring treatment plant. The entire sewer system was built for $4.1 million—a dramatic savings over conventional sewers which were priced between $6 million and $8 million.

Low-cost, easily maintained sewers are only part of the story for unsewered communities. The rest of the story involves low-cost, simple treatment technologies.

[Shanaghan is an Environmental Engineer with the Small Communities Section in EPA's Office of Water and Flowers is Chief of the Section.]



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Intermittent sand filtration is an example of a dependable small community technology that produces high quality effluent. A similar process is used for treating drinking water. Intermittent sand filters are beds of sand 2-3 feet deep. Wastewater is periodically dosed over the beds and allowed to percolate through the sand. The filtered wastewater then is collected and disinfected before discharge. The filters may be either exposed or covered and require little energy or operator attention.

Alicia, Arkansas, installed an alternative sewer system and community intermittent sand filter to serve its nearly 1,000 residents. Designed to meet stringent water quality standards, the centralized treatment system consists of a receiving tank with pumps, a six-cell filter, and chlorination equipment. The town also provides for treatment of the pump-outs from individual septic tanks. The cost for the entire sewer system and treatment plant was $322,000, only half the cost for conventional gravity sewers and a package treatment plant. Town officials find the operation and maintenance of the system extremely simple, involving little more than weeding and tilling the filter beds and servicing the pumps and chlorinators at a cost of only $5,000/year. And the good news for Alicia homeowners is that sewer service costs only $9.50 per month.

Proper planning and technology choices are especially critical in small communities.

The Mayo Peninsula on the Chesapeake Bay south of Annapolis, Maryland, is another illustration of appropriate wastewater management for small communities. Mayo residents have been plagued for years by wastewater management and public health problems, but solutions didn't come easily to this environmentally sensitive area. It finally took a combination of innovative systems to deal with Mayo's difficulties.

One hundred homes on the eight-square mile peninsula will continue to use on-site systems managed and operated by the utility district. Ninety homes are in an area unsuitable for on-site systems, but also too remote to connect to the planned central treatment facility. These homes will be served by two "cluster" systems of alternative sewers carrying septic tank effluent to a nearby communal soil absorption field.

The peninsula's remaining 2,200 homes will send their septic tank effluent through alternative sewers to a central intermittent sand filter. Following filtration, the wastewater will flow through a series of artificial marshes, then be collected and disinfected using ultraviolet light which leaves no toxic residues. Though costly because of the high degree of treatment needed before discharge to the Chesapeake Bay, this combination of systems will still be 20 percent less expensive than a conventional system, and operation costs will be drastically less.

Clean water doesn't come easily. But those small communities which have opted for simple, innovative treatment facilities are now in a good position to show others how to solve their wastewater problems through KISS and tell. □

EPA's Construction Grants Program: A History

by Jack Lewis

Widespread pollution of rivers and lakes had, by the late 1960s, helped prompt public demand for stronger Federal protection of the environment.

The United States is not alone among nations in its reluctance to confront the least charismatic of social problems: how best to keep human organic waste out of sight and out of whiffing distance. All too often, of course, out of sight means out of mind. The invisible wonders of modern plumbing have contrived to lull Americans—like residents of other advanced industrial nations—into false confidence that inexpensive, inobtrusive wastewater treatment is nothing short of a birthright.

From the earliest days of the American republic, the focus of our businessmen, politicians, and citizens has been on never-ending economic progress. In less than 150 years, the limitless expansion of trade and manufacturing transformed the United States from a sleepy agrarian backwater into a booming bastion of industry.

Improved management is now making every Construction Grants dollar go much further than it did in the past.

During those years of peak growth, Americans had no appetite for farsighted planning in the area of wastewater treatment. Each of the 48 states zealously guarded its sovereignty over all matters pertaining to wastewater treatment. Great Lakes governors, for instance, never tired of touting the then seemingly limitless capacity of those "sweet waters" for assimilating human and industrial waste.

It was not until after World War II that attitudes began to change. The nation's lawmakers decided the time had come to establish at least a rudimentary federal presence in the sphere of wastewater treatment. Congress passed a ground-breaking statute in 1948: the Federal Water Pollution Control Act. This was the tiny seed from which sprouted the ambitious federal Construction Grants program of the 1970s and 1980s.

The first federal Construction Grants were disseminated in the mid 1950s. Like their much larger descendants, these early grants subsidized improvements in the techological capacity of municipal wastewater treatment works. As the 1950s gave way to the 1960s, these initially miniscule grants gradually grew in size, but at a very slow rate.

By the end of the 1960s, the American public was clamoring for immediate action to protect the long-neglected and heavily polluted rivers and lakes of this once pristine country. Fish kills in Lake Erie, chemical fires on the Cuyahoga River: the litany of water catastrophes went on and on, with no apparent solution in sight.

Responding to a frenzy of environmental activism, President Nixon agreed to set up a special federal agency devoted exclusively to the protection of our environment. EPA opened its doors in December 1970.

The fledgling agency was given responsibility for the various versions of the Water Pollution Control Act passed since 1948. In the 1950s and 1960s, the Department of Health, Education and Welfare had been the steward of the low-profile federal presence in wastewater treatment.

The water pollution emergency was felt to be so urgent that the Army Corps of Engineers—acting in conjunction with EPA—reactivated a long-dormant law, the River and Harbor Act of 1899. The Corps began to issue permits to control the effluents discharged by industrial and municipal polluters. In 1971, however, the courts ruled that the Corps of Engineers lacked proper jurisdiction in this area. A legal vacuum existed, waiting to be filled.

Congress moved quickly in 1972 to approve a momentous group of amendments to the Water Pollution Control Act. Generally known as "The Clean Water Act," this legislation added intra-state waters for the first time to the jurisdiction of the federal government. Previously, the federal role in water pollution control had been confined to interstate and coastal waterways.

The new law, signed on October 18, 1972, provided for distribution of $18 billion in municipal wastewater treatment grants. The grants were to pay for 75 percent of the cost of approved projects in qualified municipalities.

As with any large program, Construction Grants got off to a slow start. There was no way $18 billion could be distributed in one fell swoop. From 1973 to 1975, $9 billion in grants were obligated. In 1976, the remaining $9 billion was released to subsidize more projects.

Even these phased disbursals of funds proved to be more than the limited EPA staff could directly administer. There was an urgent need for trained manpower, nor just in Washington but in the states and local communities. EPA was eager to delegate authority to state governments willing and able to take on direct administration of Construction Grants projects as partners to EPA.

Congress responded to this need by passing new amendments to the Clean Water Act in 1977. These enabled EPA to delegate operational responsibility for the Construction Grants program to state governments qualified to take on the job. In addition, funds were made available to the states for financing their new administrative expenses.

As a result, between fiscal years 1978

[Lewis is Assistant Editor of the EPA Journal.]

EPA, Region 5

and 1981, EPA delegated administration of the Construction Grants program to 45 states. Later, the other five states also qualified for delegated authority. At present, there are 1500 state employees who are directly involved in the day-to-day management of the federal Construction Grants program; they are scattered through all the 50 states.

As an additional resource, the Corps of Engineers has made its staff available to provide inspection services during the construction of a large number of Construction Grants-funded wastewater treatment projects.

But no program this challenging, involving so much money and so much coordination among different levels of government, could ever be problem-free. There were many complaints as the program matured in the late 1970s. Chief among these was that all the detailed procedural requirements, however necessary in the early stages of the program, were becoming burdensome.

"Mid-course correction" became the order of the day in the Construction Grants program. EPA worked to improve its own administrative apparatus. At the same time, the states moved more quickly toward full assumption of their responsibilities for managing the program.

New amendments to the Clean Water Act, passed in 1981, marked another major step toward returning to state and local governments the responsibility for meeting wastewater treatment needs. A plan was adopted to reduce the federal share of individual Construction Grants projects from 75 percent to 55 percent, starting in 1984. This provision of the 1981 amendments made state and local governments virtually equal financial partners with the federal government.

Approximately 2,500 Construction Grants projects, costing over $8 billion, are now underway.

Another 1981 amendment fostered sounder business practices at the state and local levels. Congress instructed EPA to provide guidance to program managers on how best to evaluate the ability of Construction Grants applicants to pay for their share of construction costs, as well as their share of operation and maintenance costs for completed projects. Applicants were to be subjected to this kind of careful scrutiny prior to their approval for grants and the formal go-ahead for construction.

These and other measures made the Construction Grants program a textbook case of the "New Federalism" in action. Decentralization has been the name of the game in the 1980s. Improved management at the local, state, and federal levels of government is now making every Construction Grants dollar go much further than it did in the past.

Noteworthy among these managerial changes:

- EPA has developed an efficient monitoring apparatus for the Construction Grants program. Evaluations of the program are now part of a sophisticated Management Evaluation System formulated by EPA's Office of Water and since adopted by other major offices at EPA. Construction Grant recipients are now required to make performance commitments with EPA, specifying what tasks must be accomplished by what specific deadlines; these commitments establish the criteria for subsequent management evaluations.

- Improved computer tracking has made it possible for EPA to do a better job of monitoring recipients of Construction Grants.

- EPA has upgraded the methods it uses to identify what are known as "infrastructure needs" at wastewater treatment facilities; such needs include overhauling or replacing old equipment, as well as introducing new technologies to improve operations.

- Through an Advanced Treatment

review process, EPA has encouraged municipalities to consider more carefully what Advanced Treatment processes are actually needed to meet water quality-based standards under the Clean Water Act.

From October 1972 to October 1986, $44.6 billion in Construction Grants was appropriated. This level of expenditure dwarfs all other programs in EPA. Among all domestic federal programs, it ranks second only to the highway program at the Department of Transportation—which has authorized $198 billion in highway expenditures since its inception in 1956.

The legislators who passed the first Clean Water Act in 1972 dreamed of a day when the U.S. could once again boast of "fishable, swimmable" rivers, lakes, and streams.

What have these billions of dollars in federal Construction Grants procured? Plenty. Over the past 14 years, approximately 4500 Construction Grant-assisted wastewater treatment facilities achieved fully operational status in communities throughout the United States. In addition, hundreds of projects smaller in scale have been subsidized at treatment works throughout the United States. Approximately 2500 Construction Grants projects, costing over $8 billion, are now under way. By the time federal funding for the program ends, several thousand additional projects will be "on line."

Also heartening is the improved level of compliance with the Clean Water Act. By March 1986, only 12 percent of U.S. municipalities that had completed construction to meet Final Effluent

International Joint Commission

Fish kills in the Great Lakes indicated those "sweetwater seas" were in dire need of cleanup.

Limits under the Clean Water Act were still in significant non-compliance. Some 67 percent of municipalities had completed construction needed to ensure full compliance.

However, this improvement has lagged behind the progress made by non-municipal (primarily industrial) treatment systems, 94 percent of which had completed construction needed for full compliance as of March, 1986. To close this compliance gap, EPA's then Administrator William Ruckelshaus formulated a National Municipal Policy in 1984. EPA's new Municipal Policy set schedules that have put many cities with previously lackluster records on the road to compliance with the law of the land.

Ruckelshaus' successor, EPA's current Administrator Lee M. Thomas, took another major step forward in 1985 when he ordered an increased enforcement effort aimed at the problem of untreated toxic industrial waste that had long been routinely discharged by some companies into municipal wastewater systems.

These discharges have been a source of grave anxiety to citizens living in industrial communities. Not only have they fouled treatment works with unidentified, untreated, and frequently untreatable hazardous substances; also, on occasion, they have upset the water-purifying technology in place for the primary and secondary treatment of human organic waste. In one spectacular instance, this sort of "interference" with municipal sewage systems by toxic dischargers led to an explosion that destroyed an entire block in Louisville, Kentucky, in February 1981.

The foundation now exists for further advances in the area of pretreatment. As of October 1986, 1429 publicly owned treatment works in industrialized communities had EPA-sanctioned "pretreatment programs" in place. When fully operational, these programs will ensure that industries intending to persist in pumping waste from factories into sewers will treat such waste prior to its discharge.

The legislators who passed the first Clean Water Act in 1972 dreamed of a day 10 years hence when the United States could once again boast of "fishable, swimmable" rivers, lakes, and streams. EPA's Construction Grants program has gone a long way toward making that goal a reality.

Consider these sterling figures compiled in 1982 by the Association of State and Interstate Water Pollution Control Administrators. Even though the population of the United States grew 11 percent from 1972 to 1982:

- 47,000 stream miles improved in quality over that 10-year period.
- 390,000 acres of lakes improved in quality.
- 142 million people were receiving secondary or more advanced levels of sewage treatment by 1982—57 million more than received such treatment in 1972.

Fishermen and wind-surfers can now be seen along the Potomac River and other less symbolic rivers throughout the United States. Toxic pollution has raised new concerns, but human sewage is much less a problem today than it was 14 years ago. Of this, EPA and the nation have every right to be proud. □

A National Policy To Enforce Wastewater Cleanup

by John W. Lyon
and Patricia D. Mott

The clean water legislation of the 1970s required industries and municipalities to meet stringent treatment standards for their wastewaters. These standards are applied through permits that limit the amounts of pollutants discharged from each facility based on its unique conditions. For most municipal treatment plants (also known as publicly owned treatment works or POTWs), these limits typically are set at least at a level known as secondary treatment. Such treatment generally uses biological processes to remove organic matter in sewage.

When Congress imposed treatment requirements, it also imposed deadlines for compliance. But it recognized that most cities would have to undertake major construction programs in order to comply. To help them do this, Congress established a carrot and stick program of construction grants coupled with statutory deadlines.

Fourteen years, several deadline extensions, and nearly $45 billion later, some 1300 major POTWs still need at least some construction to meet their permit limits. But direct federal funding, already reduced as a percentage of construction costs through the 1980s, is now expected to be phased out completely by the beginning of the next decade.

From Policy To Action

Diminishing federal funding has raised the issue of compliance with permit requirements. Would cities be forced to comply with discharge limits despite the lack of federal funds?

Over the last ten years, the courts have ruled repeatedly that cities must comply, regardless of the availablility of such funding. EPA's National Municipal Policy, issued in January 1984, builds on these rulings. The policy makes clear that, with or without federal funds, municipalities must meet their permit requirements no later than July 1, 1988. The sole exceptions are those municipalities that can prove that they are physically or financially unable to complete construction by deadline; but they, too, must abide by court-enforceable completion schedules.

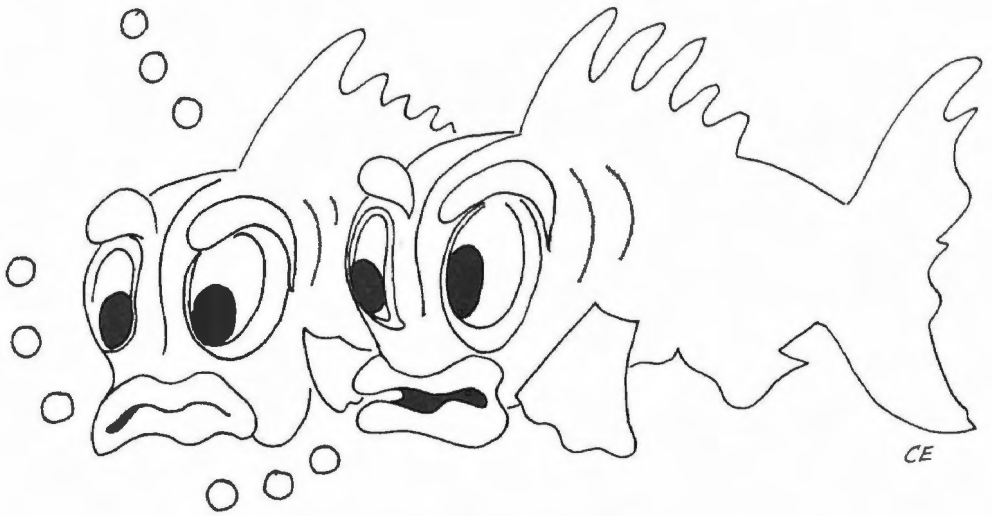
Diminishing federal funding has raised the issue of compliance with permit requirements.

Since the policy was issued, EPA has undertaken more than 60 lawsuits, suing municipalities in 20 states, plus the District of Columbia, Puerto Rico, and the Virgin Islands, and including systems ranging from 500 million gallons per day down to one million gallons per day.

Compliance with deadlines and permits is not all that EPA seeks to obtain through its enforcement efforts. It's also looking for monetary penalties. Although EPA takes into account a city's ability to pay and its good faith efforts to comply when assessing penalties, it also considers equally important factors such as the severity of the permit violations and the economic benefits a city may have enjoyed by delaying compliance. Penalties have been as high as $625,000, but most have been far lower.

Although the National Municipal Policy has emphasized enforcement, it has other facets as well. The Agency is making a major effort to help cities and POTWs with technical advice and other non-financial assistance. For example, this November, EPA is co-sponsoring a National Municipal Conference to discuss financing alternatives to federal grants. In addition, some of the states and EPA regional offices are providing "troubleshooters" to help non-complying POTWs improve their performance or get better results from their existing systems.

In the long run, however, a tough enforcement policy is still the Agency's most effective tool for obtaining



Do you think EPA could just make these waters "swimmable," and forget about the "fishable?"

(Lyon is an Assistant Enforcement Counsel for Water in EPA's Office of Enforcement and Compliance Monitoring. Mott is a water enforcement attorney in the same office.)

municipal compliance, and EPA will continue to push cities by filing more cases. The majority of the major POTWs needing further construction to meet their permit requirements have already agreed to enforceable construction schedules. But EPA is prepared to take enforcement action if these schedules are not met. In fact, suits against municipalities for schedule delay may become the most common type of case by the end of this fiscal year.

EPA is also expecting more enforcement help from the states themselves. Thirty-seven of them are authorized to administer and enforce

EPA is prepared to take enforcement action if these schedules are not met.

permits under the Clean Water Act, and in the future, more municipal cases should be brought by the states than by EPA. Until recently, in cases where the Agency was suing directly, the state was named with the municipality as a defendant. This was to ensure that any judgment against the municipality would be paid by the state if state law prevents municipalities from paying themselves. EPA is now working with the Department of Justice to develop procedures that will allow a state to join enforcement suits as a plaintiff with the Agency.

The National Municipal Policy was developed after more than a year of drafting and consultation with the states. Their growing support for the policy and EPA's continuing enforcement resolve should provide the momentum to bring municipalities into timely compliance with their permits and to achieve the goals of the Clean Water Act. □

Getting Down to Business

The city is committing itself to treatment and management improvements that could cost more than $2.3 billion.

One of the most dramatic breakthroughs as a result of the National Municipal Policy is the recent consent agreement between EPA and the City of Los Angeles.

Los Angeles was first sued for violating its discharge permits in 1977. But after almost 10 years of construction problems, funding holdups, and other delays, the city's main treatment facility—the Hyperion plant—still pumps more than a million gallons of primary sewage sludge into Santa Monica Bay every day. That's 4,000 tons discharged into the ocean daily, not including storm water runoff. And the Hyperion plant also consistently violates its permit limits for suspended solids, biochemical oxygen demand, and oil and grease, with occasional violations of limits for residual chlorine, lead, silver, zinc, and nickel.

It took almost a decade, but the municipal policy finally allowed EPA to put its figurative foot down.

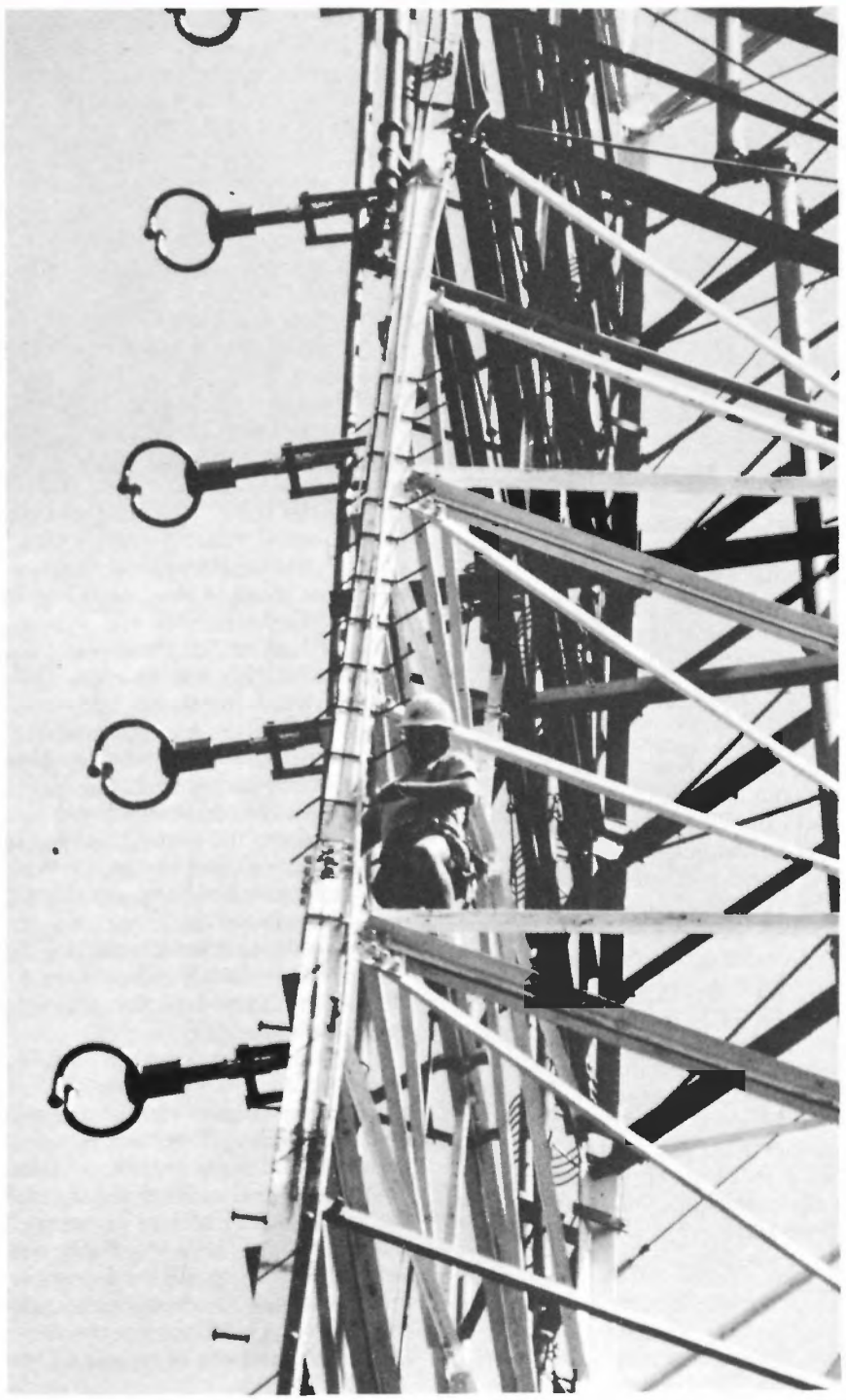
Under the terms of the consent agreement, Los Angeles not only must pay the highest civil penalty ever assessed to a municipality under the Clean Water Act ($625,000), it must also carry out a storm water control project over the next three years that may cost as much as $3.3 million. Most importantly, the city is committing itself to treatment and management improvements that could cost more than $2.3 billion over the next 12 years. Specifically, Los Angeles has agreed to:

- End all ocean discharge of sludge by December 31, 1987. Until then, the city will immediately begin hauling at least 2,000 wet tons of sludge per month from the Hyperion plant for disposal elsewhere; within six months, at least 5,000 tons must be disposed of monthly.
- Achieve secondary wastewater treatment by December 1998, in the meantime meeting interim limits. Given the magnitude of construction involved, 1998 is the earliest date by which Los Angeles can complete the necessary plant improvements to achieve secondary treatment.
- Complete construction and begin operating the sludge treatment and disposal process known as the Hyperion Energy Recovery System (HERS) by June 30, 1989.
- Maintain a specific number of staff for plant operation and maintenance.

One of more than 60 municipal cases filed or settled since the Agency first issued the policy in 1984, the Los Angeles agreement proves that EPA and cities are serious about getting down to business. □

Probing the Mysteries Of Radiofrequency Radiation

by Miles Kahn



Perched on a broadcast tower in Portland, Oregon, a worker connects a new FM antenna.

There is a certain mystique about radiofrequency (RF) radiation that surrounds few other environmental intruders. Although more is becoming known about the biological effects of RF radiation, it is still not a well understood subject, even among the experts.

The hazards associated with exposure to unusually high doses of RF radiation have been brought to light mostly over the last 15 years. One area in which a lot of progress has been made is that of making field measurements to determine exposure of nearby populations to RF radiation from sources such as broadcast towers and microwave relay stations.

EPA, through the unique capabilities of the Electromagnetics Branch of the Office of Radiation Programs (ORP), has made what is possibly the major contribution. In the process of pushing RF measurement technology, the physicists of the Las Vegas-based Electromagnetics Branch have been involved in what have to be considered some of the more unusual and interesting situations confronting any EPA field unit.

In February of 1983, a unique combination of circumstances enabled the Branch to make detailed measurements of radiation fields around an AM radio station. EPA had been requested to make measurements at a dairy farm located near an AM broadcast tower, to determine if radiowaves from the tower were responsible for dramatically reduced milk production of the farmer's dairy herd.

Branch Chief Richard Tell and his crew made measurements indicating that the broadcast tower was not responsible for the farmer's plight. Fortunately, Tell's investigation did

(Kahn is a Public Affairs Specialist in EPA's Office of Radiation Programs.)

reveal a possible cause of the problem. Apparently, faulty connections from local power lines and either improper wiring or faulty electrical equipment on the farm caused a phenomenon called stray voltage. Stray voltage has been associated in technical literature with disruption of milk production in dairy cattle.

Unfortunately, the power company's help in correcting the problem came too late to avert the farmer's bankruptcy.

In addition to responding to selected state requests for field measurements, the Branch's capabilities are employed by other federal agencies, most notably the Federal Communications Commission (FCC).

Stray voltage has been associated in technical literature with disruption of milk production in dairy cattle.

In April 1984, the FCC requested that measurements be made in Honolulu, near broadcast towers there. Normally, broadcast towers are sited in remote locations at the highest elevations possible. In Hawaii, however, state regulations prevent the placement of broadcast towers in the scenic hillsides. Consequently, many towers are located in densely populated downtown areas at the same elevations as high-rise buildings. This increases the risk that nearby individuals may be exposed to elevated levels of RF radiation.

These unusual circumstances led to one of the more interesting of all the Electromagnetics Branch field trips. "In addition to the extremely interesting aspects of our scientific work," says Tell, "we found some situations right out of the Twilight Zone." Radiowaves, explains Tell, can induce electrical currents in conductive objects. In one case, the proprietor of a dress shop with a tower in its parking lot received RF burns whenever she touched her sewing equipment. In another instance, construction workers actually walked off the job because they continually received electrical shocks from touching their tools. Tell himself was burned as he and his colleagues were measuring the current induced in a long cable used in window washing operations.

To measure the induced current caused by a nearby tower, Tell had a steel cable dropped from the roof and hooked to a ground connection in the parking lot, 40 stories below. "This was the first time anything like this had been done," Tell recalls. The electrical current was measured at 20,000 volts! (Normal household current is 120 volts.) Thus, it was not surprising that window washers were experiencing strong electrical shocks when steel cables suspending their scaffolds touched the building.

Tell decided to take the experiment one step further. He disconnected the cable from the ground. This immediately resulted in an electrical arc between the two points. Using insulated tongs, Tell then exposed a penny to the arc. The face of the coin vaporized as it began to melt; Tell was burned on the finger as his hand momentarily slipped; and music could be heard coming from the electrical arc. As Tell notes, "That part wasn't too scientific, but it sure made a point!"

In another unusual occurrence several Honolulu residents were reportedly awakened one morning by an explosion that appeared to emanate from a nearby AM broadcast tower. As they walked onto their balconies to investigate, a second explosion occurred. The words "Praise the Lord!"—magnified many times normal volume—resounded through the neighborhood. Baffled witnesses thought they were hearing the voice of God.

According to Tell there was a plausible earthly explanation. The ceramic insulators at the bottom of the tower in question had apparently become filled with water after a recent rain, thereby losing their insulating properties. A sudden electrical connection to the ground caused an arc of electricity to boil the water. At the precise moment of the second arc the flame vibrated at the same frequency as a religious broadcast beamed by the tower. This coincidence sent the words "Praise the Lord" booming through the neighborhood.

Tell is quick to point out that in only a couple of cases were nearby residents of Honolulu exposed to RF radiation levels exceeding American National Standards Institute radiation protection guidelines. In the worst cases, the FCC has instituted corrective measures. "Nationwide," Tell adds, "only one percent of the population is exposed to more than one microwatt per square centimeter. And those people are in the immediate vicinity of broadcast towers."

That fact was firmly established by a major study conducted by ORP from 1975-1977. Scientists took measurements at 30 to 40 locations in 15 cities, from Boston to Los Angeles. Exposure estimates for each city were made through the use of computer models. From these, an estimate was made of national levels of exposure to RF radiation. The study demonstrated, according to ORP Director Sheldon Meyers, that, "Despite some apprehension among small segments of the public, aside from some occupational problems, RF radiation poses a potential problem for only a small portion of the general population."

More recently, the ORP Las Vegas crew have advanced the state of the art in RF monitoring equipment. They have developed a Fiber Optic Isolated Spherical Dipol antenna (FOISD). Previous antennae used to monitor RF radiation were connected to instrumentation and power sources by standard electrical cables. In many cases, the RF fields were perturbed by the metallic cable connecting the antenna to the instrumentation.

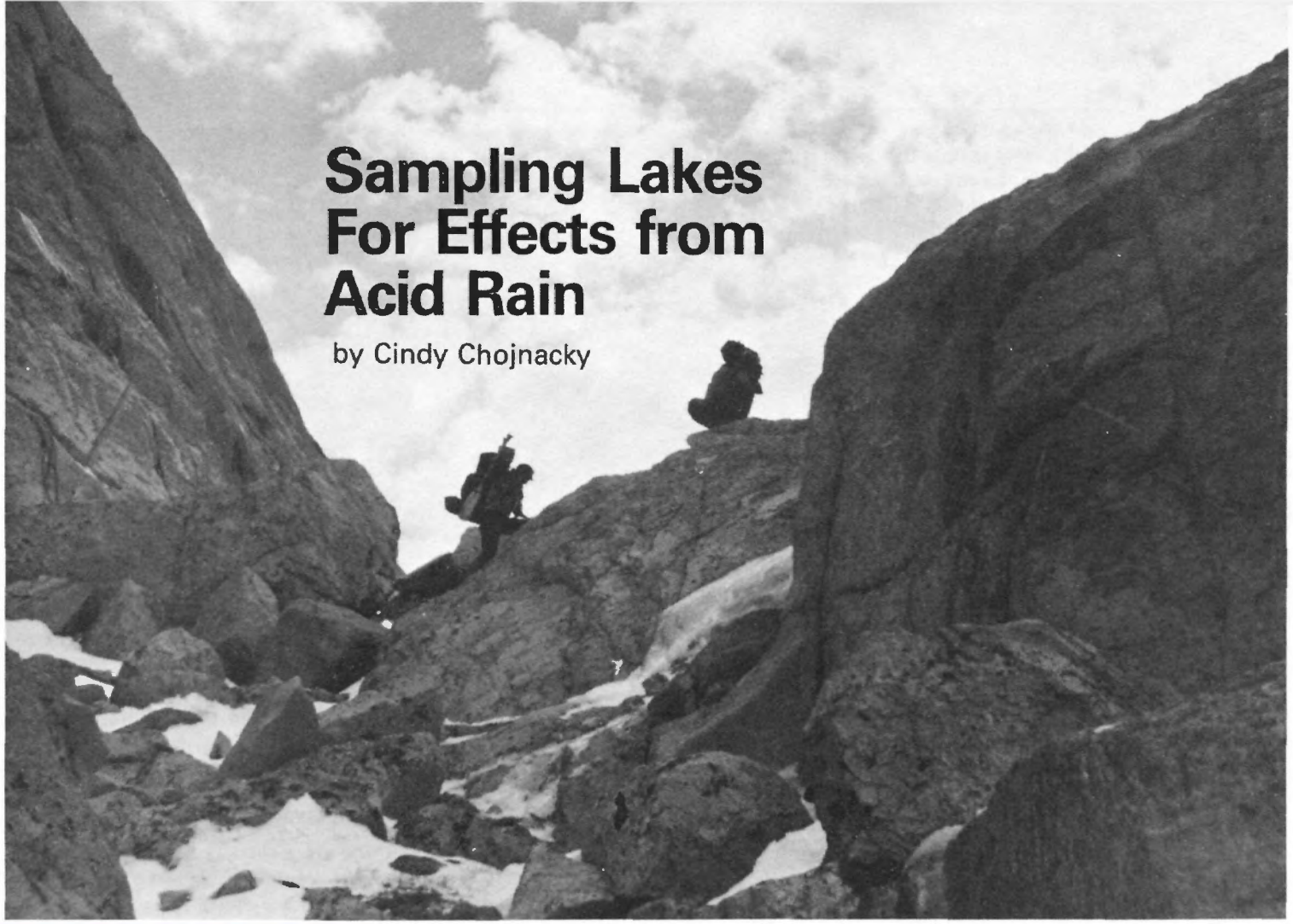
The words "Praise the Lord!" resounded through the neighborhood.

With the FOISD, however, there are no electrical cables used to power the unit or to transmit signals to the monitoring instrumentation. This revolutionary new antenna uses an internal battery and transmits its signals via fiber optic linkages. This prevents the distortions inherent in conventional technology and results in more accurate readings.

Greater measurement precision, especially in the wake of EPA's recent proposal of federal guidance options for limiting RF exposure among the general population, is extremely important. The Washington staff of ORP is now reviewing public comments on EPA's proposed guidance. As ORP's Meyers says, "No matter which option is selected, accurate measurements will become increasingly important as the public becomes more aware of the RF issue and as more becomes known about the biological effects. And EPA is leading the way in RF Monitoring." □

Sampling Lakes For Effects from Acid Rain

by Cindy Chojnacky



To reach a mountain lake, members of a Forest Service team climb a steep slope in the Fitzpatrick Wilderness of the Shoshone National Forest in Wyoming.

Editor's note: The following story is about some unusual and colorful aspects of the Western Lakes Survey conducted by EPA in the fall of 1985. Scientific results from the efforts will be published early in 1987.

For some, it meant a 16-mile horseback trek in freezing rain, hefting a heavy pack for miles through knee-deep snowdrifts. For still others, it meant crawling up icy rocks to reach an obscure wilderness lake high in the mountains.

And, in each instance, the object of the quest was a gallon jug of water!

The hardy souls involved were U.S. Forest Service employees, volunteers, and contractors who braved the frigid wilds as part of the Environmental Protection Agency's massive Western Lakes Survey in the fall of 1985. They were gathering information on the impact of acid deposition on lakes in 20 western states.

To get lake water samples, EPA normally uses flotation helicopters, but about half of the 752 lakes randomly selected for sampling were in National Forest areas protected by the Wilderness Act. That meant access by helicopters or any other mechanized form of transportation could be approved only if there was no other possible way of getting there.

"It was the hardest thing I've ever done," said Cheryl Taylor, a Forest Service hydrotechnician in the Gallatin National Forest in Montana, after hiking out 16 miles through knee-deep snowdrifts to take samples from a lake in the Absaroka-Beartooth Wilderness. But, like her colleagues, she'd "definitely" do it again.

Cheryl was one of many Forest Service people involved in the project after EPA and the Forest Service agreed that the Forest Service would provide ground crews to sample the remote wilderness waters. EPA sampled non-wilderness lakes and coordinated the entire wilderness lake-sampling effort. To assure compatibility of ground crew and helicopter sampling results, Forest Service Chief R. Max Peterson allowed EPA to sample 50 of the wilderness lakes by helicopter.

To reach their target lakes, Forest Service teams hiked or rode in on horseback, sampled the lake and sent runners back with samples which were picked up at the wilderness boundary and trucked to airports for air delivery to field laboratories for analysis.

"We were shooting to get the sample

(Chojnacky is Current Information Officer for the Intermountain Region of the U.S. Forest Service.)

Wearing dry suits and life vests, two Forest Service team members inflate the raft that will carry them to the deepest part of this lake in the Shoshone National Forest, where they will collect water samples. A third team member, right, assists them.

from the lake to the lab in 4 hours," said Pete Stender, Regional Hydrologist for the Forest Service's Intermountain Region. If it took much longer, he said, a sample's chemical composition might change. Stender headed the Utah, western Wyoming and southern Montana portion of the wilderness lake survey. His area included vast tracts such as the High Uinta Wilderness in Utah and the Bridger Wilderness in Wyoming where lakes are many miles into the backcountry. In some rugged areas, the lakes chosen for sampling were in trailless basins surrounded by sheer cliffs. In the Cloud Peak Wilderness in Wyoming, for instance, the Forest Service contracted with a mountain climbing group to get to some of the lakes.

In each instance, the object of the quest was a gallon jug of water!

Teams usually included two samplers—someone who knew the area, and either a hydrologist or fisheries biologist—along with a horse wrangler and the runners. If the team had to hike in, more helpers, dubbed "sherpas" after the famed Himalayan mountain climbing "porters," packed in 152 pounds of sampling equipment, 40-pound rubber rafts, "dry suits" (worn to keep from getting wet), and personal gear.

Samplers had to take a raft to the middle of each lake, find the deepest part (using a line with a weight on it), and take samples from a depth of five feet. Once collected, the water sample was transferred to a plastic container. In addition, two small amounts of the sample water—one for testing pH and one to test for dissolved inorganic carbon content—were drawn from the sample by syringe and put in separate containers. This method prevented contamination from contact with the atmosphere. The samples were transported in coolers loaded with frozen gel packs to keep them cool.

The timing was critical. "We had to sample when each lake was isothermal—when it had a uniform temperature—so we could get a thoroughly mixed sample," Stender explains. High mountain lakes are warmer near the surface in the summer but in the fall they "turn" as surface water cools and begins to sink until the lake is one temperature top to bottom. Samples had to be taken after turnover but before freeze-over.

An EPA contractor determined that the correct "sampling window" for the mountainous areas was a week-long period, except for the weather.

Winter came early last year, freezing many lakes in the Rockies and the Sierra Nevada and sending snowstorms whipping through Montana, Wyoming, and Utah. "We hit snow conditions in every place," Stender recalls. "The weather was just terrible."

Bob Hurley, Ashley National Forest fisheries biologist, rode horseback 18 miles in the rain his first day into the High Uintas Wilderness area. The rain turned to snow at night. After sampling six Uinta lakes, Hurley and three other Ashley employees went to the Wind River Range in the Bridger Wilderness in Wyoming and promptly hit another snowstorm. "It was so cold on the lake that when we'd take a sample out of the bottle, the last couple of drops would immediately freeze," Hurley remembers. His raft blew up just before he sampled his last lake. "But only one of the three compartments was ruined. We had our dry suits and life preservers so we went out on the lake anyway."

On the eastern side of the Wind Rivers, one crew had to slide rafts out onto the thin ice of a just-frozen lake, walking alongside, ready to jump in if the ice broke. In contrast, on an unfrozen lake, another crew encountered waves up to three feet high with a force which broke paddles. "It was an ocean experience," Skip Shoutis of the Shoshone National Forest told a Wyoming newspaper reporter. "We thought the ice was much more fun."

"A lot of people were tested to the limits of their endurance. But they went in there and did it." —Pete Stender.

The teams faced still other hazards. One horse rider carrying a sample out of the Wind Rivers encountered a bear at a creek crossing and lost half the water when his horse spooked. And in the Selway-Bitterroot Wilderness in Montana, a supply packer enroute to a sampling crew was knocked out when a moose disrupted his string of horses.

Thirteen lakes were either frozen or inaccessible in his subregion, but Stender notes that the wilderness crews still were able to give EPA a reasonable sample.

As an extra by-product, participation in the study gave national forest officials important information on how they organize and communicate.

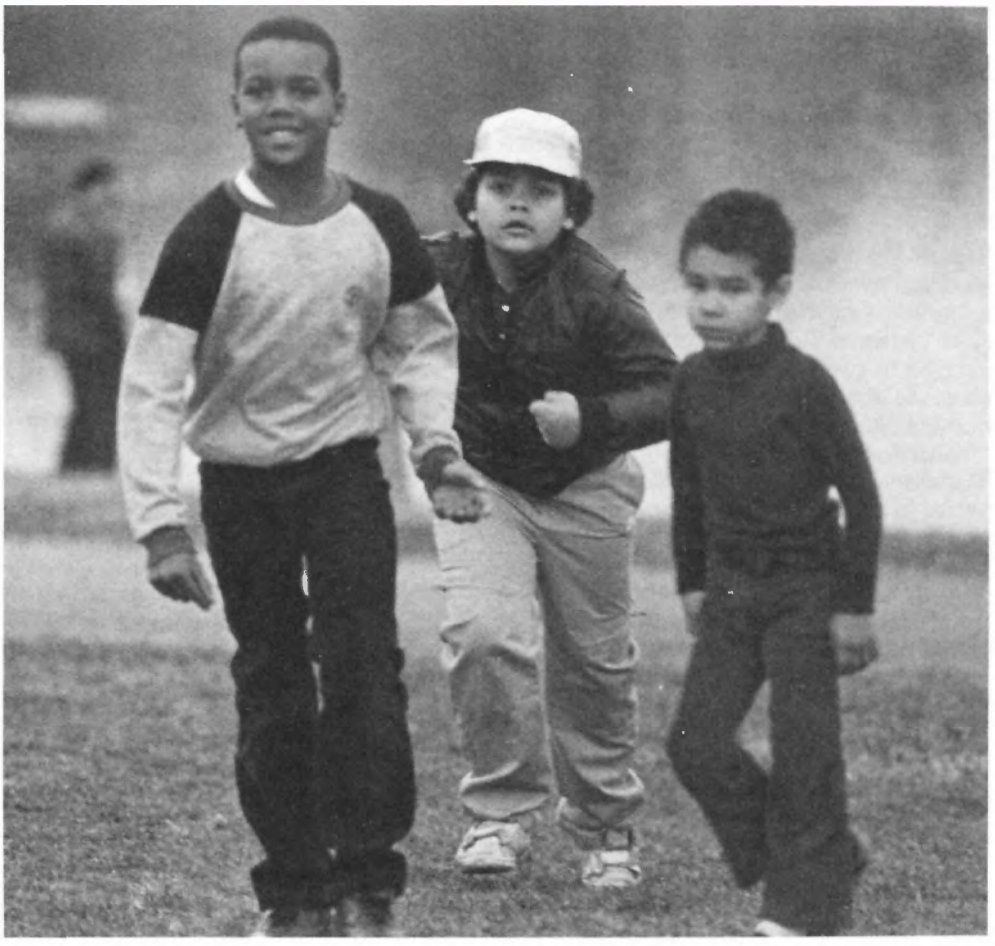
"A lot of people were tested to the limits of their endurance. But they went in there and did it," Stender said. "I look at the spinoff benefits as probably just as valuable as that jug of water. And it was great for morale." □

Communicating Risk To a Concerned Public

by Milton Russell

EPA's decision to reduce lead in gasoline will help protect hundreds of thousands of children from risks of lead poisoning. Yet the American public barely took notice of the significant decision.

(Earlier this year, Milton Russell, EPA Assistant Administrator for Policy, Planning and Evaluation, spoke to network news directors and reporters at the Columbia School of Journalism on Reporting of Health Risk Information by Television. *The following article is adapted from that speech.)*



Steve Delaney

Risk communication is the most important problem in environmental protection this country faces.

Real people are suffering and dying because they don't know when to worry and when to calm down. They don't know when to demand action to reduce risk and when to relax because risks are trivial or even nonexistent.

The nation is operating on worry overload. Some people react with free-floating anxiety; others, with defensive indifference. Why bother to wear seatbelts, reduce indoor radon, or stop smoking if everything causes cancer anyway?

But anxiety and stress can themselves be public health hazards. And worry focused on phantom or insignificant risks can divert attention, money, and effort from real risks that *can* be reduced.

The key is to pick the right worries and the right actions. Unfortunately, when it comes to health and the environment, we don't do that very well. The government and media together have failed to communicate clearly what is a risk and what is not a risk.

Categories of risk include non-fixable risks that can never be substantially reduced, such as cancer-causing sunlight or cosmic radiation and fixable risks, some big and some small. More of these fixable risks exist that can ever be successfully attacked, so choices must be made.

When it comes to risk reduction, the outcome should be to get the most reduction possible, taking into account that people fear some risks more than others. This means we should concentrate on the big fixable targets, and leave the others until later or, if necessary, until never.

Risk communication comes into play because citizens ultimately determine which risks government agencies attack. They do this through the statutes and budgets their elected representatives pass, and they do it through public opinion. If citizens misjudge risk, their orders still come through, and the government machine still delivers, but the results don't necessarily leave people better off.

Let's imagine risk reduction as a consumer-driven production and distribution process. Scientists, who assess the severity of risks, are the manufacturers. Government regulators, who make risk management decisions, are the wholesalers. And professional communicators—network and newspaper journalists—are the retailers.

We government regulatory wholesalers use risk characterizations from the scientists to explain the reasons for our decisions. Then journalistic retailers pick up our product on the loading dock. Working

against deadlines, striving to explain complicated issues, seeking to capture an audience, they present the news of the day. Based on those presentations, consumers of the news decide to buy the news or not, use it or misuse it, and change their behavior or demand that public officials change theirs.

There is sometimes an alarming disjoint between the actual risk information on which we act, and the perceptions of risk that are fed back to us by citizens. Take, for example, public reaction to two recent environmental issues: lead in gasoline and at-sea incineration.

To EPA, lead in gasoline posed very big risks—risks of learning disabilities, mental retardation, and worse—to hundreds of thousands of children. I rank EPA's decision to reduce lead in gasoline as the most significant protective action the agency has taken during my tenure here. But the public reacted to the issue with virtual indifference.

On the other hand, citizens threatened to lie down bodily in front of trucks and blockade harbors to stop EPA's proposal to allow final testing of incineration-at-sea technology. This reaction occurred despite every indication that the risk involved was small, and that the technology might replace more risky alternatives now in use.

Why such imbalance?

Ironically, part of the reason is because the people involved in communicating information did their jobs too well. They accomplished their objectives. Unfortunately, their objectives didn't include effective communication of risk.

The professionals at EPA—the manufacturers and wholesalers—insist on being precise in the statements they deliver. Their job is to present a scientifically defensible product, so they add qualifiers and use scientific terms. Then the journalists who retail the statements to the public have to translate them to make them understandable. The journalists also have to restructure the statements so they will be short, so they will sell, compete with other messages for air time, and win the attention of viewers.

The result? A misunderstanding of actual risk.

Public attention often doesn't have much to do with level of risk.

Let's put the problem in focus. Here is one paragraph from a recent EPA news release, with the chemical names changed.

> *The draft notice of intent to cancel action is based on lifetime animal feeding studies which showed that dinitrochickenwire caused carcinogenic effects in mice and rats. This pesticide also metabolizes or breaks down into 1,1-dimethyl double death (UDDD) in the presence of water and acid pH levels. UDDD also has been shown to be carcinogenic in animals. Residues of both dinitrochickenwire and UDDD are found in raw agricultural commodities and processed food.*

How would a journalist translate this for readers or viewers? Probably something like this:

> *EPA announced today that it is about to pull yet another cancer-causing pesticide off the market. The pesticide is now found in pears, avocados, and kiwi fruit.*

On TV, if time allowed, the picture would probably then cut to a grocery fruit bin, with a voiceover from an "expert." Depending on what side of the issue the expert was on, he or she might contend either that "EPA was derelict in not acting sooner," or that "EPA was destroying American agriculture." There would almost certainly be no time for evaluating the qualifications or special interests motivating that spokesperson.

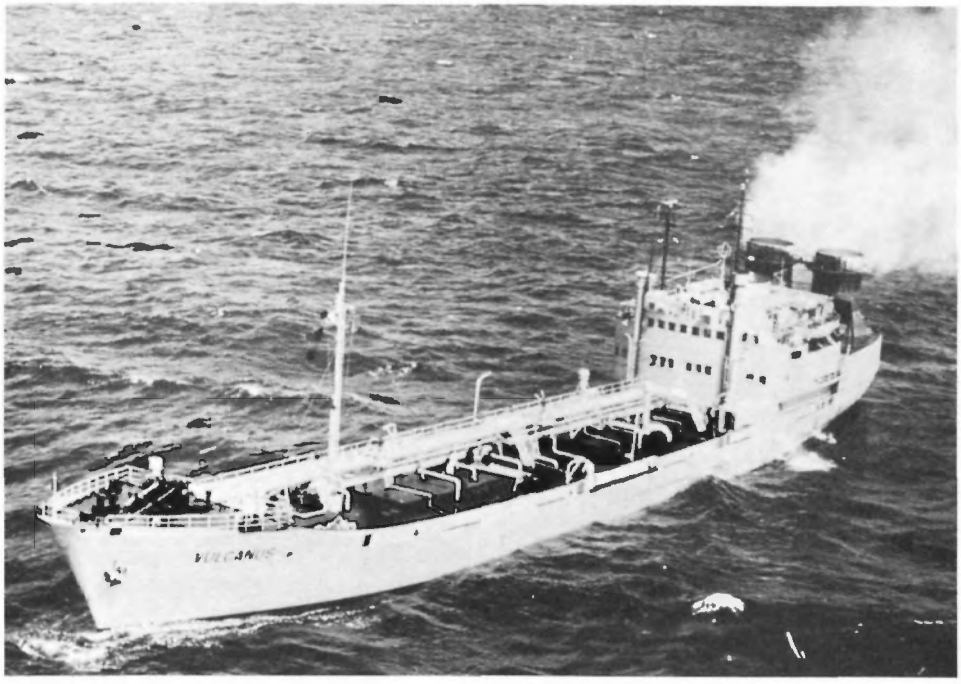
Whatever viewers take away from the program, it won't be an understanding of the uncertainties of the science, nor of the fact that EPA errs on the side of protection. Nor will they understand that the risks are chronic, not acute, with the EPA decision based on extrapolating a lifetime of exposure. They certainly won't have any sense of how much this pesticide, *if* it causes cancer, adds to the 450,000 cancer deaths that already occur each year. And they won't know that eliminating to the point of detection all such man-made chemicals in the environment would have little impact on that total.

In short, they won't take away any sense of perspective, whether to worry or whether to calm down. And they won't take away any sense of confidence that the message is reliable, that it is honest and based on the best judgment science can offer.

When citizens understand a risk, and the cost of reducing it, they can determine for themselves if control actions are too lax, too stringent, or, like Baby Bear's porridge, "just right." But too often such understanding remains out of reach. Three examples illustrate this point: EDB, indoor radon, and uranium mill tailings.

EDB should have been a *good* news story. A pesticide in use for 30 years was found to present a chronic risk; the risk was removed; and people were safer.

Instead, EDB was a disaster story. The media featured pictures of muffin mix with skull and crossbones superimposed. State after state started pulling food off the shelves, in some cases sending out squad cars to do the job.



Burning hazardous wastes on incineration ships at sea is a controversial issue involving the question of how to communicate actual risk.

Agency scientists were saying, essentially, "EDB isn't good for you, but it's not an acute threat either." But the country, getting the message about EDB risk from news reports, panicked. Perspective came finally when one credible voice, Bill Ruckelshaus, went on national TV and told people why, in understandable terms, they should calm down.

In this case, EPA did its own retailing—and had the communicator who could do the job. But, until that happened, much anxiety and economic loss was suffered unnecessarily.

As for radon, three facts tell the essence of the story:

- A reasonable estimate of annual deaths caused by naturally occurring radon in homes is 5,000 to 20,000 per year; some estimates go as high as 30,000.
- Some homes show estimated risks as high as would be posed by smoking over 100 packs of cigarettes a day.
- Calculated risks from spending less than an hour in some radon-contaminated homes is equivalent to that of a *lifetime* of exposure to citizens most at risk from PCB incineration at sea.

People panicked over EDB. They dread at-sea incineration. Yet, the story of indoor radon, which potentially presents much graver risks, plays very differently. Public attention often doesn't have much to do with level of risk.

The story of uranium mill tailings makes a similar point. EPA risk assessments show that, due to escaping radon, uncovered mill tailings piles will cause about 600 cancer cases *per century*, or about six per year. EPA promulgated regulations that required covering the piles with about eight feet of earth to reduce risk by about 95 percent, or to one case of cancer every three years. Estimated cost of implementing the regulation was $390 million.

Environmental group reaction was intense. EPA was severely attacked for not requiring seven more feet of dirt, at an additional cost of $180 million, to reduce the risk to one case of cancer every 30 years.

We at EPA need to speak more clearly, and journalists need to listen more critically.

To put the issue in perspective, remember that indoor radon causes 5,000 to 20,000 deaths a year, and uncovered uranium mill tailings piles cause six deaths a year.

These cases demonstrate to me that the risk message is not getting through to people who need to know when to demand action and when to calm down. The answer is not to communicate *more* information, but *more pertinent* information.

We at EPA need to differentiate the risk information we distribute to our two major consumers: the scientific community and the public. Talking among ourselves, to other scientists, and to professionals who use and monitor our work, we speak in scientific niceties, complete with caveats and uncertainties. Unfortunately we use the same words to communicate through the press to the public.

Journalists don't need those words. Instead, they need three pieces of information that rarely come through clearly: How big is the risk? What is being done about it? What will it cost? This is the kind of information that would enable citizens to put risks in proper perspective, to judge whether that extra seven feet of dirt makes sense or not.

To make matters worse, our statements often have no sense of history. We fail to convey that, while today's risk may be important, yesterday's risk may be more important, and may still need sustained media and public interest. The result is the Chemical of the Week Syndrome, where the immediate drives out the important.

It needn't be this way. We at EPA need to speak more clearly, and journalists need to listen more critically, so they can evaluate and transmit the significance of the message.

Stories about risk should be no different from others on which daily news judgments are made. I recognize that every risk story that comes across the desk is going to be carrying emotional flag words like "cancer" or "birth defects." Nevertheless, I still believe it is possible for the media to weigh and deliver information on environmental and health risks as they do on other stories.

Suppose, in the competition for viewers, the sentence that puts the risk in perspective also puts the story off the air? Perhaps this is as it should be—if, when properly understood, the risk doesn't deserve attention.

If EPA does its job of providing pertinent information to the press, the press can make the same kinds of news judgments that it makes in other areas. In fact, this is the responsibility the press has to society, and the long term credibility of newspapers and networks depends on this responsibility being well carried out. □

Taking Steps To Control Wood Stove Pollution

by Roy Popkin

The picturesque chimney smoke that rises from millions of wood stoves and fireplace inserts in American homes has become an environmental health threat akin to pollution from industrial smokestacks.

New EPA regulations, to be proposed early in 1987, are designed to sharply reduce the emission of pollutants from wood stoves used for heating and cooking in private homes. Although the new regulations will apply only to units manufactured after July 1, 1988, or sold after July 1, 1990, it is hoped that over the next 15 years the 800,000 new wood stoves sold each year will gradually replace most of the 12 million older, dirtier models now in use.

Prior to the mid-1970s, wood stove-generated smoke pollution was not considered a serious problem in the United States. At the beginning of that decade, perhaps two percent of American homes burned wood as a primary heat source. But the sharp increase in fuel prices led to widespread interest in alternative heating sources such as wood, especially in parts of the country where wood was cheap and plentiful. By 1980, wood stove sales reached two million a year, and the number in use is growing by hundreds of thousands annually.

By 1980, wood stove sales reached two million a year.

While use of the "old fashioned" devices provided relatively inexpensive heat, in some parts of the country—notably heavily wooded areas of New England, the Rockies, the Southwest, and the Northwest—they soon became a major source of pollutants and drew the concern of environmentalists and governmental agencies.

The three main air pollutants generated by wood stoves are particulate matter or "total suspended particulates" (TSP), carbon monoxide (CO), and polycyclic organic matter (POM), which are unburnt residues containing carcinogenic substances. EPA monitors national emissions of TSP and CO because they are two of the six criteria pollutants for which EPA has set National Ambient Air Quality Standards. The Agency estimates that wood-burning stoves and fireplace inserts produce over 15 percent of the particulates and as much 40 percent of the potentially cancer-causing POMs nationwide.

The wood heaters now in use account for about 2.5 million megagrams (about 2.75 million tons) of particulate matter annually. "Airtight" wood heaters also account for most of the POM emissions from stationary sources. Without regulations, EPA experts estimate that particulate emissions would increase at a rate of about 121,000 tons annually, but under the proposed rules would increase by only 31,000 tons per year.

As concern about wood stove air pollution grew, Oregon and Colorado developed regulations for new wood stoves. A number of communities either banned wood heaters or put limitations on their use. Other states such as Maine, Vermont, Massachusetts, and Washington are considering legislative actions.

In August 1985, after considering the problem of pollution from wood stoves for about a year, the Agency announced its intention to propose national New Source Performance Standards (NSPS) for wood stoves. Two articles which had appeared side by side in the April 1985, edition of *EPA Journal* began to seem prophetic. One, by Tom Super of the EPA Office of Air and Radiation, told of the growing concern about wood stove-related air pollution. The next article, by EPA management consultant Cynthia Croce, told of the Agency's experiments with negotiated rulemaking, a process which, she wrote, "brings the parties together to air their concerns and resolve conflicts in face-to-face negotiations before the proposed rules are published. The desired end-product is consensus on all key issues." Super's article pointed to the problem; Croce's, to a method of resolution which, subsequently, was applied to that problem.

After EPA published its intention to develop the rules, pressures from manufacturers on one side and environmentalists on the other made it appear that a negotiated regulation process was the way to go. After consulting with individuals and groups that would be affected by the standard, a "reg neg" committee was established under the Federal Advisory Committee Act to work out agreed-upon standards. The committee included representatives of EPA, state agencies, manufacturers of wood stoves, environmental and consumer groups, catalyst manufacturers, and testing laboratories. The committee met for six two-day sessions starting in March 1986. Differing viewpoints and concerns that might otherwise have been argued in the news media or protracted lawsuits were hashed out across the table and fashioned into an agreement by the committee at its final meeting on August 21.

Commenting on the process in an interview with the *Washington Post*, David Doniger, senior attorney for the Natural Resources Defense Council, said the Council agreed to forgo some provisions it favored in the interest of time. "By agreeing on a standard two years ahead of schedule, we will include over one and a half million stoves sold during that period that otherwise would not have been covered," he said.

Wood N Energy

A store display of wood stoves. New EPA regulations will propose sharp cuts in emissions from wood stoves manufactured after 1988.

The proposed regulations apply only to new, not existing, wood heaters, but gradual replacement of those now in use will eventually reduce the amount of air pollution emitted by wood stoves, EPA believes. Although the rules set emission limits only for particulate matter, the required catalytic converters or secondary combustion chambers also reduce the amount of carbon monixide, POM, and other pollutants found in wood smoke.

The proposed standards control particulate emissions from wood heaters manufactured after July 1, 1988, or sold after July 1, 1990. Stricter limits will be in force on July 1, 1990, for heaters manufactered after that date or sold after July 1, 1992. Small manufacturers producing less than 2000 heaters a year will have an extra year in which to comply with the first phase standard. The standard applies to virtually all kinds of "airtight" wood stoves or fireplace inserts made for home use. It does not apply to open fireplaces, boilers, and furnaces, nor does it include wood-burning industrial equipment.

Units now in use release about 30-35 grams of particulates each hour, depending on their efficiency and how their owners operate and maintain them. The new regulations would require reducing the emissions to 5.5 grams per hour for catalytic burners and 8.5 per hour for noncatalytic ones manufactured after July 1, 1988, and 4.1 and 7.5 grams per hour, respectively, beginning July 1, 1990. Although the stoves with catalytic converters will initially emit less pollution, emissions will increase over time due to the catalyst wearing out. Catalysts must be replaced periodically to maintain high efficiency and low pollution.

"The new rules will reduce air pollutants from wood stoves significantly and should result in net savings to consumers."—J. Craig Potter.

When implemented, the standard would require a certification program under which the manufacturer submits a sample heater to an EPA-accredited laboratory for testing. Model lines which have been certified by the Oregon Department of Environmental Quality and which meet minimal burn rate requirements may be certified by EPA (for the 1988 standard) without further testing.

Certification records would be reflected in labels on all new wood heaters offered for sale, and would be used by enforcement personnel to determine compliance status. Purchasers would use temporary labels to make comparisons in emissions and efficiency, and to compare heat output in much the same manner as home appliance buyers can now compare labels indicating the items' energy consumption. Further, quality assurance programs would be required of manufacturers, and retailers would be required to keep records of the names and addresses of individual purchasers.

EPA estimates that the new stoves and fireplace inserts will cost $100-$250 more than conventional stoves. It will cost about $75 to replace the catalytic combustors (honeycombed ceramic chambers containing the catalyst). These combustors will have to be replaced about every 10,000 operating hours.

According to EPA Assistant Administrator for Air and Radiation J. Craig Potter, "The new rules will reduce air pollutants from wood stoves significantly and should result in net savings to consumers." Because of the clean burning of the new units, this savings should be realized over the life of the device if it is properly maintained and operated. In fact, most methods of controlling wood stove emissions save money for the owners. Less wood is burned for the same amount of heat. Less creosote builds up in the chimneys. This means less frequent chimney cleaning and could mean fewer chimney fires. To help assure savings and cleaner air, EPA plans to promote the proper use of the heaters.

When the prospective savings for wood stove owners are added to the potential savings in environmental and health costs, the net social savings have been estimated as high as $29 million dollars annually. □

Update

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

HAZARDOUS WASTE

Waste Reduction

EPA said that a survey of 22 industrial processes indicates that industry has the potential to reduce the amount of hazardous waste it currently produces by one-third or more.

J. Winston Porter, EPA's Assistant Administrator for Solid Waste and Emergency Response, said, "EPA found that industry has significant potential to reduce public health and environmental risks by minimizing its hazardous waste production." He further stated that "as a result, EPA will encourage industry to find ways to reduce both the volume and toxicity of its waste . . . "

The Agency also said in its report to Congress that it would develop the first national data base on hazardous waste reduction techniques and that it would also provide technical assistance to help companies achieve waste reductions.

PESTICIDES

Ban on Dinoseb

Administrator Lee M. Thomas has ordered the immediate emergency suspension of all uses of the pesticide dinoseb because of the risks posed by exposure from field application.

The Agency estimates that as much as 25 percent of the total annual usage of dinoseb would occur during field applications. As many as 25,400 workers (including 1,300 females) could be occupationally exposed to dinoseb during this period. Approximately 45,000 workers are exposed throughout the entire year.

Administrator Thomas stated that "exposure to dinoseb during or shortly after field applicaton poses a very serious risk of birth defects to the unborn children of pregnant women, particularly if exposed during the early stages of the pregnancy." Thomas also stated that "dinoseb exposure from field application may also pose a risk of sterility for male workers."

Restrictions on Dinocap

The agency has proposed numerous restrictions on the continued use of the pesticide dinocap in order to reduce the health risks to workers who mix, load, and apply this product.

EPA began a special review of dinocap in January 1985 based on laboratory tests that showed that the pesticide causes birth defects in rabbits.

Some of the proposed restrictions include requiring enclosed cabs for applicators using ground boom, air blast, and mist blower equipment; and requiring applicators, mixers, and loaders to wear long-sleeved shirts and long pants; in addition, mixer/loaders must wear chemical resistant gloves, and applicators must wear chemical resistant gloves when exiting the cab and working on the equipment.

WATER

New Wetlands Office

Stressing the importance of saving the natural resource of wetlands, EPA Administrator Lee M. Thomas announced the creation of a new Office of Wetlands Protection in the Office of Water. The wetlands program had been administered by a division in the Office of Federal Activities, under EPA's Assistant Administrator for External Affairs. Thomas stated that elevating the program from division to separate office status will "result in enhanced attention to wetlands matters. The program will benefit from the technical expertise and strong enforcement capabilities of marine, estuarine and ground-water protection programs ongoing in the Office of Water."

Wastewater Treatment Plants

Administrator Lee M. Thomas honored six wastewater treatment plants in cities throughout the U.S. with outstanding performance awards.

The awards were given to six cities whose wastewater treatment facilities were outstanding in 1985 in operations and maintenance, compliance with government pollution standards, and commitment to clean water.

Thomas stated, "what sets these six operations apart is their 'do-it-yourself' attitude. In many cases, these operators and their staffs have gone beyond their normal duties to adopt innovative practices, fix old equipment, and get approval for needed facilities."

This is the first year that awards were presented. EPA plans to make this an annual event.

The following cities received awards:

Kokomo, Indiana
Statesboro, Georgia
Spearfish, South Dakota
Albuquerque, New Mexico
East Providence, Rhode Island
Hebron, Nebraska □

Appointments

Robert S. Cahill has been appointed to the position of Associate Administrator for Regional Operations.

He previously served in that position in an acting capacity; prior to that he was a special assistant in EPA's Office of the Administrator/Deputy Administrator. Prior to EPA service, he was an assistant to William D. Ruckelshaus and to the vice president for public affairs at the Weyerhaeuser Co. in Takoma, Washington.

He received his B.S in civil engineering in 1972 and his MBA in 1975 from the University of Washington.

Richard E. Sanderson has been named Director of EPA's Office of Federal Activities.

He has previously served as Associate Assistant Administrator, Acting Assistant Administrator, and Deputy Assistant Administrator in EPA's Office of External Affairs. Sanderson brings with him a wide range of government experience. He has served at the Federal Emergency Management Agency, the Department of Housing and Urban Development, the Executive Office of the President, the Philadelphia regional office of Emergency Preparedness, the Philadelphia regional office of Economic Opportunity, and the Headquarters Ground Electronic Engineering Installation of the U.S. Air Force.

He received his bachelor's degree from Harvard in 1958.

Steve Delaney

Along a country road, Maryland, 1981.

Back Cover: At home on the water.
Photo by Ron Colbroth, Folio, Inc.

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