DESERET NEWS

133rd YEAR — NO. 100 68 PAGES SALT LAKE CITY, UTAH 25 CENTS FRIDAY, OCTOBER 8, 1982

# Freeze urged on sewage plant projects

By Robert D. Mullins
Deseret News staff writer

A critic of plans to spend $250 million to $275 million on new sewage treatment plants says the public should demand a freeze on those plants.

Peter Maier, an engineer with Westech Engineering Inc., 1931 S. Eleventh East, said a freeze should be imposed now on any further planning. Such a freeze would give the scientific community enough time to study the decisions already made.

Maier said the "basic crunch is that the people are walking away from this dispute, because they don't have enough information."

The plans for building these new sewage plants are not based on scientific data, he said.

Maier has criticized the plans that have been offered for constructing the new South Valley Water Reclamation Facility and the Central Valley Water Reclamation plant and the expansion of the Salt Lake City sewage treatment plant.

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The combined cost of the three is estimated at $250 million to $275 million. Those costs reflect the money needed to keep up with current growth.

Statewide, the costs over the next 20 years for sewage and waste disposal could reach as much as $700 million, according to estimates from the governor's office.

Maier has been critical over the past several months of the methods of building the plants and of some site selections.

His suggestions for changing plans that have already been made by respected engineering firms have been denied.

Refusing to follow his suggestions has dismayed but not deterred the volatile Maier, who has been involved in building sewage treatment plants all over the world.

He said plans for either building or remodeling treatment plants in the Salt Lake valley are too expensive, and are based on unscientific conclusions.

Two new plants are proposed for the Salt Lake valley — the South Valley Water Reclamation plant near Midvale and the Central Valley Water Reclamation plant near the old Vitro uranium mining plant — and the expansion and remodeling of the Salt Lake City sewage treatment facility near Redwood Road and 17th North is planned.

Maier's main criticism of the current plans for all three construction jobs is that complete data on how the current treatment plants are operating is not available.

He said, "Nobody knows for certain just how well these plants are operating."

Maier asked Dr. James O. Mason, state health director, in a letter May 26, "how can the Environmental Protection Agency of the state enforce any antipollution legislation if its test procedures are scientifically incorrect and if the same regulations potentially are creating a public health hazard."

He told Mason that he (Maier) is aware that many professional engineers don't appreciate his efforts to get the plans changed. He said, "I realize that the majority of the public do not understand the issues involved and that those who do understand them do not appreciate my efforts."

He said he will continue to speak on these issues.

Officials responsible for the decisions to go ahead with current proposals have told Maier it is too late to change the plans.

Any change of plans or site locations or of construction concepts would require the return of millions of EPA planning money, and the cities involved cannot return the money, officials said.

# Don't delay sewage plants

One thing the Salt Lake Valley can't afford is any delay in building new sewage treatment plants. The system already is overloaded.

Yet that is exactly what one critic suggested last week. He wants a construction freeze while experts iron out "scientifically incorrect test procedures" used to measure sewage plant effectiveness.

Peter Maier, an engineer who has worked on many sewage plant projects, said the public should demand a halt to treatment plant construction until all the answers are in.

Maier's objections fall in two areas. First, he thinks the $250 million to $275 million cost for new sewage facilities is too high, exceeding the average cost for such facilities according to an Environmental Protection Agency study.

His second objection deals with the effectiveness of existing treatment plants. He claims nobody knows how well the valley's sewage plants are operating because the proper technical data to evaluate their performance is lacking.

Maier doesn't want to see government rush into expensive projects while such information is missing.

Some of his concerns may be valid, but it's hard to see how the area would benefit by construction delays when all but one of the valley's sewage plants are running at capacity or beyond — and growth continues.

The lead time necessary to bring new sewage facilities into service, even by moving as quickly as possible, is several years.

Take Salt Lake City as an example. The treatment plant near Redwood Road and 17th North was built in 1963 to handle a flow of 45 million gallons per day. It is now running over capacity at 51 million gallons per day.

A plant to expand capacity to 56 million gallons is underway, but the larger capacity won't come on line until 1986. By that time, the waste flow may be at capacity again. It's like running hard to stay in the same place.

Any freeze on construction also would cost local governments the chance to take advantage of current low prices. Because of the recession, construction bids presently are running 15 to 30 percent below engineering estimates.

The technical problems raised by Maier — and about which the experts themselves disagree — can be worked on in the years it takes a new sewage plant to be studied, designed and built. But the valley can't afford to halt work altogether.

# Old Watermaster

## On Peter Maier

In a government based on checks and balances, who checks government? How is it done? In a system of majority rule, how should minority opinions be handled? In a system where government policymakers rely on expert opinions, whose expert opinions should prevail?

We have a chance to walk into a political laboratory and watch an experiment that may answer some of these questions. Impaled on a specimen pin and held up for us to see is Peter Maier—sardonic, intelligent, combative, direct. Even though Peter is an engineer, the experiment is political, not scientific. Even though Peter has run many experiments, this time it is we who are testing the nature of things. He is being observed as he affronts The System. Let's set the stage.

Peter has become a celebrity, of sorts, in the water business. A talk he gave at a recent water pollution conference packed the house. Wives of conferees, alerted by their husbands, searched meeting rooms asking, "Where is that guy-who-makes-everyone-mad going to talk?"

"Oh, you must mean Peter Maier."

"Yes that's him, where will he be speaking?"

In Utah, people who will publicly question authority are somewhat novel. Peter has used his staccato, charging style to discomfit cities, district boards, county agencies, and state bureaus. They don't always take it well. Some have banded together to spy on Peter to find out what makes him do what he does. They sought out his employer to see if he was trying to sell something. They called him in to blind interviews to ask personal questions in hopes of finding some sinister motives with which he could be dismissed. None appeared. The commercial firm Peter consults for does not stand to gain in any identifiable way from Peter's public work. He is not a berserker for environmental groups or fringe political parties, and he is a generally upstanding citizen.

Peter's crusades are largely one-man stabbings at the soft underbelly of the bureaucracy. He chiefly aims at government judgment calls on technical decisions. In a sense, he is an anchorite, reporting from his hermitage on the goings-on of the Vestry of Politics in The Cathedral of Engineering. He has left his wounds in the CUP, Salt Lake City, the South Valley Water Reclamation Facility, the Bureau of Public Water Supplies and the Salt Lake County Water Conservancy District.

Peter doesn't take cheap shots. The stabbings are frontal, relating to those decisions which leave the deciders uneasy, even after the decision. Salt Lake, said Peter, should reject a million-dollar study of their sewer system since the master flow meter was, by city admission, substantially in error.

Others have felt the blade. The CUP, according to a Maier newspaper article, is going to bring thousands of acre feet of water in to an already flood-torn area. In meetings with the board of the South Valley Water Reclamation Facility, Maier charged the design engineers with using much more costly foundations than necessary for the new sewage plant.

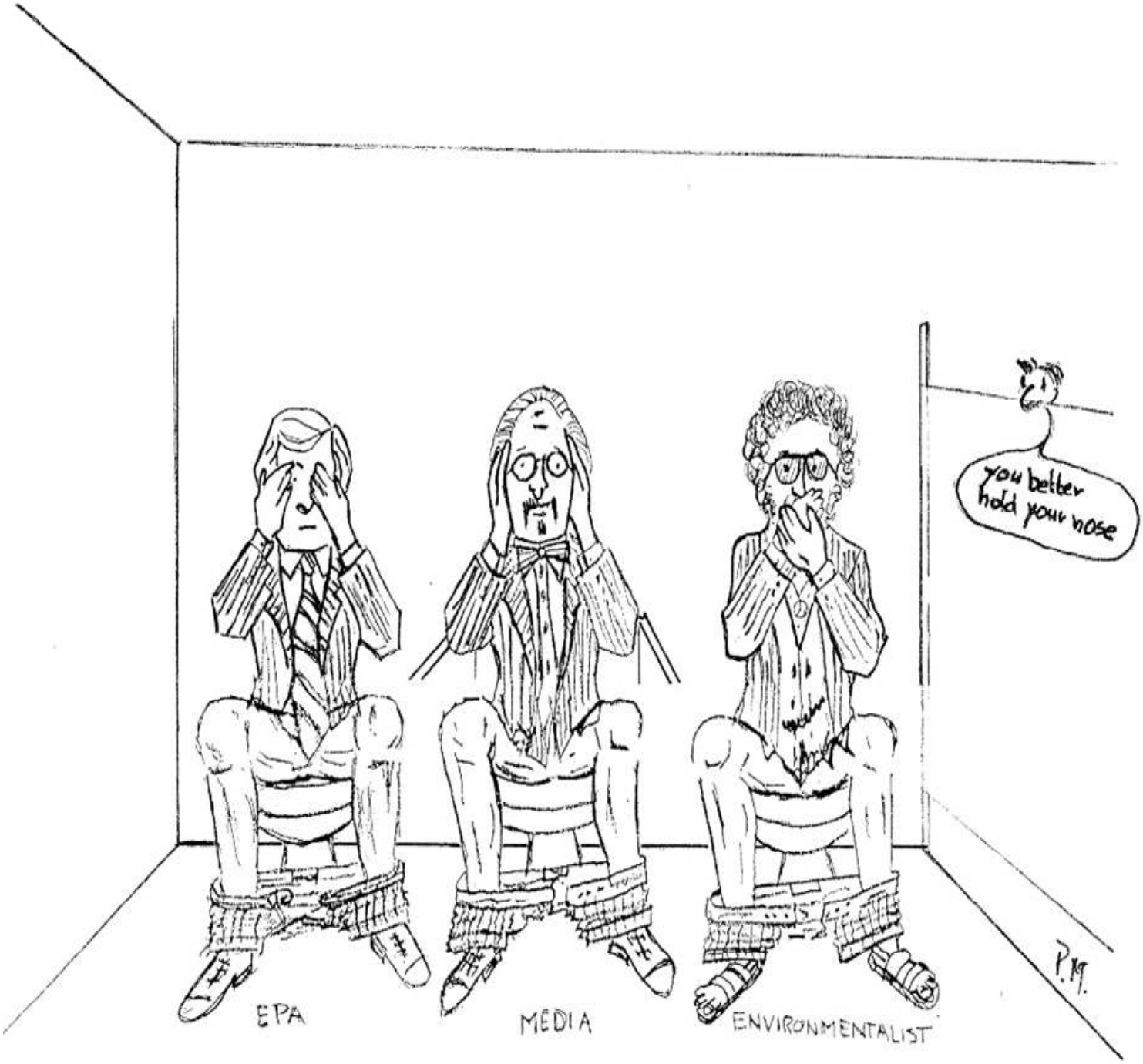
In a letter to the governor, Maier charged that the ubiquitous use of chlorine to disinfect Utah's water and sewage was creating a complex soup of chemicals, some of which may cause cancer. Maier also decried high pressure, prevalent in culinary water delivery systems, as being wasteful of water: Leaks leak faster and homeowners use more water than they intend to. He feels water officials don't care, since revenue depends on water use. Maier reflects the truth in most issues he attacks, but the greater question is whether knowledge without a commercial, governmental or public patron is legitimate in public works decisions.

Maier has answers. In didactic form he explains alternate solutions for the problems, their cost, their implementation. He is above average as an engineer, with experience outside the U.S. He doesn't care much for the government's hired experts, nor they for him. Even so, experts respect his opinion and are hard pressed to defend against his technical proposals.

In our political science experiment, we already have some results. Maier's *pro bono publico* solutions have not been adopted directly by any of the governments he has attacked. He is frustrated by this. People generally listen attentively but are slow to follow his lead. Even those who feel he is right are reluctant to ally with him. Most of the victim boards do not see him as representing opinions of a large group. They see him as selfless and public-minded, but someone who must remain politically emasculated because of the trouble he might cause.

We will all be able to watch more experiments as Peter continues his activities, but the trend is clear. Without a patron, a crusader is not going to be taken seriously in the arena of public works decisions. Peter's ideas may be fully correct, but there can be no watchdog without a master, and no hero without the oppressed.

*Old Watermaster*


you better hold your nose
EPA
MEDIA
ENVIRONMENTALIST
P.M.

*Thanks to the Clean Water Act, this environmental-industrial complex has an open door to the federal treasury.*

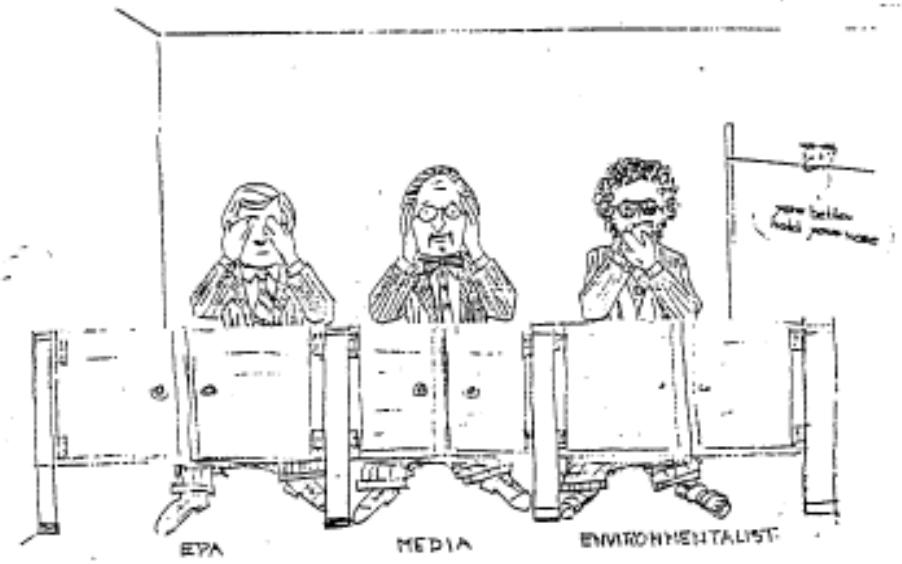
12-September 28, 1987 -- High Country News

With his attack on the BOD-5 test and the design of sewage plants, Maier broadened his critique from Salt Lake City to the national clean-water program.

Washington, D.C., water-lawyer Larry Silverman says that people at EPA headquarters tell him off the record that Maier is right, and that regulations and tests can and should be improved. But they also tell him change is impossible because, Silverman says, "It would require the re-education of an entire industry." He adds that it might also require the re-tooling of an industry that is happy with the status quo.

Salt Lake City illustrates the industry's ability to resist change. According to Silverman, "In Salt Lake City, as in most of the country, there is a sewer lobby. They have a product to sell and they sold it. There are equipment manufacturers, engineers who design it, construction companies that build it. They're all good citizens in the sense that they support the local politicians; they are well placed and highly organized."

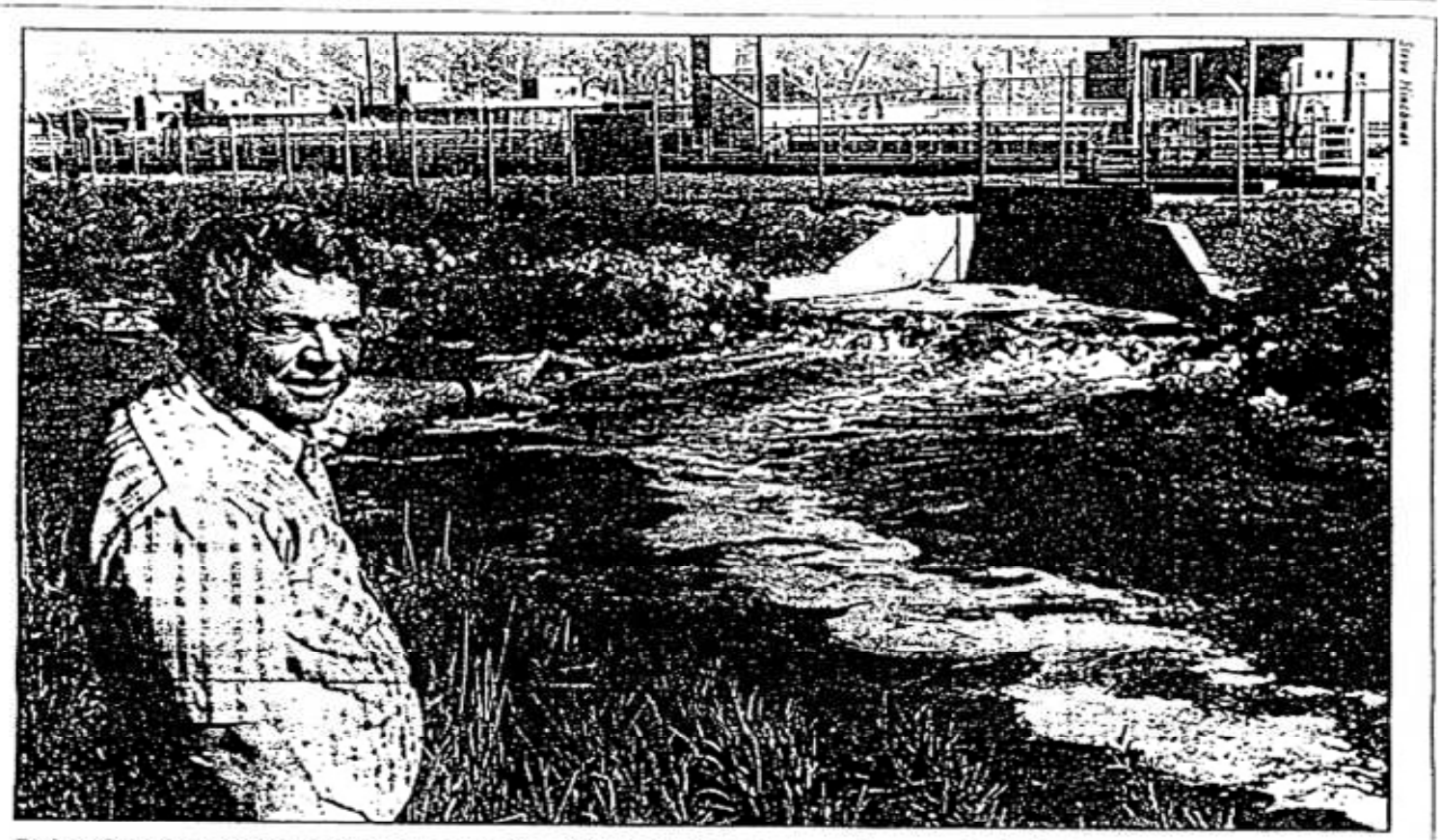
Thanks to the huge sums allocated to sewage plant construction under the Clean Water Act, this environmental-industrial complex has an open door to the federal treasury. It also has a monopoly on the knowledge needed to evaluate the projects it proposes and builds.




**The nation has thrown massive resources at the water-pollution problem since 1972, only to witness the relative failure of the regulatory and technical solutions it chose. The blame can be spread far and wide.**

# High Country News

September 28, 1987 Vol. 19 No. 18 A Paper for People who Care about the West One Dollar

Engineer Peter Maier points to an outlet where sewage from Salt Lake City's new treatment plant enters the Jordan River

## Sewage industry beats critic

# Goliath 1, David 0

by Steve Hinchman

America loves the story of David and Goliath, in which a small but righteous person takes on and slays a dangerous, powerful foe. The nation is less fond of the far more common case, in which a large foe smashes a small challenger flat.

Peter Maier, an engineer in Salt Lake City, believes he is an example of the latter. In 1980, Maier took on what he calls the engineering-construction complex in Utah. He challenged the proposed building of three large sewage treatment plants to replace an array of smaller, local plants in the greater Salt Lake City area.

The Dutch-trained expert in sewage treatment believed the new plants were not needed and would do a worse job than the existing plants. Maier made his case forcefully, charging that the plants were based on poor science and that his fellow engineers were more interested in large fees than in clean water. Even those friendly to his cause said his science was better than his politics.

Perhaps for that reason, he lost the fight. Today, two of the three plants, costing together over $180 million, are coming on line to treat the valley's sewage; the old plants are being closed.

While his fellow engineers supervise this massive public works project, Maier, at one time a top executive with Dutch and U.S. firms specializing in sewage treatment facilities, gets up four days a week at 4 a.m. to drive 85 miles into the desert to the U.S. Army's Dugway Proving Grounds. There he works as chief engineer until 5 p.m., when he begins the lengthy commute home.

Maier says it is unlikely he will ever get another job in civil engineering in Salt Lake City. It is also unlikely that he could get on at a sewage job elsewhere. That is because his criticisms of the Salt Lake projects also go to the heart of America's national program. He says the complex of regulations and sewage treatment plants spawned by the Clean Water Act is a quiet Challenger explosion.

Maier is a renegade in Utah's professional engineering society. For three years he fought the state's water establishment over its water pollution-control program -- three years of fireworks, television coverage and turbulent public meetings.

For the Utah Water Pollution Control Bureau, it was three years of challenges where they had never been challenged before, three years of explaining and justifying their program to

(Continued on page 8)

## Goliath...

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the public, three years of delays.

Maier quickly became the bane of the agency and of other officials involved in putting together the planned $300 million expansion and upgrade of the Salt Lake valley's sewage treatment system. Observers say officials were most angered by Maier's charge that the projects could be built for half the cost, if they needed to be built at all.

**Maier won a few battles. But in the end he lost the war. What may have ruined him was lack of outside support -- public, professional and political.**

Part of the problem was his rapid-fire delivery of complex technical arguments. Few who were not trained in bio-chemistry could follow his arguments at public meetings, on television or in interviews with the print media. And it seemed that those who did understand were not talking. A technical smokescreen enveloped Maier and the issues he raised.

Pete Hovingh, a biologist with the University of Utah and co-chair of the environmentalist Inter-Mountain Water Alliance, says he found it difficult to understand the issue even though it was related to his own field.

Hovingh also says, "After reading Maier, I didn't want the (1987 amendments to the) Clean Water Act to pass, and that's like being against god and motherhood as far as the environment is concerned. The Clean Water Act funds jobs and construction companies. The environmentalists don't understand it, the engineers don't understand it. All you really see is big bucks going for construction, which everybody understands."

Maier never managed to remove the technical confusion around the issue. Instead, the conflict turned nasty when he alleged nest feathering and professional malpractice. At that point, state water officials responded that they had listened to Maier's arguments, found them lacking and were tired of continuing to waste valuable staff time.

Some who followed Maier's lone struggle say he was stonewalled by the state's water establishment. Kay Henry, a talk-show host on Salt Lake radio KTKK, says officials' reaction to Maier was: "Why don't you go curl up and die."

Maier has a point of view they don't want to look at," she says. "That makes him a dangerous person. If he's right, they're wrong, and bureaucrats handling multimillion dollar budgets shouldn't be wrong."

Maier's best opportunity to prove his point hit a bureaucratic brick wall. In 1984, the Utah Governor's Science Council agreed to tackle the subject, and formed an investigative committee. Its members included the assistant director of the state Water Pollution Control Bureau, professors and others in the field.

The committee concluded that the Utah Water Pollution Control Bureau was correctly managing the sewage program. But it also recommended that for six months the bureau conduct alternative tests to the standard BOD-5 test. The BOD-5 test, a major target of Maier's criticism, is the test used to test sewage and to design plants. After the six months, the committee said, it would review the results of the additional testing.

To date, the water bureau has not conducted the requested tests.

In a 1986 meeting with the bureau, director Ken Alkema told Maier that not one staff member in the department agreed with his ideas. Lowell Palen, a sewage plant equipment contractor present at the meeting, and one of the few people in the industry in Salt Lake to support Maier, said, "I came to the conclusion after that meeting that Peter was beating a dead horse with those guys."

Other professionals were silent and Maier says that crippled him. "The people in the field say it's a political issue. I have always claimed that you cannot expect laymen to understand it; it's a professional issue."

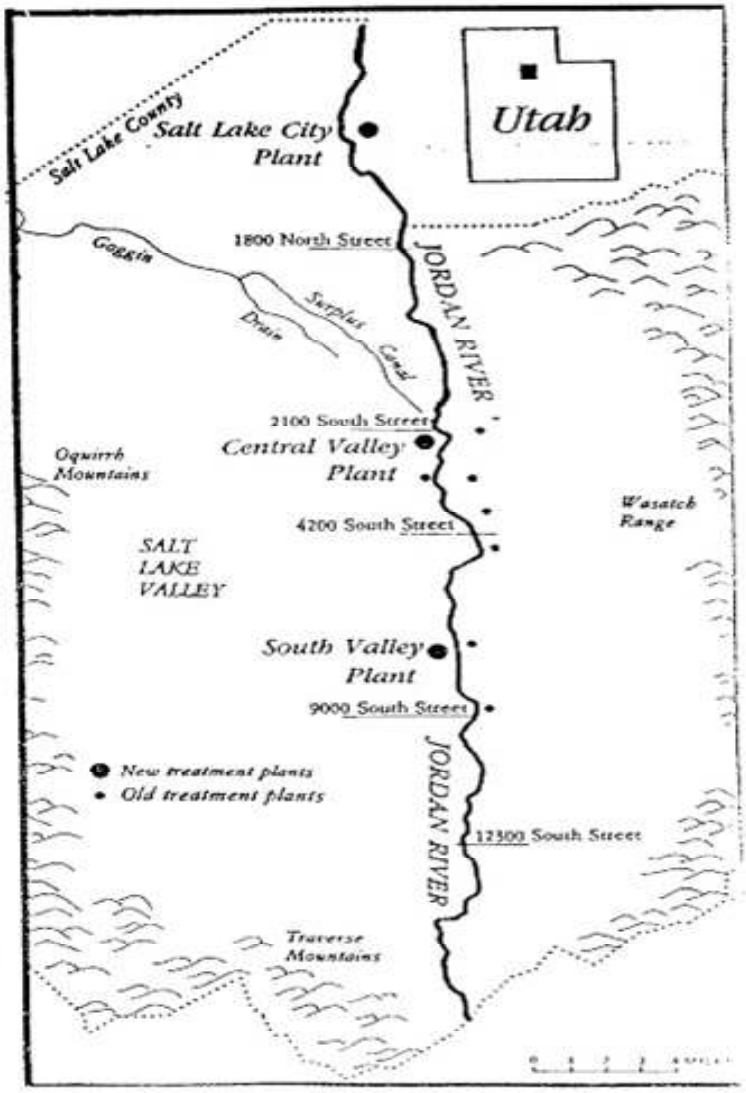
Kay Henry suggests the lack of professional support was indeed political: "The government is the name of the game in this area, in terms of who is going to get what work."

A major industry in Salt Lake City this century has been the federal government -- military, interstate public works projects, waste dumps, Indian reservations and the Clean Water Act. The other big industries, mineral extraction and oil and gas, have been on the ropes since 1982 or so.

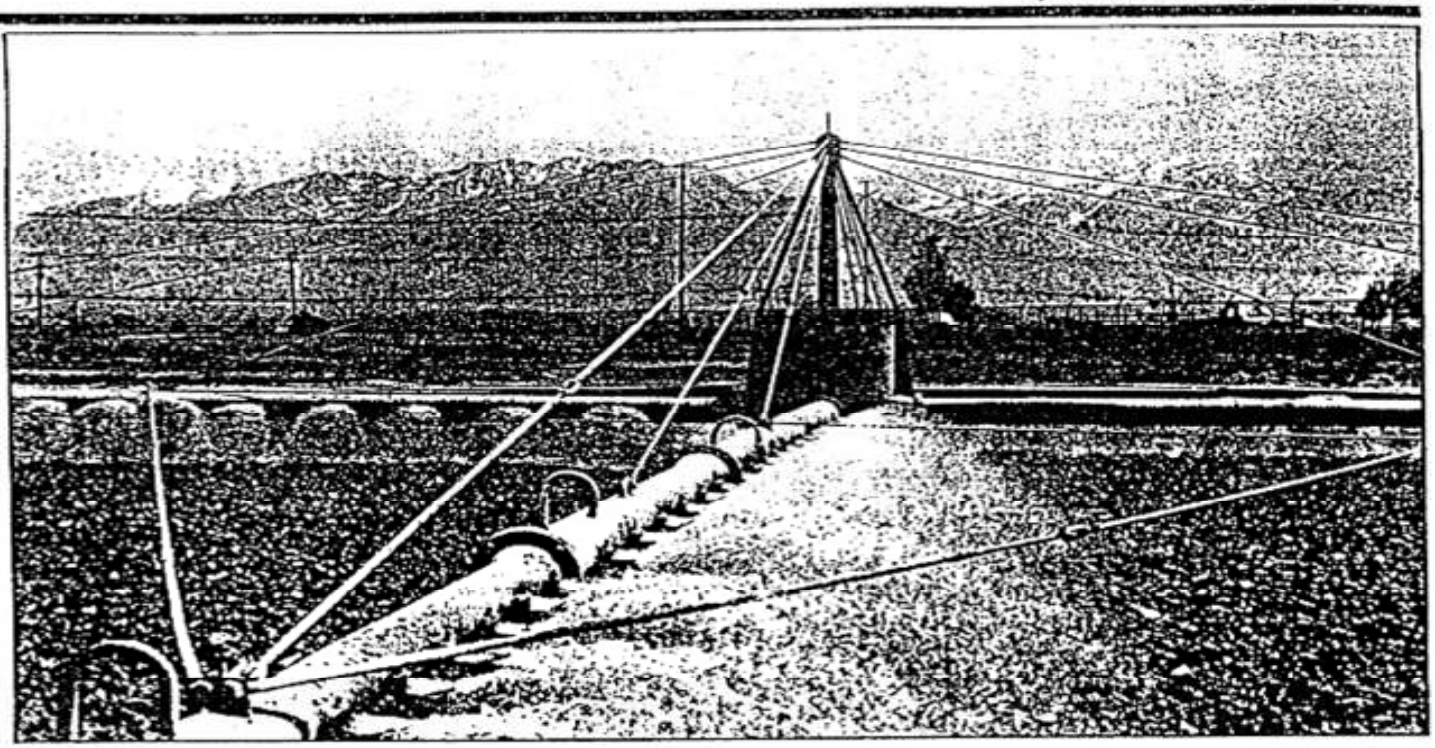
*Thanks to the Clean Water Act, this environmental-industrial complex has an open door to the federal treasury.*

The fight between Maier and the state water agency began narrowly, over the cost of the three plants planned for the Salt Lake valley. However, in the midst of the battle, Maier stumbled onto what he soon decided was a major flaw in the EPA's regulations and, he says, possibly the main cause of the Clean Water Act's failure to cleanse the nation's waters.

As he tells it, while preparing a presentation for a public hearing on the proposed plants, he discovered that the BOD-5 tests used to justify the plants give incomplete and misleading results. Maier testified in the hearing that the test is of little value to an engineer who has to design a treatment plant to clean a stream or lake. But, he said, it is the perfect test to justify building another big treatment plant.




*The Central Valley plant will be fully operational next summer, when the Salt Lake City plant upgrade is finished.*
*The South Valley plant came on line last year.*



Steve Hinchman

*One of the Salt Lake valley's old trickling filter plants, which will soon be closed down*

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That was the case in the Salt Lake area's sewage situation. Beginning in 1980, the Environmental Protection Agency, the Utah Water Pollution Control Bureau and 10 sewage districts prepared to upgrade the valley's sewage system.

Their plan called for two huge central plants outside the city to replace eight smaller, aging suburban plants. In addition, Salt Lake City planned to upgrade its existing plant, built in 1965, and then to double the city's sewage capacity by building a new plant.

The proposed expansion would have handled the waste from 2.6 million people. The current population of all Utah is now 1.5 million; the Salt Lake valley population is .7 million.

Altogether, project costs topped $300 million, with over half to come from the federal treasury. According to Don Ostler, construction grants manager for the Utah Water Pollution Control Bureau, the rest was to come from state funds, local bonds and rate hikes.

Salt Lake City's plans to upgrade its existing plant and build a new one were based on a study by CH2M Hill, a national engineering firm. Its study showed the existing plant was dangerously overloaded and would soon violate its discharge permit. The CH2M Hill study was based solely on the BOD-5 and total suspended-solids tests. It also used population growth curves that were current in the yeasty days of the 1970s.

Today, that planned $110 million project, the only one of the three ineligible for federal funds, is on indefinite hold. Although city water officials say the delay is caused by water conservation and low growth, there are indications that it was derailed when the Salt Lake City Council allowed Maier to conduct his own set of tests in 1984.

Unlike the BOD-5 tests, Maier's tests separately measured the demand for oxygen created by the two classes of waste: the carbonaceous waste and the nitrogenous waste. He found that, rather than being overloaded, the sewage flowing into the plant required only 60 percent of the plant's capacity.

That was the good news. The bad news was that sewage was not being cleaned. The plant, although underloaded, was removing only 35 percent of the pollutants.

Maier says the problem lay with the design of the plant. It had three times as much capacity as it needed to treat the carbonaceous sewage load. But it was totally incapable of removing nitrogenous wastes found in urine. The need wasn't for more sewage capacity, Maier concluded. Instead, Salt Lake City needed to upgrade the existing plant to treat the nitrogenous wastes, and eliminate the oxygen demand those wastes create.

The city proceeded with the upgrade, and cancelled plans to build the new plant one month after Maier submitted his results. Maier considers it his only victory in the war.

The two suburban plants were built with federal help. One appears to be an example of how not to build a sewage treatment plant. The other appears to be just as definitive an example of how to build a plant.

The first, the Central Valley trickling-filter plant, is one of the most expensive plants to be funded under the Clean Water Act. Costs thus far exceed $130 million, and at least $43 million more will be needed before the plant meets standards. Ostler of the state pollution bureau says the project is so expensive, construction barely goes fast enough to keep ahead of rising costs due to inflation. It is conceivable that several years from now, after $43 million more has been spent, there will still be $43 million to be spent on the yet unfinished part of the plant.

The trickling-filter approach is perhaps the most common secondary sewage treatment design. It uses wide, deep concrete tanks topped by rotating arms that spray sewage water over rock or plastic filters in the tanks. The filters are home to carbon-eating bacteria. Unfortunately, the filters seldom provide a home for nitrogen-eating bacteria. So trickling filter plants do well with carbon wastes and poorly with nitrogen wastes.

The Central Valley plant could be upgraded to handle nitrogen wastes. But that would cost $13 million to build and $30 million to operate over the next 30 years. Plant officials say they don't have the money and have asked the Utah water bureau to lower its nitrogen requirements so the plant can meet standards.

It bases that request on a recent $300,000 study showing that the Jordan River has mostly carp and other tough trash fish of no recreational value. A little less oxygen in the river, the report says, will not hurt the fish. Those opposed to the change say it could interfere with the reproductive cycles of all fish in the river.

The state water bureau has not ruled on the nitrogen issue, but assistant director Jay Pitkin says there is a tentative agreement to lower the nitrogen standards for the Jordan River.

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## Goliath...

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That means Central Valley will not have to build the $43 million nitrogen-removing basins as originally required.

Maier says that by not requiring Central Valley to meet its original nitrogen standards, the plant will do no better and may even do a worse job of cleaning sewage than the five smaller plants it replaces in 1988. Central Valley authorities refuse to conduct alternative tests on the five old plants, Maier says, because the results could be politically damaging. But results Maier has seen from standard ammonia tests at one of those plants indicate that it was removing most of its nitrogen pollution.

Meanwhile, the EPA is charging the Central Valley plant and its sewage districts $10,000 a day for nitrogen and other violations. The total is now over $1 million and rising.

Twenty miles upstream from Central Valley is a very different plant. There, the South Valley oxidation ditch has become a national showcase. South Valley cost twice as much as Maier felt it should. But it cost only a third of Central Valley's current costs, and on a per-unit basis it cleans sewage three times as well.

The plant was designed to have little more than half of Central Valley's capacity. But plant manager Jack Peterson says the first year of operation showed the plant could handle sewage 40 percent more efficiently than Central Valley, which brings it up to two-thirds the capacity of Central Valley.

South Valley's permit allows it to discharge water into the Jordan River that contains up to 10 milligrams of oxygen-demand per liter of water. However, the plant averages only 3 milligrams per liter, or mg/l. It reduces nitrogen pollution to .01 mg/l, which is extraordinarily efficient.

Peterson says, "I think we're getting total cleanup at an economical cost. I don't know what other plants are paying, but they're not getting the type of removal we are."

South Valley stands in marked contrast to Central Valley. It was finished early, construction costs came in under bid, it takes fewer workers to operate the plant, and the water it discharges into the Jordan is cleaner than the water already there.

Comparison of the two plants appears to support Maier's contention that the sewage industry and government agencies are not building the best and cheapest plants they could.

Opponents say Maier is a special-pleader when it comes to oxidation ditches. Maier says that during the three-year fight, Salt Lake media were told he was merely trying to sell a different design. EPA's Hais, for example, writes Maier off as just another special interest. "Oxidation ditches remove part of nitrogenous oxygen demand as part of the process," Hais says, "Maier and other oxidation ditch proponents stand to gain if there were nitrogenous standards."

That, says Maier, is a cruel joke. During the three years he waged his campaign, Maier, his wife Dodie, and their three children lived solely off savings. Just before the money ran out in 1984, he says, he took a job in Cincinnati and spent a year there living alone in a small apartment. Now he is back in Salt Lake City employed in a job far below his professional level. Stubborn as ever, he continues his campaign.

Maier says he never walked away from the fight, even though he figures it cost him $35,000 in savings, plus the $30,000-a-year salary he could have made in some other state. "I reached a point where I was put against the wall and you either have to admit you're a big phony or you have to fight," he says.

*"I was put against the wall and you either have to admit you're a big phony or you have to fight."*

His family says the cost was higher. "Even though he was right, professionally he killed himself," says his oldest daughter, Eleonore. "I think it has something to do with us being from the Netherlands; they doubted his credentials."

Maier's wife, Dodie, says the experience has disillusioned her husband, who had viewed America as a symbol of freedom, creative thinking and innovation. The rest of the family has or will soon get U.S. citizenship; Peter Maier refuses to do so.

Despite the long battle and hard feelings, Maier is respected by some in Salt Lake who, as Lowell Palen says, see him as the "leading edge of something important in sewage engineering." Palen bases much of his opinion on reports from Europe. "It's pretty obvious which way they are going there," he says, "and they're way ahead of us."

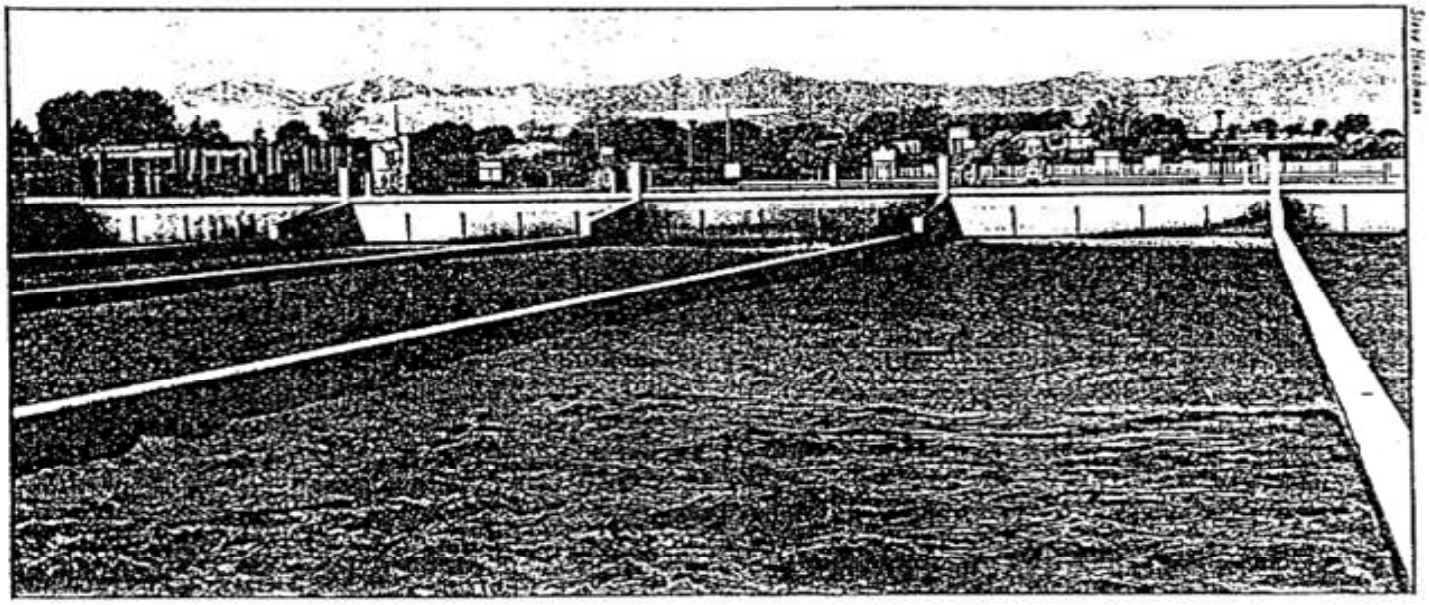
Brigham Young University's LaVere Merritt, who was also on the Governor's Science Council committee that investigated the controversy, says Maier is a very important voice in the wilderness. "Peter (Maier) may help move us toward a more rational approach in pollution control over time. He is a not-too-well received proponent of a valid point of view, one we will probably move to in the future."

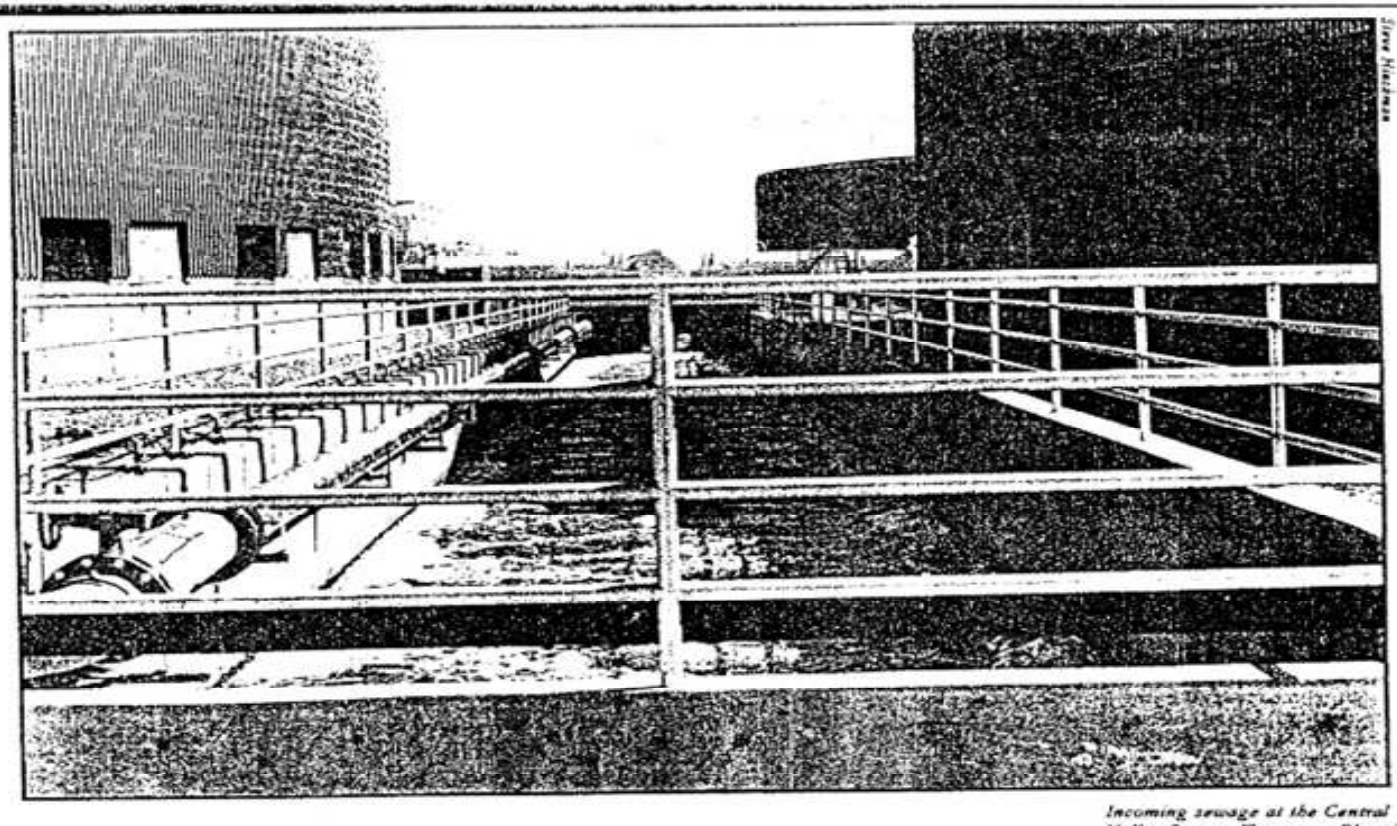
Maier says people call him a scientist operating in a field of theory. He says, "I am a down-on-the-ground engineer. What I care about is saving money. And if they follow my philosophies, then all the money will be out of sewage treatment."

□

This story and related articles were made possible by the Fund for Investigative Journalism in Washington, D.C., and the High Country News Research Fund.

*The South Valley Sewage Treatment Plant below is the largest oxidation ditch in the U.S.*





*Incoming sewage at the Central Valley Sewage Treatment Plant in Salt Lake City*

*The BOD-5 test*

# Fatally flawed or perfectly adequate?

*by* Steve Hinchman

At the heart of Peter Maier's criticism of the nation's sewage treatment program is the BOD-5 test, the short name for the biological oxygen demand test. According to Maier, the test can be compared to a carpenter building a house with a ruler calibrated in meters while he thinks it is calibrated in feet.

The BOD-5 test is the tool used to design sewage treatment plants and then to determine how well they are performing. If the test is fatally flawed, as Maier contends, then the nation's fleet of sewage treatment plants have been based on a faulty foundation.

The theory of a sewage treatment plant is straightforward. It is designed to perform, in the space of a few acres, the functions that would be carried out naturally by a stream over many miles.

In place of vegetation and gravel, the plant uses mechanical filters to remove solids from the sewage stream. In place of rapids and falls, the plant uses rotating paddles to churn air into the sewage, or pumps and perforated pipes to bubble air up through it. Finally, the plant uses concrete ponds, tanks filled with rocks or long concrete channels as the streambed.

Although the environment is artificial, the goal is to mimic nature. The plant creates a home for the bacteria that break down the carbon and nitrogen wastes found in sewage, transforming those wastes into carbon dioxide, nitrogen oxides, water and inert sludge.

The decay process is confined to the sewage treatment plant in order to protect the stream, lake or ocean coast into which communities discharge their wastes. If sewage wastes are released into open waters the same decay process will occur, but in the process bacteria will consume the stream's dissolved oxygen. Without sufficient oxygen, fish and other aquatic life cannot survive, and water turns anaerobic. A new and very unpleasant class of organisms takes over the stream. Under such conditions bacteria now convert wastes into toxic compounds like methane gas and sulfurous oxides. Often in a secondary reaction, the decaying remains of aquatic life suffocated by oxygen loss act as fertilizers stimulating the growth of large algal mats and causing lakes to become eutrophic.

Thus, the concept of sewage treatment is appealing and straightforward, and Congress, with voters strongly behind it, have consistently voted billions to build these concrete, steel and plastic streams to protect the nation's natural bodies of water.

Congress, however, does not build sewage treatment plants. So it ordered the Environmental Protection Agency to adopt a set of regulations and a test to measure water quality. The agency did that, and then handed the job of designing and building the plants over to the consulting engineers and construction firms that make up the sewage treatment industry.

The heart of the regulations adopted by the EPA is the BOD-5 test. It measures how much oxygen the materials in sewage will consume; that, in turn, determines how much and what kind of treatment a community's sewage needs.

The test, then, guides the design of the plant. After the plant is built, the BOD-5 test determines whether the plant is functioning well enough to earn the community a discharge permit.

No one claims the test is perfect. But the sewage treatment industry and the EPA say it is adequate.

Peter Maier says the test, more than any other factor, is responsible for what he calls the failure of the Clean Water Act and the waste of billions of the public's dollars.

Everyone admits that the test is quick, dirty and imprecise. It does not distinguish between oxygen consumed by the decay of carbon-based compounds and that consumed by nitrogen-based compounds. Nor does it measure all of the oxygen demand in a sample of sewage. Complete decay takes about 30 days, while the test lasts only five days. Finally, the test does not measure, and sewage plants are not designed to treat, the many complex materials which now find their way into sewage.

The BOD-5 test was designed over 50 years ago as a shortcut to the normal 30-day BOD test. It was selected as the backbone of the EPA's sewage treatment program in 1972, because the shortcut fit the needs of a sewage plant operator. A sewage plant cannot retain the sewage of several hundred thousand people for a month. The operators must

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## BOD-5...

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have quick results if they are to know, on a day-to-day basis, how well the plant is functioning. Although more precise tests to measure sewage content are now available, such as the chemical oxygen demand test, the EPA only requires sewage plants to use the BOD-5 test.

When the agency decided to base its regulations on the five-day version of the BOD test, Maier says it may have irreparably damaged the sewage treatment program. Although neither the five nor the 30-day test distinguishes between the carbon and nitrogen-based wastes, the 30-day test gives the total amount of oxygen demand in the water. The five-day test does not. In fact, the EPA assumes BOD-5 ignores all nitrogen decay because nitrogen wastes don't start oxidizing until six to 10 days after sewage is produced.

But Maier says nitrogen wastes can eventually account for up to 40 percent of the total oxygen demand in an average sample of sewage. Nitrogen also acts as a fertilizer for algae and other lower life forms, and therefore helps eutrophy, or age, lakes.

Maier adds that by testing sewage early, at five days, the BOD-5 test also misses a third of the ultimate, or 30-day, carbonaceous pollution. Altogether, Maier says the test ignores 1.5 times more pollution than what it measures.

Maier concludes that when the EPA wrote the regulations for municipal waste water treatment in 1972, it picked the wrong test. That, he says, has made for a deceiving standard and little change in water quality despite the billions spent.

But the BOD-5 test does have a perverse advantage, Maier charges. Because it is so imprecise, he says it has enabled the sewage industry to build plants that cost a lot to build and then produce questionable results.

Examples of poor quality plants abound. Historically, the majority of treatment plants built under the Clean Water Act have experienced tremendous difficulty meeting discharge permits. In the late 1970s, the EPA reported that at any given time 50 to 75 percent of the nation's treatment plants were not performing as designed and were in violation of their permits.

A 1981 U.S. General Accounting Office study found that in 1978, 87 percent of the plants violated their permits, 31 percent seriously. EPA waste water technician Allan Hais, in Washington, D.C., says only 25 percent of the nation's plants are in violation today. However, half of that improvement is probably due to a change in BOD-5 testing procedures allowed after 1984.

In addition, the most commonly built sewage treatment plants -- the activated sludge and trickling filter designs -- do not provide a good home for the bacteria which eat nitrogen waste. According to EPA reports, such designs average only 85 percent removal of total oxygen demand and suspended solids, which is all that is required under the EPA's secondary treatment regulations.

Because of population growth and an increase in the pollution produced per person since 1972, plants that only achieve the secondary standard of 85 percent removal barely enable water pollution control agencies to keep pace with higher sewage levels.

Any treatment beyond secondary is called advanced, or tertiary, treatment. Advanced treatment is required only where the EPA or state water agencies determine that secondary treatment won't prevent degradation of existing water quality. Only 20 percent of the nation's 15,400 treatment plants fall in the advanced category.

Maier and others say it is possible to build sewage plants that can easily meet advanced standards, while costing less than plants that now have trouble meeting secondary standards. He also says this technology predates the 1972 Clean Water Act.

One such approach is the oxidation ditch, a Dutch-design that has been around since the late 1960s and has seen extensive use worldwide. Building oxidation ditches has been Maier's business for 15 years.

Like the others, the oxidation ditch works by mimicking a stream. But it does so in a less compact way. In it, sewage moves through long channels arranged in a concrete maze. The water is kept moving by rotors, which also churn in dissolved oxygen. The system has a long retention time compared to other types of treatment plants, and supports a healthy population of both carbon and nitrogen-eating bacteria.

A 1978 EPA study found that oxidation ditches consistently get 95 percent and higher removal of wastes, putting it among the best of the advanced treatment categories. The study also showed that the plant has lower construction and operating costs.

Despite this, the oxidation ditch has never been well accepted in the U.S. The EPA regulations place it in the less funded advanced treatment category, says Salt Lake-based sewage consultant Orris Albertson. He also says it is unpopular with the industry because lower construction costs mean lower fees and less work for the engineering and construction companies that build sewage plants.

Albertson has worked in sewage engineering for 30 years. He says, "A lot of engineers really haven't accepted the fact that you can build advanced treatment for the cost of secondary treatment. They've been doing it their way for 20 years and are not ready to change."

He adds that if the EPA's secondary regulations had nitrogen standards, as Maier wants, it would have long ago forced the industry to begin using oxidation ditch technology.

To return to the test itself, experts in the sewage industry, universities and many trade organizations say the BOD-5 test does exactly what it is supposed to do. If there is a problem, it is not with the test, they say, but with the EPA's application of the test.

Historically, the EPA has made serious mistakes in its use of the test. The worst problem was just discovered three years ago. It occurred when the BOD-5 test was used to measure sewage plant performance. The problem happened because the agency did not distinguish between the two types of pollutants measured in the BOD-5 test: carbonaceous wastes and nitrogenous wastes.

In those cases where plants were not breaking down nitrogen, pollution tests showed the plants were working properly. That is because nitrogen wastes were not being oxidized in the plant, nor registering in the tests. Instead, they pass downstream to become untraceable pollutants.

The problem came when plants that were not designed to treat nitrogen did. That caused nitrogenous oxidation demand to creep undetected into test results, which in turn caused the BOD-5 test to show a high oxygen demand still remaining in the sewage. EPA officials interpreted the high readings to mean the plant was not treating its sewage and therefore violating its permit, when the plant actually had treated more sewage than its permit required.

The Water Pollution Control Federation, a leading sewage industry trade organization, formed a task force to study the issue in 1983. The group reported that even though the information on nitrification interference in the BOD test has been available in the technical literature since the 1930s, the EPA either "ignored or forgot" to differentiate between carbonaceous and nitrogenous oxygen demand.

Until 1984, the EPA fined treatment facilities for violations on the basis of BOD-5 data, and hundreds of plants were expanded or re-built because the test said the plants were out of compliance. The new plants typically achieved compliance by prohibiting conditions that allowed nitrification -- thus removing less pollution than the plants that were replaced.

As the situation was discovered in the late 1970s, engineers from cities all over the nation with violations on record petitioned the EPA to allow plants to separate carbonaceous and nitrogenous oxygen demand. It took a lawsuit from the city of Dubuque, Iowa, which the EPA had fined $10,000 a day for permit violations, to get the EPA to allow new testing procedures.

The new test, in effect since 1984, allows plant officials to add a nitrifying inhibitor to the BOD test bottle. The method screens out nitrogen, and results show only carbonaceous oxygen demand. The Water Pollution Control Federation *Journal* reports that 60 percent of the plants in the nation with chronic violations on record became legal through this device.

Maier says that instead of correcting the problem the EPA has simply eliminated nitrogen testing and treatment from its Secondary Treatment regulations -- thereby skirting the real issue and leaving nitrogen pollution in the water to cause problems downstream.

EPA and Utah water officials vehemently disagree with Maier and other critics. They deny that they are improperly regulating the sewage treatment program or that they have wasted taxes. The officials don't question Maier's science; they say he misunderstands the regulatory system.

According to the EPA's Hais, Maier is right when he says the BOD-5 regulations only control carbon wastes. But, Hais continues, that is as intended. Carbon pollutants, he says, outweigh nitrogen three-to-one, and are a much greater threat to oxygen levels. Moreover, Hais says, when nitrogen becomes a problem, sewage plants are required to deal with it.

Hais says Maier wants the

*When the EPA changed its BOD-5 test, 60 percent of the plants with chronic violations became legal.*

Steve Hinchman

*Sewage -- in the first stages of treatment*

EPA's minimum standards to cover both types of wastes and to do away with separate secondary and advanced regulations. But, he says, "The agency made a conscious decision to regulate it another way."

The Utah Water Pollution Control Bureau, which has clashed with Maier many times since 1980, makes the same point. Assistant chief Jay Pitkin says, "Peter (Maier) says we are ignoring nitrogen demand, but we're not. Sometimes it's not measured, but where it's important, it's taken into account."

The water quality approach is deemed the best method by the regulators because it allows agencies to concentrate limited funds on the worst problems. They say the effect of Maier's suggestion would be to raise water quality standards across the board -- an unnecessary and expensive proposal. Officials say such a change would be resisted by most communities, which are already stretched nearly to the breaking point.

EPA officials admit that sewage technology is changing, but warn that the oxidation ditch is not a panacea. It requires more land than most other technologies, which raises costs.

However, in the West, where land is often cheap, it may be the wave of the sewage future. Five oxidation ditches are being built or designed in Utah alone, and nearly every expert predicts they will become the most common treatment plants.

The trend is not due to a change by the EPA. The pressure comes from the people who run the local sewage districts, who now, thanks to less federal money, have to pay a larger bill. More municipalities are telling engineering firms to build the oxidation ditch, Albertson says.

Problems in the EPA's construction grants program create a second push for change. In a report to Congress, Albertson tracked how long it takes a construction grant application to pass through EPA: 7½ years, at a minimum.

Municipalities about to be fined $10,000 a day by the EPA for sewage violations can't wait that long, he says. Moreover, plant costs can double or triple over that time. As a result, a few communities have washed their hands of the EPA and built plants for less than they would have paid with EPA's help.

Maier says that as engineers in the sewage industry begin to use other technologies, the question of standards will become academic. But in the meantime, he says, it is professional malpractice to design and build sewage plants which do not use the best available technology.

"In any other field of engineering this would have been unacceptable, because it would have directly resulted in death -- bridges collapsing, buildings falling, airplanes would not fly." But in sewage treatment, he says, only streams and fish die.

Maier has not yet presented his views on the BOD-5 test in a national scientific journal, a step many professionals consider a must before he can be taken seriously. But a few peers in Utah quietly support his views.

Hal Link, publisher of the now-closed trade magazine *Utah Waterline* and manager of a sewage treatment consulting service, says, "Maier's science is correct and the officials who are charged with the work are incorrect." But Link adds, "Peter (Maier) never got sufficient political backing to push his points through and change policy."

Lowell Palen, a Salt Lake contractor who builds equipment for sewage plants, says Maier is the most ethical engineer he has met, and that his ideas are consistent with the leading new technologies. Palen adds that Maier's name is something of a swear word in Salt Lake's engineering circles, but that many others hold him in high regard.

Some experts in the field say the use of the BOD-5 test is not so much wrong as irrelevant; an arbitrary technical standard that has distracted the industry from its goal of making the nation's waters swimmable and fishable.

Larry Silverman, who has served as executive director of the American Clean Water Association, and who is now a private attorney in water pollution control, says, "Engineers who design our water treatment plants do not design for bass or game fish, they design for certain standards -- BOD standards. But the standards miss the mark."

The EPA's regulations may also be dangerously flawed for a reason that threatens not just fish, but also public health.

Dr. Lenore Clesceri is professor of biochemistry at Rensselaer Polytechnic Institute in New York, and currently chair of the *Book of Standard Methods* joint editorial board; which is responsible for writing and reviewing testing methodologies used by the sewage industry. Clesceri warns that industrial changes have far surpassed the EPA's tests and regulations. New synthetic compounds have entered surface and groundwater systems across the nation.

She says the new synthetics are difficult or impossible to break down by natural biological processes, seldom register on the BOD-5 test and pass through a sewage plant untreated. Clesceri says they are often toxic, and can interfere with the reproductive ability of fish and other marine animals. They also pose a serious threat to human health as the toxins are carried upward through the food chain.

Jim Fish, executive director of the eight-state and two Canadian province Great Lakes Commission, says the sewage problem has been eclipsed by four new major pollution problems. Those are:

- Non-point pollutants, which, because of their origins on fields and city streets, are difficult to control;
- Toxics and radioactive pollutants, which are only now being monitored and understood;
- Toxic sediments and radioactive "hot spots" from early, untreated discharges; and
- Airborne deposition of acids, PCBs and dioxins.

Fish says dealing with those problems may require changes in the way America lives. "We have not begun to consider the ramifications of the stuff we're using -- household chemicals, plastics, etc. We seem to demand and industry seems to produce more and more toxins that we can use on a daily basis."

The potential disaster of the huge quantity of waste currently held quiescent by the salt in the Great Salt Lake is echoed by water quality problems elsewhere in the West. The Clark Fork River in Montana, and the lake it feeds, Pend Oreille in Idaho, have experienced yearly fish kills and eutrophic conditions. National jewels such as Crater Lake in Oregon (*HCN*, 8/3/87) and Lake Tahoe in the California Sierras are threatened.

Both the Jordan River in Utah and the South Platte downstream of Denver, Colo., are in the midst of battles to lower water quality standards because sewage treatment plants built for millions of dollars can't meet the current standards.

Several major rivers flowing out of the Colorado mountains are highly toxic due to contaminated mine waters. The most noticeable are the Arkansas near Leadville, due to the Yak tunnel (*HCN*, 2/3/86), the San Miguel and Uncompahgre rivers, because of mines in the San Juan Mountains, and the Eagle River outside Minturn because of the Eagle Mine.

Some say that the nation's growing water quantity problems may actually be water quality problems. In the West, it is said, water flows uphill toward money. But sewage and toxins flow downhill, contaminating downstream water supplies, polluting groundwater and forcing communities to go farther afield in search of pure water.

The nation has thrown massive resources at the water pollution problem since 1972, only to witness the relative failure of the regulatory and techoical solutions it chose. The blame can be spread far and wide.

# Clean Water Act hasn't done the job

by Steve Hinchman

Amendments to the Water Pollution Control Act were meant to set the nation on a new approach to water quality in 1972. Their goal was to make dirty streams swimmable and fishable by 1983. Even more ambitiously, polluting discharges were to be completely eliminated by 1985.

A new philosophy was at work: that municipal sewage and other wastewater would be reclaimed rather than flushed away. Sen. Edmund Muskie of Maine said during the Senate debate: "These policies simply mean that streams and rivers are no longer to be considered part of the waste treatment process."

It was perhaps the deepest shift in American sewage treatment policy since the invention of the flush toilet in the 19th century, when we began releasing sewage into the waterways around us.

The new law went beyond rhetoric and optimism; it was backed by teeth and money. It ordered the Environmental Protection Agency to set national treatment standards, and it gave the agency 13 years to hook the entire nation into sewage-treatment systems.

Because a multimillion dollar treatment plant was beyond most communities, the 1972 Congress said the federal government would bear 75 percent of the costs. As a start, it appropriated $18 billion to build sewage plants. Later amendments reduced the federal share to 55 percent.

The first consequences of the law were felt on Wall Street, where pollution-control stocks soared. The result was the birth of a national environmental-industrial complex, which is today full grown and thriving.

Despite the regulations, billions of dollars and the passage of both the 1983 and 1985 deadlines, neither of the law's goals are close to being met. In some ways the nation's lakes, streams and ocean coasts are no better than in 1972. In other ways, they are worse.

After spending at least $72 billion in federal, state and local funds, barely 60 percent of us are connected to a sewage treatment plant that meets EPA standards. The agency says it would take $60 billion more to finish the job.

Even without additional expenditures, the program is the second largest U.S. public works project, after the national highway system. But the interstate system has achieved its goal. One can drive from coast to coast and from Mexico to Canada on interstate roads.

By comparison, the EPA can't say if the nation's waters are any cleaner. It certainly can't say that they are all fishable and swimmable. Few of our waters are free of polluting discharges. There are local success stories, but many state water agencies say they are barely able to maintain water quality at 1972 levels.

In addition to the statistical evidence that says the nation's waters are no better than in 1972, anecdotal evidence abounds. Recent reports say estuaries on the East Coast are dying, due in large part to long term build-up of sewage wastes. Along the Atlantic coast, "red tides" come and go; porpoises die mysteriously.

In the interior, rivers and lakes are under intense pressure from rising sewage levels due to population growth. On the West Coast, sewage effluent regularly fouls beaches and coastal waters. In many beach and lakeside communities, the 1960s and 1970s are remembered as "the good old days," while the present is noted for its polluted waters.

Moreover, even as the nation struggles to control plain old sewage, additional pollutants are being found -- including toxins, hazardous chemicals and radioactive elements -- that are more dangerous and complex than the municipal sewage we have been unable to control.

The accumulated threat to water quality is occurring just as many cities and towns wish to take back their riverbanks and lakesides from industrial use or neglect. The drive to reclaim these areas comes from a desire for riverside greenbelts and parks close to where people live. The recreation pressure is abetted by looming water shortages, especially in the West, which make even polluted water more valuable.

Utah's Jordan River, which runs 75 miles from Utah Lake in the south to the Great Salt Lake in the north, is typical of many rivers. Where it passes through rural areas, fertilizer, pesticides and herbicides are washed off the land into the river with each rainstorm, or the agricultural pollutants enter from canals returning used irrigation water to the river.

In urban areas, imperfectly treated sewage pollutes the river, and this is compounded by grease, metals and other substances washed off city streets by rain.

In industrial areas, factories, mills and plants discharge a wide variety of pollutants into the river.

Nor is the Jordan physically whole. Dredges have straightened it and scraped its bed smooth, destroying fish habitat and sending downstream pulses of polluting material that had settled out of the river. It has also been mined for gravel, lined with concrete walls and auto bodies, and otherwise reworked until in places it is more sluggish ditch than live stream.

Nevertheless, in the water and stream-scarce West, the Jordan is a potentially valuable resource, and pressure is building at the grassroots to restore it to life. A start has been made. For half of its length through Salt Lake City, it is already a state park, called the Jordan River Parkway. Plans exist to expand the riverside park out to the city limits, at the edge of the southern suburbs.

The proposed changes are more than a matter of hauling off rusting car bodies and planting grass and trees. The Salt Lake Water Conservancy District says it even intends to take water out of the Jordan River for drinking.

At present, however, the Jordan's water quality is so poor it is limited to non-contact recreation such as boating and fishing. Before the Jordan's water can be piped into anyone's home, a major filtration plant must be built.

Even as these plans go forward, the river continues to be damaged by a variety of pollutants. Steve Jensen of the Salt Lake City/County Health Department, says the combination of sewage and other material and low oxygen levels make the Jordan very fragile. It is especially vulnerable during the summer, when discharges from the Salt Lake Valley's eight sewage treatment plants can make up half the river's flow.

Sewage is only part of the problem. The Jordan not only must absorb what pours out of sewage treatment plants, but it must also accept the so-called non-point source runoff from fields and streets, and the point source discharges from mills and factories.

Their effect on the Jordan is both immediate and long term. The decay of the sewage in the river supports an interesting zoo of bacteria, but as the biological material is eaten by the bacteria it consumes the oxygen dissolved in the water. The result is a chancy environment for fish.

That delicate balance can turn to disaster in rainstorms, which flush more nutrients off fields and streets into the river, chewing up the remaining oxygen and further stressing the fish.

The river is also subject to long-term threats. Municipal sewage has more than biological wastes -- it also contains household chemicals, chlorinated hydrocarbons created when the plant chlorinates its sewage effluent, and other substances.

Runoff from streets and industrial discharges are rich sources of toxic substances. These don't affect oxygen levels. But they may be taken up by the fish, or sink to the bottom to accumulate in sediment, there to await future activation by dredging or high river flows.

Jensen says industrial discharges come from electroplating and semiconductor plants on the lower part of the river. The discharges are often heavily alkalai, and contain solvents and heavy metals. Leaking underground storage tanks, including one found this summer in the Utah Transit Authority terminal in Salt Lake, and oil refineries contribute a variety of petroleum products.

Another major heavy metal source is a 100-acre tailings pile at the now closed Sharon Steel plant, a national Superfund site. Finally, Jensen says, illegally dumped chemicals flow into the river from both storm sewers and domestic drains.

The Jordan is handicapped, Jensen continues, by its own limited restorative ability. It is slow moving and has no waterfalls or rapids where the water could be naturally aerated.

Although the Jordan absorbs pollution from a variety of sources, tests in 1982 showed that 77 percent of its oxygen loss is due to the Salt Lake valley's eight sewage plants. The oxygen loss will decrease with completion of the valley's two new treatment plants in 1988. However, the effects of decades of degradation will remain, aggravated by lower but continuing flows of sewage, rural and urban runoff, and industrial discharges.

The cumulative effect is overpowering -- life in the river is a fraction of former levels, according to a 1983 study by the U.S. Geological Survey and the Salt Lake City/County Health Department. That report found the most serious threats to the Jordan to be oxygen loss and toxic trace elements.

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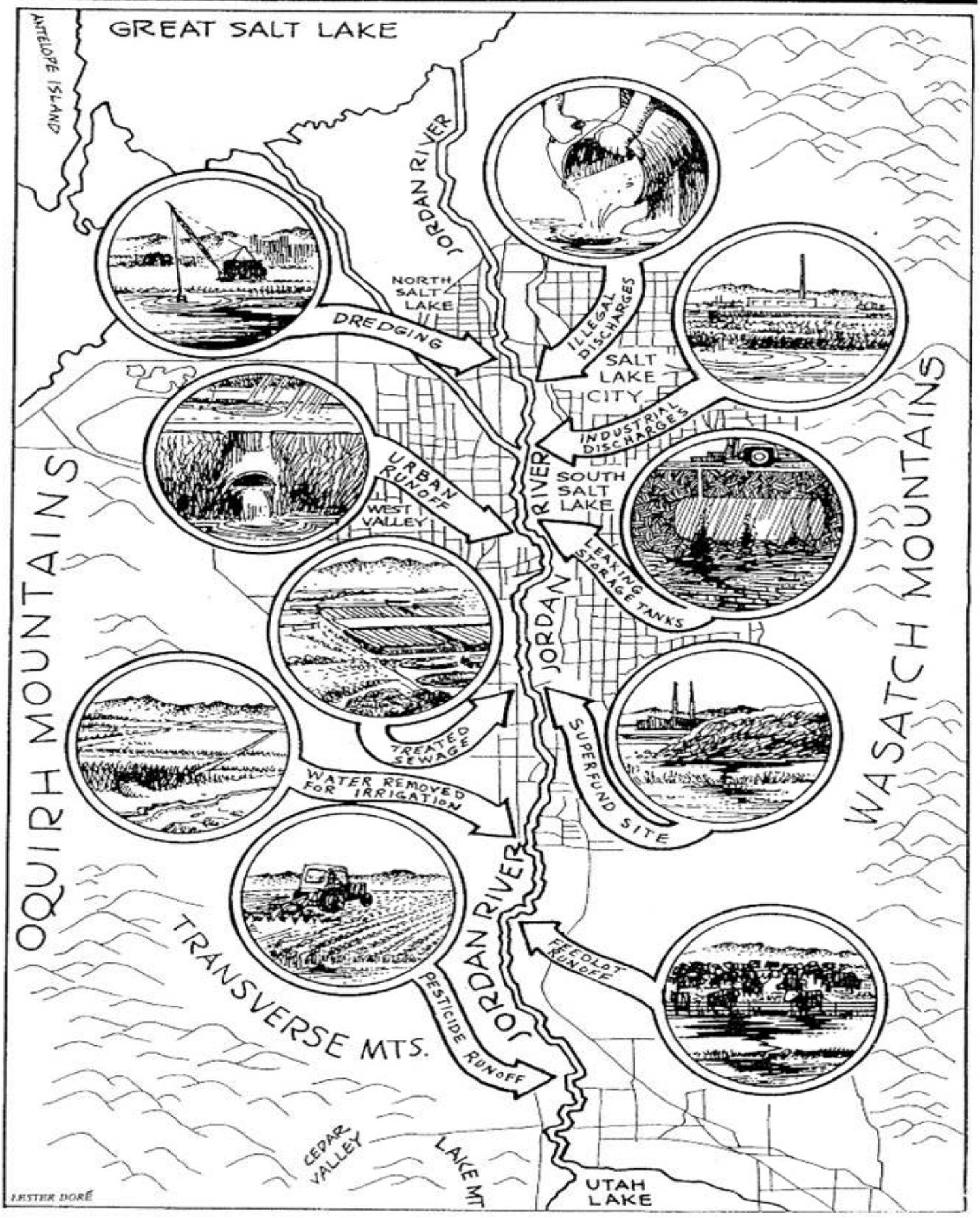
GREAT SALT LAKE
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ILLEGAL DISCHARGES
SALT LAKE CITY
INDUSTRIAL DISCHARGES
URBAN RUNOFF
WEST VALLEY
SOUTH SALT LAKE
LEAKING STORAGE TANKS
OQUIRH MOUNTAINS
JORDAN RIVER
WASATCH MOUNTAINS
TREATED SEWAGE
SUPERFUND SITE
WATER REMOVED FOR IRRIGATION
FEEDLOT RUNOFF
TRANSVERSE MTS.
PESTICIDE RUNOFF
CEDAR VALLEY
LAKE MT.
UTAH LAKE
LESTER DORÉ

Steve Hinchman

*The Jordan River in Salt Lake City*

## Jordan...

(Continued from page 14)

By the time the Jordan reaches the valley's main population center -- Salt Lake City -- it is already burdened by sewage and other pollutants from upstream cities and farms. On its course through that city, demand for dissolved oxygen doubles, mainly because of the flow of partially treated sewage into the river. So the already scarce oxygen in the water entering Salt Lake City is cut another 52 percent by the time the river reaches the Great Salt Lake.

The study found 11 trace elements and heavy metals accumulating on the bottom of the Jordan. Levels were acceptable as the river entered Salt Lake City, but halfway through the city metal levels exceeded standards and continued increasing downstream. The worst offenders were arsenic, cadmium, chromium, copper, lead, mercury and zinc.

LaVere Merrit, chair of the civil engineering department at Brigham Young University, says he expects the low oxygen levels to cause fish die-offs in the lower Jordan once every few years. Jensen says the health department is a bit more optimistic. It thinks most fish species can live with the toxic pollution, but that it may destroy their ability to reproduce and maintain native populations. The Jordan is classified as a cold water fishery in its upper reaches, a warm water game fishery through most of Salt Lake City, and a non-game fishery at the bottom.

State officials warn that the city is taking a big risk by polluting its river and the lake it empties into. Reed Oberndorfer of the state Water Pollution Control Bureau says:

"Everything that comes into the river is pickled in the Salt Lake. Our concern is that we can overload the system too much, because we don't know what's going to happen."

Peter Maier says Salt Lake City is sitting next to an ocean of sewage, toxins and industrial waste in the Great Salt Lake. It has been saved thus far, he says, by the lake's high level of salt, which stops most biological process.

But, he warns, if the lake continues to freshen, as it has done for the past several years because of increased water levels, the toxic soup could come back to life with disastrous effects for the neighboring area.

# *The Toilet Papers* and other sources

The issue of sewage treatment is carefully monitored by several organizations and has spawned numerous publications.

The major industry tradegroup is the Water Pollution Control Federation, a network of plant operators and water pollution control officials. The federation's *Journal* runs self-policing articles investigating the methods, successes and failures of the sewage industry. The peer-reviewed, monthly publication is available from the Water Pollution Control Federation at 601 Wythe St., Alexandria, VA 22314 (703/684-2400). Other trade groups are the American Water Works Association (202/628-8308) and the American Public Health Association (202/789-5600).

Several industry watchdog groups monitor progress made under the Clean Water Act and other legislation. They also lobby Congress, provide information and advice, and conduct research. Groups include the Clean Water Action Project (202/547-1196) and the American Clean Water Association (202/363-0297).

Where there are major bodies of water around the nation, research and conservation groups have emerged to investigate water quality, pollution levels and reclamation efforts. Examples are the Great Lakes Commission at 2200 Bonisteel Blvd., Ann Arbor, MI 48109 (313/665-9135) and the Chesapeake Bay Foundation at 162 Prince George St., Annapolis MD 21401 (301/268-8816).

The U.S. General Accounting Office investigates current and past problems in the EPA's many water-quality programs. Reports focus on specific projects and include suggestions on how to do it better next time. Two reports are: *Key Unanswered Questions About the Quality of Rivers and Streams* (Sept. 1986), and *Better Planning Can Reduce the Size of Wastewater Treatment Facilities, Saving Millions in Construction Costs* (July 1982).

Every two years the Environmental Protection Agency submits to Congress a survey of the current status of the nation's network of sewage treatment plants. Called the *Needs Survey*, the report also estimates how much construction is required to meet future sewage demand and its cost.

The press has done some investigations of its own. Notable is Patrick E. Tyler's five-part series on "America's Pollution Floodgates" that appeared in the *Washington Post* in 1981. It examined corruption and bureaucratic inefficiency in the EPA's construction-grants program for sewage-treatment plants. Jon R. Luoma's "The $33 Billion Misunderstanding" in the Nov. 1981 issue of *Audubon* magazine examined difficulties the EPA encounters in making clean water legislation work. Rochelle L. Stanfield's "Enough and Clean Enough" in the Aug. 15, 1985, *National Journal* connected the issues of water quality and water quantity.

Any investigation of water quality and sewage eventually comes to the forbidden topic of re-using wastewater. The concept of sewage as a valuable resource is as old as using manure for fertilizer, but it is not an issue that the nation's mainstream press often covers. Yet recent successes of innovative land disposal experiments have made sewage re-use one of the more promising solutions in sewage technology.

The American Water Works Association's annual symposium in Denver, Colo., this summer focused on "Implementing Re-Use." The proceedings of the four-day meeting should become available this winter from 1010 Vermont Ave. N.W., Washington, D.C. 20005.

The Freshwater Foundation recently devoted an entire issue of its *Journal of Freshwater* to the topic, "Rethinking Re-Use," which is available from the foundation at 2500 Shadywood Road, Box 90, Navarre, MN 55392.

*Future Water* by Jon R. Sheaffer and Leonard A. Stevens (New York, N.Y.; William Morrow and Co., 1983) makes the argument for an alternative national sewage network that reclaims and re-uses wastewater. Sheaffer and Stevens include historic examples of circular sewage systems as well as modern case studies and demonstration projects.

*The Toilet Papers*, by Sim Van der Ryn (Santa Barbara, Calif.; Capra Press, 1980) examines re-use technology ranging from single-unit compost designs to sewage reclamation facilities for cities.

*--Steve Hinchman*

# A Rotten Fish Story

The November/December 1988 issue of the *Columbia Journalism Review* included an article by former EPA press officer Jim Sibbison titled "Dead fish and red herrings: how the EPA pollutes the news." The article was critical of both the agency for distorting the facts and the Washington press corps for accepting, without challenge, the agency's press releases and using them as the basis for their stories.

Sibbison offered as an example a July 28 EPA announcement that nearly 90% of the nation's wastewater treatment plants had met the July 1 deadline for secondary treatment. The press release accompanying the announcement quoted EPA Administrator Lee Thomas as saying that the compliance rate represents a "significant step toward the goal of making the nation's streams and estuaries fishable and swimmable again." With the exception of Michael Weisskopf of *The Washington Post*, who wrote a piece about treatment plant noncompliance, the press, including *The New York Times*, ran upbeat stories about the progress being made in cleaning up the nation's waters, according to Sibbison. To reinforce the writer's message, the article included a photo showing a New York river beach covered with rotting fish.

"The *Times* piece," Sibbison wrote, "illustrates a principal occupational hazard in environmental reporting from Washington: relaying to readers self-serving statements by EPA officials as truth."

UPI's George Lobsenz, who was mentioned in the article, said, "This guy (Sibbison) has obviously never been to a hearing. He's comparing apples and oranges. It is not a contradiction to say that water pollution control problems are severe in some places and that the national clean water program has been successful." Lobsenz also doesn't see anything unusual about a press office wanting to make its boss look good. He also praised the press office for its professionalism.

EPA press office director Dave Cohen said, "I'd rather see EPA's feet held closer to the fire than have its performance overestimated. It is in the public's interest to be critical of government." At the same time, Cohen said, "No one hates to see negative press more than I."


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City Beat - October 9, 2003
A Piss Poor Test
Raw sewage could be unnecessarily strangling the Great Salt Lake.
by Shane Johnson
Never has a man been so consumed with urine as environmental engineer Dr. Peter Maier.

The good doctor, a retired sewage-treatment consultant, is right pissed that sewage treatment plants locally and even nationally won't stop flooding U.S. waterways with untreated urine. For two decades, Maier has lobbied and litigated for a niggling little change in EPA policy that would zip the fly on an arbitrary and outdated wastewater test, but his cries have fallen on deaf bureaucrats.

If Maier's demands were adopted by the EPA, most sewage treatment plants would fall out of compliance with pollution regulations. But he says that's a poor excuse for using a flawed test to determine how much and what kind of waste is being treated before it's sent streaming into lakes and oceans. "Because we don't test correctly, we aren't able to judge how well the plants are working, or even how they work," Maier said.

Congress passed the Clean Water Act in 1972 with the goal of eliminating all water pollution by 1985. The act requires sewage treatment plants to curb oxygen-depleting pollutants. But, in 1984, after it was found that antiquated plants were releasing the pollutants well above allotted levels, the EPA tinkered with the monitoring test, called BOD-5, to coddle offending facilities into compliance.

Initially, the BOD-5 test measured the amount of oxygen depleted from water by organisms that feed on carbon- and nitrogen-based compounds over a five-day period. The five-day test was never time enough to gauge the total oxygen depletion caused by carbonaceous (fecal) waste, didn't allow for significant oxygen depletion by nitrogenous waste (urine and proteins) and didn't distinguish between the two types of waste. Even so, sewage treatment plants could not satisfy EPA standards. So in 1984, the agency nixed nitrogenous waste monitoring altogether.

Maier contends that as flawed as the BOD-5 test already was, the EPA ignored a huge environmental threat when it abolished testing for nitrogenous waste. The result: Billions of dollars have been spent building plants to satisfy a mediocre treatment standard.

When released untreated, enough nitrogenous waste nurtures the explosive growth of algae blooms that suck oxygen from water, a phenomenon called eutrophication. In the Gulf of Mexico, nitrogen-rich waters from the Mississippi River have rendered 8,000 square miles of coastal water a barren "dead zone."

The same effect is now being studied at the Great Salt Lake's Farmington Bay. For going on 40 years, treated and not-so-treated sewage from Salt Lake City has inundated the bay with algae-spawning nitrogen by way of an old oil

drain ditch. Most of the raw fecal material taken into the city's wastewater treatment plant in North Salt Lake is sifted and separated into huge sludge beds, dried and then removed to landfills. Maier says that nitrogenous waste, however, is merely cycled through the plant and flushed into the lake.

Plant manager Jon Adams says that up to 70 percent of some forms of nitrogenous waste are effectively treated at the plant. But since the plant performs only the BOD-5 test, he has "no information to refute Mr. Maier."

Utah State University ecology professor Wayne Wurtsbaugh monitors Farmington Bay. Nitrogenous nutrients and algae blooms are so prolific in the bay that last week Wurtsbaugh could only see about four inches into its murky depths. Compare that with about 15 feet of visibility at Bear Lake, he said. At times, oxygen sensors in the bay register zero at all depths, a tell-tale sign of eutrophication.

However, it is unfair to blame the nitrogenous waste coming into the bay solely on Salt Lake City's sewage treatment system, Wurtsbaugh said. Urban and industrial runoff and wastewater from agricultural fertilizers are bigger causes of eutrophication.

The damage to the lake's ecosystem is somewhat mitigated by its high salinity and surrounding wetlands. And since brine shrimp-the lake's only flourishing creatures of political consequence-have proven resistant to eutrophication, protecting the lake from pollution is not that high on anyone's priority list, Wurtsbaugh said.

A putrid stench in the bay wafts up from the detritus of sometimes toxic, always pungent algae colonies, making for a rather uninviting swimming hole. The state classifies Farmington Bay as safe for contact recreation, but Wurtsbaugh says he's never seen humans swimming there. "In some ways, it's behaving like a sewage treatment plant," he said.

A native of Holland, Maier witnessed a sewage revolution of sorts. In 1948, a Dutchman conceived of the oxidation ditch, a process which today achieves about 95 percent treatment of raw sewage, including nitrogenous waste. By the same standards-and for about twice the cost-prevailing sewage treatment systems in the United States achieve about 65 percent total treatment, according to Maier.

"I am not a proponent of using our lakes-whether it is the Great Salt Lake or any other-as an easy cesspool," said Salt Lake City Councilwoman Nancy Saxton, who has talked with Maier about the city's outmoded treatment system.

From discussions with the city's waste treatment officials, however, Saxton is of the mind that it is better to wait and build an improved system than to throw money at retrofitting the old one. "Without national standards being set, it's hard for individual municipalities to jump on the bandwagon," Saxton said.

And that's the rub. Treatment plants only monitor and treat what the EPA mandates, and EPA won't raise the standards because most plants can't meet them.

Maier sued the EPA in 1993, pleading that the test be fixed. In 1995, a three-judge panel of the 10th U.S. Circuit Court of Appeals ruled 2-1 against Maier's group. A subsequent petition to the U.S. Supreme Court was denied.

It's just more bumps in the road for Maier, who at 67, says he'll keep at it through his retirement years because, "In a way, I feel responsible; for as part of my social return for having had a great life and a fantastic education ... I should do something with it."
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