

Imagine an environmental problem "potentially . . . more serious than that of hazardous waste dumps," stated a recent Environmental Protection Agency report. A threat so widespread that EPA estimates four million of them exist in the nation; one million of them



Leaking Buried Gasoline Tanks Threaten State's Groundwater

"Out of sight, out of mind" doesn't apply to tanks with potential for enormous environmental pollution

in EPA's Region VI which embraces Oklahoma, Texas, Louisiana, New Mexico and Arkansas.

But the problem is not one easily seen. Leaking underground storage tanks and the substances they emit are a very real hazard to a nation heavily dependent on groundwater aquifers for drinking water. Random sampling of the nation's underground storage tanks—most of which contain refined gasoline—indicated leakage in about one-third.

Experts and laymen agree that gasoline is not something they want pooling in valuable, pristine groundwater.

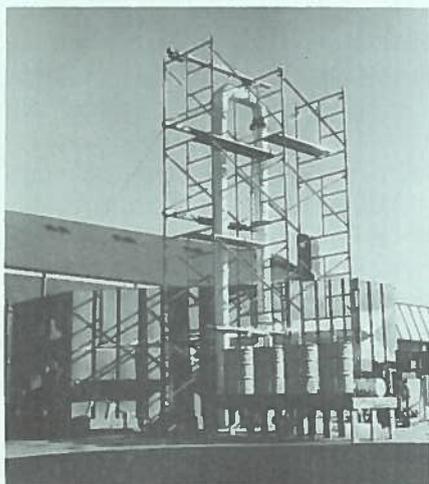
Although it is doubtless that its presence spells potentially grave consequences, the behavior of leaked substances in the substrate is still somewhat of a mystery. Uncertain migration of toxic substances through the earth's varied geologic formations, coupled with complicated and expensive clean-up procedures, has only muddled the already complex issue.

One thing is for sure, according to Ron Jarman, OWRB Water Quality Division chief: corrosion (rust) is a major cause of underground storage tank leaks. But he added that improper installation, external damage and internal punctures from a variety of sources are also factors which can lead to a myriad of hazards.

"A leaking underground tank can cause any number of problems in addition to the obvious threat to groundwater," he said. "But the most immediate problem is that of possible fire or explosion when gasoline is released and allowed to flow freely underground or to the surface. Therefore, numerous authorities—state and local fire officials, county and state health departments, the Oklahoma Corporation Commission (OCC) and, of course, the OWRB—are often contacted to help control and remedy the situation."

Jarman said that, because of the Board's mandate to prevent and abate

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Air Stripping is a countercurrent air/liquid extraction process in which air is forced upward through a column filled with packing material. Polluted water is pumped from a frac truck and into the right column. Then, as it is pumped upward, it continually separates and falls by gravity. Meanwhile, resulting vapors move on down the left column and are collected in vented barrels filled with activated charcoal. This stripper was developed by engineer Pat Lynam, of Terracon Consultants.



Lynam (left) inspects the stripper's air blower while OKC Fire Department Inspector David C. Boyd and Bill Swain and Tom Maiello of the OWRB look on.

Tanks, continued from page 1

water pollution, they have received and responded to 118 complaints of leaking tanks since 1977.

"Many of these complaints—which usually come from citizens, owners and operators of service stations and insurance and consulting firms—are referred to the Board because an underground leak signals potential water pollution," he said.

"There has been much confusion, especially with the public, regarding which agency—the OWRB or the OCC—to contact for this type of pollution. In the case of leaking underground gasoline tanks, the Board responds because the threatening substance is of a refined nature. The OCC has jurisdiction over unrefined petroleum pollution, such as crude oil spills," Jarman added.

Thousands of these plastic balls pack the air stripper's right column. Their high surface volume causes volatile hydrocarbons to vaporize.



Federal Resource Conservation and Recovery Act requires all states to formulate an underground storage tank program within two years.

Already, one-third of the states have implemented some type of regulatory program. EPA currently is developing guidelines for those states who choose not to create their own program.

"There has been little regulation of underground gasoline storage tanks and few records exist concerning their numbers, locations and types," said Tom Maiello, senior environmental specialist for the Board's Enforcement

Section. "This could present a problem in the future, but most of the complaints we now receive involve service stations still in operation."

Although a comprehensive federal program for leaking underground storage tanks is still in the works, some legislation has already been passed to deal with the problem. For example, EPA has banned the use of bare steel tanks which are easily corroded.

The EPA ban has no effect on tanks already in use, many of which were installed in the forties. Their life expectancy is only 20 years.

Maiello explained that once a leaking tank is isolated as the source of pollution, the OWRB works closely with the responsible party to remedy the pollution yet shelter the tank owner from excessive clean-up costs (remedial measures can be very expensive, often costing between \$10,000 and \$50,000) which could lead to bankruptcy. Some states have a fund to guarantee clean up in case of such an eventuality; Oklahoma does not.

Most underground tanks contain gasolines, diesel or waste oils. Many others store non-fuel products such as those used by dry cleaners, factories, military installations, machine shops, etc.

"Often, the danger is not apparent until it is too late. We usually get a call when gas fumes are detected in a manhole, or even later in a school or church," Maiello said. "That is why we really encourage the use of monitoring systems which can detect early leakage. Already, many large service stations have installed detection systems in anticipation of upcoming, tighter state and federal controls on underground tanks."

When OWRB Enforcement personnel respond to a complaint, they attempt to isolate the pollution source by interviewing tank owners or operators. Often, they require hydrostatic tank and line testing and/or the drilling of monitoring wells to verify leakage. Many times, hydrogeologic investigations are required to pinpoint the source and geologic profiles are obtained to predict the underground

movement of the pollution. But, according to Maiello, this can be quite difficult.

"Once a product is released, it is essential to fully understand the physical and chemical nature of it, how it interacts with the subsurface, and how it migrates through local geologic formations. But every situation is unique; geology varies so much from one area to another," he said.

Hydrocarbons, the most common pollutants, have extremely complex interactions with soil and groundwater. Thus, little is known about the possible consequences of leaking petroleum. Such problems, though, must be handled promptly.

Normally, cleaning up hydrocarbon-polluted soil and groundwater involves three steps: collecting the free product in the soil by pumping the lighter hydrocarbons off the top of the water table; using biodegradation, flushing or enhanced evaporation to remove the residual substance; and, the most difficult and costly phase, removing the dissolved hydrocarbons in the groundwater through evaporation. This third step is most commonly achieved by an air stripper which pumps the polluted water to the surface, filters out the volatile hydrocarbons, then releases gas vapors into the air.

Dealing with a fragile environment, time-consuming and costly clean-up procedures, and knowing "how clean is clean?" are just a few of the problems encountered in mitigating leaks.

Probably the biggest problem lies with the program's youth.

As yet, few regulations have been enacted to allow for punitive measures against negligent parties responsible for leaks.

"We need specific statutory jurisdiction to put teeth in the program and better coordination between state and local officials in preventing and mitigating subsurface spills and leaks," Maiello said. "Some federal officials have proposed a registration system for new tanks and a certification program to license those involved in installing and testing underground storage tanks."

More controversial proposals include the mandatory placement of leak detection devices in high-risk areas and the posting of bonds by tank owners and operators to cover the cost of a clean-up should a pollution incident occur.

All said, proper management and prevention seem to be the keys. When taking into account the severe threat of groundwater pollution, the carcinogenic nature of petroleum products and other environmental factors, it is imperative that something be done before pollution occurs. "Out of sight, out of mind" does not apply to leaking underground tanks; the problem is there, it is real and it must be addressed.



Dr. Church Foundation Formed

Eastern Oklahoma State College in Wilburton announces the creation of the Dr. Lloyd E. Church Foundation for Agronomy, Soil and Water Conservation and Forestry. It honors the 90-year-old retired Wilburton dentist and longtime Water Resources Board member who still vigorously promotes soil and water conservation.

The college invites friends, admirers and associates of Dr. Church to become charter members of the foundation which will assist deserving students who major in agronomy, horticulture or forestry and will support improvement of college pasture, forest and horticulture lands. It asks one-time gifts of money, or properties such as real estate, livestock, life insurance and securities or offers the option of contributing in a monthly, semi-annual or annual pledge.

Before his retirement from the Board in 1977, Church had served the Board two decades as chairman, vice-chairman and member.

Contributions to the Dr. Lloyd E. Church Foundation may be mailed to Dr. Jesse Mitchell, Eastern Oklahoma State College, 1301 West Main, Wilburton, Oklahoma, 74578. Further information is available by calling Dr. Mitchell at (918) 465-2361.



Dr. Lloyd E. Church

Sullivan Named Secretary

Former OWRB assistant director Glenn H. Sullivan was named Secretary of Natural Resources by Gov. Henry Bellmon last month. Sullivan, a registered professional engineer, assisted in developing water supply strategies for the "Oklahoma Comprehensive Water Plan" during his term at the Board.

He has served as executive vice-president and principal water resources engineer with the Benham Group, a national firm. As a specialist in wastewater and water resources development, Sullivan has testified before U.S. Senate committees on water resources matters. He has also served



Glenn H. Sullivan

as chairman of the state Chamber of Commerce Natural Resources Committee.

Sullivan comes to his cabinet position from a vice-presidency at Engineering Enterprises, Inc., of Norman.

ICWP Seminar March 10-11

The Fifth Annual Interstate Conference on Water Policy will be held at the Rayburn House Office Building in Washington, D.C.

According to James Barnett, ICWP Chairman and Executive Director of the OWRB, the seminar serves as a central voice in expressing to Congress and the Administration the needs and concerns of the 50 member states.

Invited speakers include Sen. Daniel P. Moynihan of the Environmental and Public Works Committee; Robert K. Dawson, Assistant Secretary of the Army; Maj. Gen. Henry T. Hatch, Director of Civil Works, U.S. Army Corps of Engineers; Speaker Jim Wright, House of Representatives; C. Dale Duvall, Commissioner of the Bureau of Reclamation; and Larry Jensen, Assistant Administrator, U.S. Environmental Protection Agency.

Compact Meeting Scheduled

On April 28, the OWRB will host the meeting of the Red River Compact Commission at the Park Suite Hotel in Oklahoma City. Oklahomans serving on that Commission are former OWRB member L.L. Males of Cheyenne and James R. Barnett, OWRB executive director.

According to J.A. Wood, OWRB Stream Water Division chief, it is a responsibility of his division to assist Oklahoma commissioners with background information on conservation storage projects, water quality and quantity. He said that the stream compacts provide a forum for the amicable solution of water problems and set out guidelines for the equitable division of interstate waters.

Oklahoma compact commissioners are appointed by the Governor, except for Barnett, who is entitled to serve as an ex officio member by virtue of his position as executive director of the OWRB.

Limestone Remedy for Lakes

Researchers seeking cures for lakes damaged by acid rain have discovered that adding a slurry of crushed limestone and water neutralizes the acidic water. The "cure" came so swiftly for

seven Massachusetts lakes treated last summer that new stocks of fish could be planted immediately.

Dropping a slurry of finely crushed limestone and water from a helicopter proves to be the most effective treatment. Coarser mixes sink to the bot-

tom, and other alkaline substances such as lime and caustic sodas are too caustic to be used with safety.

The limestone slurry was first used in Sweden several years ago to treat 150 acid-damaged lakes.

**ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS
AS OF JANUARY 16, 1987**

| PLANNING REGION LAKE/RESERVOIR | CONSERVATION STORAGE (AF) | PERCENT OF CAPACITY | PLANNING REGION LAKE/RESERVOIR | CONSERVATION STORAGE (AF) | PERCENT OF CAPACITY |
|-----------------------------------|------------------------------|------------------------|-----------------------------------|------------------------------|-------------------------|
| SOUTHEAST | | | NORTHEAST | | |
| Atoka | 93,642 | 75.4 | Eucha | 63,500 | 80.0 |
| Broken Bow | 917,533 | 99.9 | Grand | 1,329,710 | 89.0 |
| Pine Creek | 77,700 | 100.0 | Oologah | 544,240 | 100.0 |
| Hugo | 157,600 | 100.0 | Hulah | 30,594 | 100.0 |
| CENTRAL | | | Fort Gibson | 365,200 | 100.0 |
| Thunderbird | 105,925 | 100.0 | Heyburn | 6,600 | 100.0 |
| Hefner | 75,355 | 100.0 | Birch | 19,200 | 100.0 |
| Overholser | 15,935 | 100.0 | Hudson | 200,300 | 100.0 |
| Draper | 90,003 | 90.0 | Spavinaw | 30,000 | 100.0 |
| SOUTH CENTRAL | | | Copan | 43,400 | 100.0 |
| Arbuckle | 62,571 | 100.0 | Skiatook | 258,718 | 87.4 |
| Texoma | 2,637,700 | 100.0 | NORTH CENTRAL | | |
| Waurika | 203,100 | 100.0 | Kaw | 400,078 | 93.3 |
| SOUTHWEST | | | Keystone | 616,000 | 100.0 |
| Altus | 132,886 | 100.0 | NORTHWEST | | |
| Fort Cobb | 78,423 | 100.0 | Canton | 97,500 | 100.0 |
| Foss | 180,687 | 74.2 ² | Optima | 3,000 | 1 ¹ |
| Tom Steed | 88,971 | 100.0 | Fort Supply | 13,900 | 100.0 |
| EAST CENTRAL | | | Great Salt Plains | 31,400 | 100.0 |
| Eufaula | 2,329,700 | 100.0 | STATE TOTALS | | |
| Tenkiller | 627,500 | 100.0 | | 12,254,904 | 94.8³ |
| Wister | 27,100 | 100.0 | | | |
| Sardis | 302,233 | 99.9 | | | |

1. In initial filling stage
2. Temporarily lowered for maintenance
3. Conservation storage for Lake Optima not included in state total

Data courtesy of U.S. Army Corps of Engineers, Bureau of Reclamation, Oklahoma City Water Resources Department, and City of Tulsa Water Superintendent's Office.

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