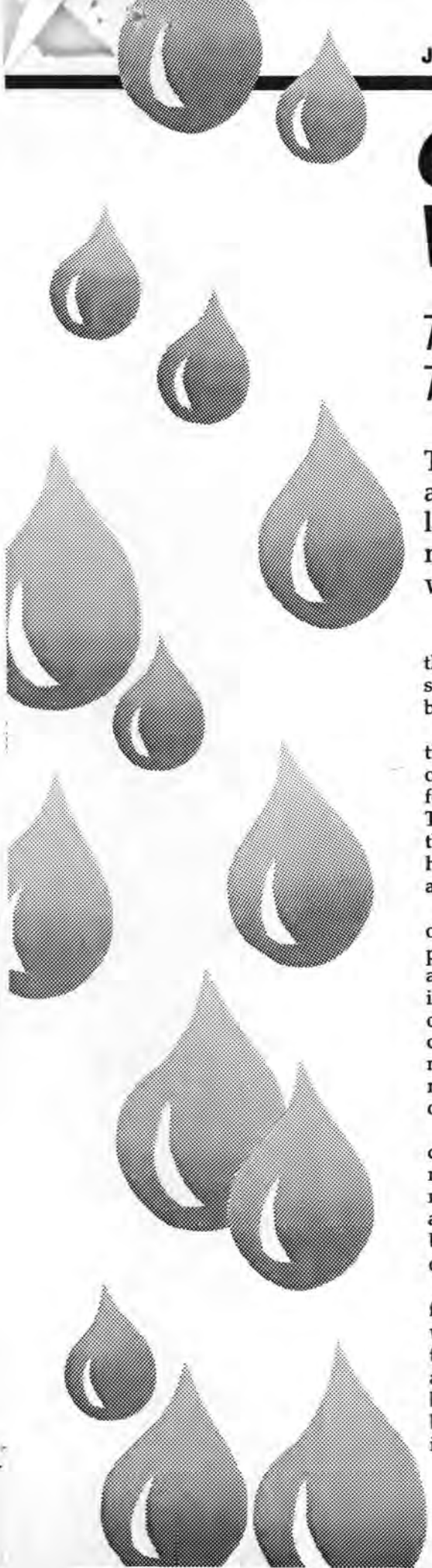
J.H. Foegen

Contaminated Water

The Trickle-Down Problem That's Welling Up Fast

Toxic chemicals disposed of by U.S. industry pose an increasing threat to underground water. Strict laws could reverse the trend, but consumers may need to turn to filtration devices to ensure that their water is safe.



Groundwater contamination in the United States is a major and still-growing threat to public well-being that must soon be confronted.

Underground geological formations called aquifers are the main—or sole—source of drinking water for nearly half the U.S. population. Those supplies are increasingly threatened by contamination from hazardous waste dumps, landfills, and other pollution sources.

An estimated 260 million pounds of toxic chemicals per *day* are disposed of in unregulated ways across the nation. Seventeen major industries, depended upon not only for needed products but for often-well-paid jobs, generate 35 million metric tons of such materials yearly, four times the volume of total stored nuclear waste.

Chemical contamination of underground water supplies has already closed more than 1,100 wells nationwide and affects every state, according to a 1984 report by the U.S. Congress's Office of Technology Assessment.

Louisiana has an especially difficult problem with contaminated water, due to tons of wastes containing potentially toxic heavy metals and organic chemicals that have been generated daily for decades by oil refineries and the petrochemical industry. While no provable connection has been established between oil and gas activity and the area's extensive water pollution, anxiety is increasing. State cancer deaths for white males are over 9% higher than the U.S. average, and 10 parishes (counties) in the oil producing and refining southern part of the state rank in the top 5% nationwide per capita among this group.

Present Precautions Not Enough

In the United States currently, the most common treatment used on groundwater is chlorination to prevent such diseases as cholera and typhoid. But this fails to detect or remove potentially dangerous organic chemicals.

While "common wisdom" has long held that water filtering down to aquifers through the ground is somehow cleansed, recent studies indicate that much of it is highly contaminated by toxic industrial solvents. Also, polluted underground water can remain dangerous for centuries since, unlike the surface variety, it does not enjoy self-cleaning due to dilution, circulation, and the effects of sunlight and water-dwelling organisms.

Evidence of the problem's extent, both nationally and locally, is accumulating rapidly, even though

Pipes and hoses carry away water pumped from contaminated site for treatment and disposal. This costly cleanup project might have been avoided by preventive measures.

OFFICE OF TECHNOLOGY ASSESSMENT

a nationwide monitoring system does not yet exist. Lacking is "a coherent, tightly coordinated strategy that would include authority and funding for comprehensive monitoring, locally oriented analysis and planning, and systematic pollution control through land-use regulations and discharge permits," according to Jon R. Luoma in *The Minnesota Volunteer*.

Current conditions are a "mind-bending" assortment of federal and state laws and regulations. At the federal level, the Clean Water Act, the Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Toxic Substances Control Act, and the more recent "Superfund" Act address the groundwater problem. At the state level—using Minnesota as an example—the Department of Natural Resources, the Department of Health, the Pollution Control Agency, the State Planning Agency, and the Geological Survey are involved. In addition, local governments can pass ordinances, and individuals can sue. Such a complex, piecemeal approach is certainly inadequate.

Most authorized programs, furthermore, are in their early stages and generally have narrow foci. More than 200 natural and synthetic substances have been detected in groundwater, but the federal government has established only 22 mandatory water quality standards, 18 for specific chemicals. Furthermore, both federal and state programs are directed mostly at protecting public drinking water supplies, but as much as 20% of the population may rely on private wells.

During the past decade, state officials and the Environmental Protection Agency have found more than 7,700 sites where underground water has been fouled, and as more wells are tested, problems increase. Of 466 checked during spring 1983, 28% showed cause for concern.

Cleaning Up Groundwater

America's groundwater contamination problem "has not yet reached critical proportions," but the nation must adopt a "much more aggressive policy" if the resource is to be saved for future generations, says the National Groundwater Policy Forum.

The Forum was formed to work out a comprehensive groundwater policy—an effort that will require a unique "new environmental partnership" among the federal government, state and local agencies, the private sector, and public-interest groups.

The Forum recommends the mapping and classification of aquifers, limits for levels of contaminants, controls on sources of pollution, water-monitoring programs, and effective provisions for enforcement of the new laws.

Concern for water's future is not limited to the United States, however. For example, the government of West Germany recently drafted a law to tighten pollution controls on drinking water. The new law pioneers a "minimizing" clause, which mandates that pollution of drinking water be reduced not only to the legal standard but *below* it when it is economically feasible.

Ed. note: For more information, see "Groundwater: Saving the Unseen Resource," available from the Conservation Foundation, 1255 23rd Street, N.W., Washington, D.C. 20037.

—Karen Penn

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Toxic Chemicals, Gasoline Pollute Groundwater

One specific problem involves an estimated 100,000 leaking, underground gasoline tanks. Environmental experts say they may be losing tens of millions of gallons of gasoline each year—and only one gallon a day, going into a groundwater source, can foul the supply of a community of 50,000 people.

Some major producers are taking remedial action; Exxon, for example, says it has been a pacesetter in conducting leak-prevention programs since the 1960s. Owning tankage at some 7,000 locations, it has upgraded or replaced such underground storage facilities at some 5,000 already, according to a company source, and a six-year program is to be completed in 1986. Cost per location has ranged up to $70,000. Despite such efforts by some, however, the overall threat remains.

Locations involving other than gasoline also are cause for serious concern. The Minnesota Pollution Control Agency alone has identified 41 illegal hazardous-waste sites where groundwater is known to be contaminated; it expects to find many more.

In one Massachusetts city, parents say water from wells fouled by industrial solvents—the most common and dangerous of such pollutants—has caused 20 cases of leukemia diagnosed over a 10-year period in one neighborhood alone. And on Chicago's far-South side,

"Only one gallon [of gasoline] a day, going into a groundwater source, can foul the supply of a community of 50,000 people."

two residential wells were found to contain potentially harmful levels of cyanide, a poison that can be fatal when consumed in even small amounts. A city health official noted, "You have to assume it's groundwater recharge out of the Little Calumet River," which is bordered by heavy industry.

Even supposedly clean industries are troubled. According to one report, toxic chemicals from semiconductor plants in California's Silicon Valley are seeping into wells and aquifers that serve 1.3 million people. Arsenic; phosphorus and boron, which are added to silicon crystals to improve conductivity; subsequent bathing in sulfuric and nitric acid solutions; and exposure to hydrofluoric and hydrochloric acids and trichloroethylene are involved, along with such toxic gases as arsine and phosphine.

Cleanup Is Costly, Difficult

Cleanup efforts to date have proved costly and difficult. One California firm, for instance, has spent some $20 million, and state engineers say major leaking of underground containers has yet to be curtailed. In fact, the dangerous material has already traveled more than two miles—and continues at up to 30 feet a day.

The federal government has been slow to act, and the remedial steps it has taken thus far have been inadequate. Congress, for instance, passed the Safe Drinking Water Act in 1974, but meaningful federal funding or incentives have been lacking.

One state, California, has finally responded with strong laws—but only since 1983, and after considerable damage had already probably been done. Reflecting the increasingly recognized risk, nearly all cities in Silicon Valley have now passed ordinances requiring double-walled storage tanks, strict leak monitoring, public disclosure of the nature and location of stored materials, mandatory reporting of leaks or spills, and protection of employee-informants from employer retaliation. The cost of doing all this, and of enforcing regulations, is bound to be high.

While such remedies are needed, as a practical matter they will probably have to be supplemented by filtration for many years. Contaminants deposited for decades have done—and are still doing—their nefarious work. Even if dumping of toxic materials were stopped completely tomorrow, a huge volume of dangerous material has accumulated and will eventually have to be dealt with.

Demand Grows for Water Filters

Many people have already turned to water filters. Increasing publicity about growing hazards can only make such use grow more rapidly. According to the Water Quality Association, which represents water-softening-equipment dealers and manufacturers, Americans spent around $700 million on water filters during 1983.

The most effective kinds, it says, use granulated, activated carbon, which sieves out suspended dirt and rust particles, absorbs organic chemicals from pesticides and herbicides, and changes potentially dangerous, large, chlorine molecules into innocuous chlorides. However, such filters will not remove bacteria, dissolved minerals, or metals, and if they are not changed often, filters could prove counterproductive by giving bacteria a fertile breeding ground.

Evidence of consumer interest is growing. One British firm, for instance, says the U.S. market is ready for its $250 water purifier, and a Chicago company sees volume increasing for its filtration devices that cost $15 to $35. A publication called *New Shelter* checked and rated 10 commercially available home filters and found considerable variation in ability to remove chemical pollutants. Drinking water can contain any of over 700 chemicals.

The problem of polluted groundwater may still be mostly out of sight, but it is no longer completely out of mind. Some think, in fact, that gradually increasing public awareness of, and interest in, exposure risks and their causes is the "strongest basis for optimism," as consequent pressure is brought to bear on government and industry to assure the future safety of vital water supplies.

Boom Likely in Water Filtration Equipment

As more and more people become aware of the spread of groundwater contamination, the demand for home water purifiers is likely to grow dramatically.

For those venture capitalists and risk-takers who "get in on the ground floor" of the water filtration business, returns could be handsome. Entrepreneurs and investors who are prescient enough to see what is happening, to note emerging technology and trends, and to act decisively may be the modern-day equivalent of the early investors in IBM and Apple Computer.

—J.H. Foegen

About the Author

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