

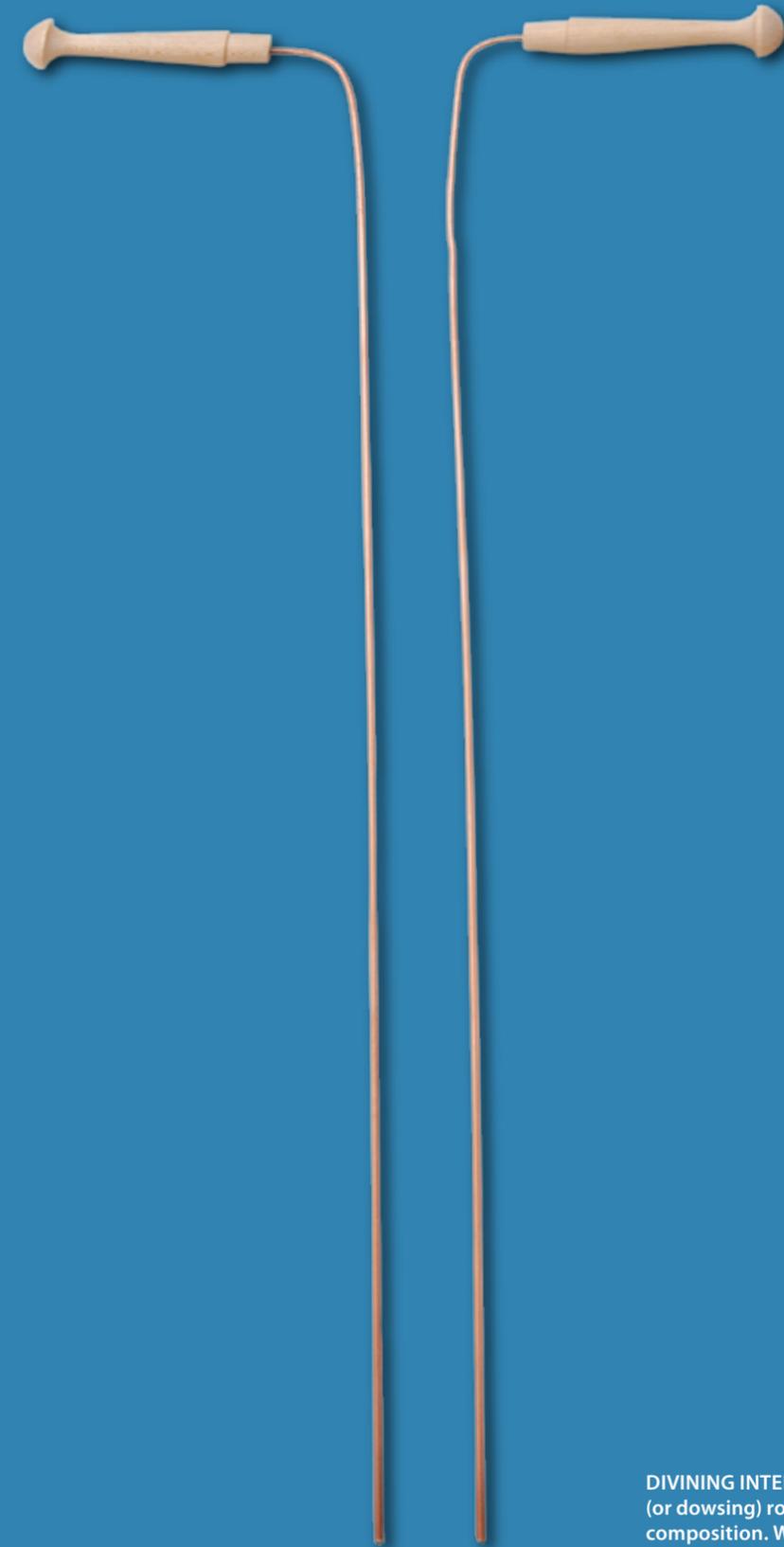
DRINKING

WELL

As rural communities abandon wells
in favor of municipal water,
the debate becomes muddy. by Sarah Bates

MEL SIMMONS stands in the sprawling grass field in the part of town where folks measure their property in acres. The stink of manure drifts from a neighbor's plot across the dirt road in Marcellus and hangs in the humid afternoon air. Before he sets up his 42-foot hydraulic rotary drill, he selects the best spot for a new well. Veins of water run deep below ground. He knows that below him rest a series of layers: clay, gravel, dirt, a bedrock of shale, and then the water followed by mixtures of sulfur, sand, and salt. If he drills in the wrong place or at the wrong depth, the well will run dry or produce foul water.

Simmons' knowledge comes from decades of working in the region. Hydrogeologists have mapped the aquifer system in central New York in great de-



DIVINING INTERVENTION: Divining (or dowsing) rods vary in length and composition. Well drillers may use brass rods (shown above) or make them from a forked willow or cherry tree branch.

WANDA LAU

tail, but to find the spot that offers the best chance of tapping into running water, Simmons follows family tradition. He walks to his van and pulls out his divining rod, a folk instrument that consists of two "L"-shaped, brass-wire wands. Holding them in front of his chest, he steps slowly across the land with his face fixed in wrinkles of deep concentration. Gradually, the rods drift apart as if pushed by an invisible hand.

Simmons stops. He's found his spot.

Thirty minutes later, the tip of the drill shoe thunders 36 feet into the earth. Red dirt coats Simmons' glasses, jeans, T-shirt, and skin. Without his yellow ear plugs, 35 years of the churning noise of the machine would have robbed him of his hearing by now. Occasionally, he clears his throat of the grit thrown into the air by the huge machine. The dust makes his lungs wheeze like those of a coal miner. He figures he needs to drill 114 more feet before dirt becomes mud. Twenty years

ago, when the loghouse stood alone on the road, Simmons dug 55 feet for the property's first well. As the neighbors moved in and built their own wells, the water supply dropped. Without the clean flush of deep, flowing water, wells run dry or fill with sediments. These days, drillers must reach deeper and deeper into the ground to accommodate the growing population of thirsty mouths that drink more and more from the same underground source.

Similar scenes play out all across rural areas in New York. Anywhere from 20 percent to almost 60 percent of households in central New York counties drink from wells (compared to the amount of people in New York who rely on wells, which is roughly the same as the national average and the same for Onondaga County, one of the most urbanized counties in the region — 10 percent). But in the string of smaller towns that dot the region, fewer and fewer people demand Simmons'

It's like in the old Westerns
at the cowhand saloons:
It's more money for
a glass of WATER
than a glass of whiskey.

services, a fact that marks a change in the water culture of this area. The U.S. Geological Survey of water use estimates that, between 1950 and 2000, the number of people who used wells decreased from 38 percent to 15 percent of the total population. Over the same period of time, the amount of water drawn from wells increased by 71 percent, reflecting the increase in demand by those with wells.

As population and water usage increase and prompt shared groundwater to run low, municipal water — a steady stream of treated water piped in from the nearest city — becomes a tempting alternative with cultural ramifications. Townspeople view wells as nuisances to tolerate until the city rescues the population by installing water meters that offer a common and trustworthy water supply. More rural folk see wells as a statement of independence and a source of more "natural" water, but the recent need to drill deeper to find potable water creates concern and a decided uneasiness. As municipal pipes snake farther out into the rural communities, some welcome them, others resist. Regardless of which side of the well issue residents stand, new water infrastructures upend a community, creating economic opportunities, eliminating others, and prompting political and health debates that foreshadow what scientists and researchers refer to as the coming global water crisis (see sidebar: Water Wars). But for now, the state of wells in the rural parts of central New York serves as our region's canary in the coal mine and offers a telling look at this area's water culture.



A Town with Troubled Waters

Bristol offers more bed-and-breakfasts than seems necessary for a town its size and boasts manicured fields ripe for spur-of-the-moment baseball games. It also serves as the perfect example of how drinking water can alter the balance of power and money in a community. Set in the hills southeast of Rochester, Bristol supports a population of about 2,400. Almost a decade ago, many residents started clamoring for access to municipal water and carping about the quality and quantity of their well water — with good reason. Town supervisor Wayne Houseman said standard lab tests on many of the wells showed elevated levels of coliform, a bacterial indicator of more harmful germs, and E. coli, a bacteria that signals the presence of feces.

Many sources caused Bristol's water trouble. The city's shallow "dug wells" proved particularly susceptible to bacteria, and the town's steady population increase prompted greater individual water usage. A pocket of groundwater that can produce plenty of water for a family of four may prove inadequate when that same family demands water for showers, washing machines, dishwashers, and garden hoses. To illustrate the problem, Don Siegel, a hydrogeologist at Syracuse University, likens this common situation to a giant sponge filled with malted milk. "You have all these straws in it and all these kids sucking from it," Siegel says. "And one kid can suck on it for a long time and have a nice satisfy-

ing drink, but if you have a whole bunch of them and you tell them the straws can't go any deeper, then you drop the level down." The town government lacked funds to pay the more than \$2.1 million bill for the equipment to pipe water from the nearest supplier — the city of Canandaigua — so the project to link Bristol to a municipal source stalled. Residents who could afford it paid for home chlorination and filtration systems to clean their water. Others subsisted on bottled water from Wegmans grocery stores. When drought set in two years ago, people hauled tanks of water in on pickup trucks from surrounding towns. Then, last year, Bristol received a \$1.2 million state grant to cover part of the cost. Before 1988, both federal and state governments allocated considerable budgets (about \$4.7 billion annually) to support loans and grants to help communities finance municipal water systems. But legislators have tightened their belts since then. Only communities that show "sufficient need" for city

What's happening now
will happen someday
to every town when
the population
reaches a tipping point.



IN THE FUTURE, wars might be fought not for land or ideology, but for an increasingly rare liquid that isn't oil. More than 1.2 billion people worldwide lack clean drinking water. Scientists predict climate change, combined with population growth, will lead to even greater shortages.

"Water will be the greatest problem for humanity in the next decade," says Don Siegel, a hydrogeologist at Syracuse University. "The next Middle East war will be over water."

In 1999, the World Commission on Water for the 21st Century reported that more than half of the world's major rivers are polluted or going dry. Poor management of shared waterways makes the problem worse. Because of overuse in the western United States, for example, the Colorado River is little more than a trickle when it reaches Mexico.

"A paper in *Science* this month argues compellingly that the American West will go into a Dust Bowl drought for perpetuity," Siegel says. "And how we're going to adjust to that as a society, I don't know."

"On the happy side, in New York, pretty much all the models say weather is going to be terrific," he says. "We're going to have climate like we have now, or maybe a little bit wetter. It's likely people will be moving back Upstate, because we'll be water rich."

The *Buffalo News* agrees with Siegel. "With careful attention, the Old Rust Belt could become the New Water Belt," an editorial commented earlier this year. A proposed agreement between eight U.S. states and two Canadian provinces could create a legal wall around the Great Lakes. If ratified, the agreement will: ban any new water diversions from the Great Lakes, require each state and province to establish conservation programs, and require registration before withdrawing 100,000 gallons of water (about one-sixth the amount of water in an Olympic-size swimming pool).

The Great Lakes contain an estimated 90 to 95 percent of the fresh surface water in the United States. If ever faced with a war over water, it looks like we are well positioned for a fight.

— Jim Baxter

water earn government support. Victims of natural disasters or industrial pollution earn prime spots on the request list. It took Bristol 10 years to qualify.

Even so, the new construction lacks universal enthusiasm. The system serves only a small area of Bristol — the "most needful" — and any of the 87 people in that section of town face a tough choice:

hook up and pay \$840 per year for 35 years (plus the cost of water and equipment installation), or reject the line, pay a new fee for extra fire protection, and depend on well water only. Suddenly, water becomes an expensive commodity. "It's like in the old Westerns at the cowhand saloons," Houseman says. "It's more money for a glass of water than for a glass of whiskey." The heavy expenses involved in the construction of the partial municipal system make many wonder why the government doesn't subsidize

the cost of individual household water filtration systems instead. A 1,200-gallon carbon filtration system — which can be hooked up to an existing well — costs less than \$500, with annual filter upkeep less than \$100. That's far less than the bill

Bristol paid for miles of pipes and labor (and quicker, too).

The city offers residents a choice between municipal water and the status quo. Those who can join the new system, will, Houseman says. That includes him. The newly created Canandaigua-Bristol Water District means a steady paycheck from Bristol to Canandaigua, which

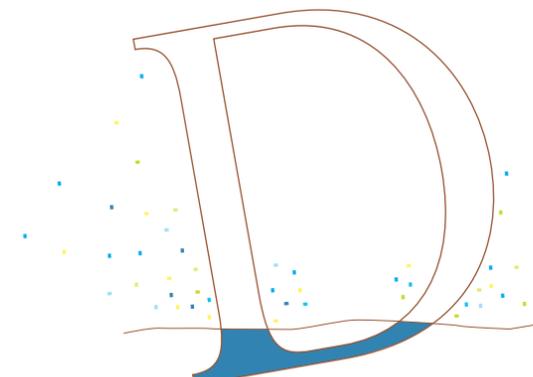
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owns the water, but it also means new revenue in water taxes for the town. The municipal system will never replace all of the rural wells, Houseman predicts, because the water can be pumped only so far before water pressure loses out to hilly

terrain. Maria Redzinski of the Ontario Planning Department says the municipal pipes may already be overextended. "For a somewhat rural county, we've got water lines up and down these hills," she says. "It's extremely expensive to extend water service on a per capita basis."

Redzinski suspects some people will tolerate the high (and many say unnecessary) cost of going municipal because of the added convenience. They prefer to let the government handle the water worries. Amy Galford, water specialist with Cornell Cooperative Extension, says that in the absence of money concerns, every home would choose municipal water. "In an ideal world, you want to use water that has gone through a water treatment plant that is under EPA and DEC regulation," she says. "But people in the city are

not willing to help pay for water in rural areas." So the economic burden falls largely on the small-town citizens. As a result, some communities will have to go without a municipal water supply for the time being.



Deep Impact

Compared to municipal construction, building a new well comes cheap. Drilling costs the most. Though dug wells still number in the thousands in central New York, "drilled wells" are steadily replacing them, largely to avoid surface contaminants, but also to tap more groundwater. The depth of drinkable water and the geology of an area determine the exact cost of a well. In other words, it's the rocks that call the shots. New York offers prime water drilling territory compared to most other states. In some states, like Oklahoma, drillers go as far down as 2,000 feet to reach drinkable water. In Florida, almost all water tastes strongly of sulfur regardless of depth. Drillers in New York, on the other hand, rarely go deeper than 150 to 200 feet.

Even so, it takes a skilled driller to navigate underground and find untainted water. Beneath the surface in many places, a layer of salt water resides a few hundred feet down. In western New York, that salt water is actually brine — water

that's 10 to 30 times saltier than seawater. Any driller who delves too far down eventually strikes this undrinkable mixture. Near Seneca Lake, the water at that depth is contained within rocks riddled with sulfur, giving it a rotten-egg smell. In other places the water becomes excessively "hard." Hard water contains large amounts of dissolved calcium and magnesium. Drillers have to strike a balance between going deep enough to protect the well from surface contaminants and staying shallow enough to remain within the pocket of potable water. So while the favorable geology of New York lends itself nicely to water wells, a knowledgeable driller, such as Simmons, remains a necessity. Hiring one makes up a large part of the cost of any new well.

Unfortunately for consumers, that cost has risen lately. A few years ago, the state passed legislation requiring all drillers to earn certification by the NYSDEC, which involves fees, paying for and passing exams, and complying with equipment and usage guidelines. These new expenses are now largely passed on to the customer. While such official monitoring reduces the number of "below-the-board" bargain drillers, only about 300 certified drillers remain to service the entire state. Despite the drop in well usage, demand remains high for this small group, and they charge a premium price for their services. The cost of drilling and pump installation varies from \$5,000 to \$10,000 for a residential well. One Bristol well owner says he paid about \$1,200 for his 120-foot well

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WELL WORTH IT

IF YOU'RE A WELL OWNER, the health of your family shouldn't depend on the odds that your water is safe. One test could make a big difference.

Private wells are not monitored by any government agency, but the EPA recommends that owners bring a sample of their well water to a commercial lab at least once a year — more if the water's taste or smell changes. Many owners, however, admit that even the occasional tests are rarely done. Although a drive to the closest lab is sometimes inconvenient, a basic lab test to screen for coliform and E. coli costs only about \$30.

Sometimes, the tests are even cheaper. Cornell Cooperative Extension offers annual educational workshops in several counties where owners can test their water for just \$15, but only a small group of people consistently comes. "Some folks do come to the well workshop every year, but most folks don't test often," says Amy Samuels of CCE. Of those who do, few samples test positive for coliform or E. coli, she says.

Certified well inspectors also make house calls. It's important to check well equipment in addition to the water. An inspection by a New York state-approved laboratory should include:

- Water quality tests that meet the standards of the NYS Department of Health
- A flow test to measure water levels and output
- An inspection of well equipment to make sure it's clean
- A written report that explains the results should be given to the well owner and the NYS DH.

Additional tests are required if water is cloudy or oily. To arrange for a checkup, contact the Empire State Water Well Drillers Association at 315-339-8960 or online at www.nywelldriller.org.

— Jim Baxter

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around five years ago and claims his neighbors have been quoted \$7,000 for a new well this year. "A lot of guys used to do it under the table for a lot less, and those guys are gone now," he says.

After the initial cost of pump setup and drilling the hole, relatively cheap upkeep and testing are the only additional expenses (see sidebar: Well Worth It). The costs are even less for well owners who test their wells infrequently. The people who don't test usually aren't worried enough about the quality of their water to make the drive. "Seems folks who have lived in the area with a well for a long time feel comfortable with it," says Amy Samuels of CCE. "If people move out here that are used to municipal, they feel uncomfortable because of the maintenance and the strange taste." Those people insist upon getting city water even if it's not in their best economic interest, so the number of wells continues to drop.

The health risks of lax well testing partially depend on who drinks the water. Families with newborns have to be especially cautious. A large amount of nitrates, a form of nitrogen that results from the decomposition of waste or nitrate fertilizer, is normally safe for adults. In the bodies of developing babies, however, they convert to nitrites. Nitrite exposure leads to "blue baby syndrome," a dangerous condition in which the function of red blood cells is disrupted and anemia sets in. But even if elevated levels of nitrates are found in a well, water treatment methods can remove them. John Hassett, a well owner and professor of aquatic chemistry at SUNY-ESF, says that occasional tests are enough to catch most dangerous substances. He admits that he didn't have his well tested until his first child was born, when he was concerned about nitrate levels.

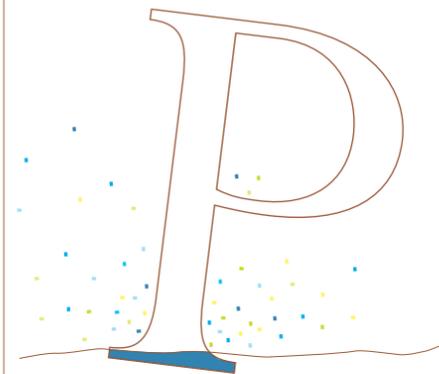
In any case, problems with nitrates extend beyond wells (municipal systems harbor the same susceptibility). Hassett says that most water problems in central New York, especially those in the public water supply, stem from nitrates. The earth exists as a natural filtration system, and the groundwater replenishing the wells moves at a snail's pace. Unless a contamination site is located

right next to the source a well draws on, more chemicals are usually found in the surface water supply used by municipal systems. Bodies of water, like lakes, rivers, and streams, are thus likely to test positive for nitrates long before the contaminants seep into groundwater. "In reality, private well owners have a better handle on water than municipal systems do," says Tom Bates, president of Empire State Water Well Drillers' Association. Scientists agree with Bates. As it turns out, municipal systems don't always have cleaner water. If well water is cheaper and just as clean, the decision of so many rural communities to move to municipal water before urbanization demands it seems puzzling.

Nonetheless, the change continues all across the state. Beyond Bristol, other small towns are joining the rush to go municipal. The town board of Manchester recently approved a 10-mile extension of the water line that supplies some of its 3,815 households with water from Rochester. The town's assessor estimates that 774 households have access to private wells. The additional line — originally estimated to cost \$1.8 million aided by a \$350,000 grant — will replace sources of groundwater that have become "scarce." The connection fee for residents will be at least \$1,000. It's unknown how many residents the new water line will serve, but the more the costs are added up, the more it becomes apparent that building the infrastructure necessary for getting municipal water to rural areas quickly becomes expensive.

The politics of water extend far beyond small towns and all the way to the White House. The federal Clean Water Act has been revised several times since its enactment in 1972. While the consensus is that a basic structure for regulating pollutants into waterways is absolutely necessary, some local scientists and drillers argue that the state and federal governments' regulations regarding water have become too stringent. The New York State Assembly recently passed a law that will require all property owners to test the drinking water from private wells before a house is sold. It also establishes a private well-testing program that specifies

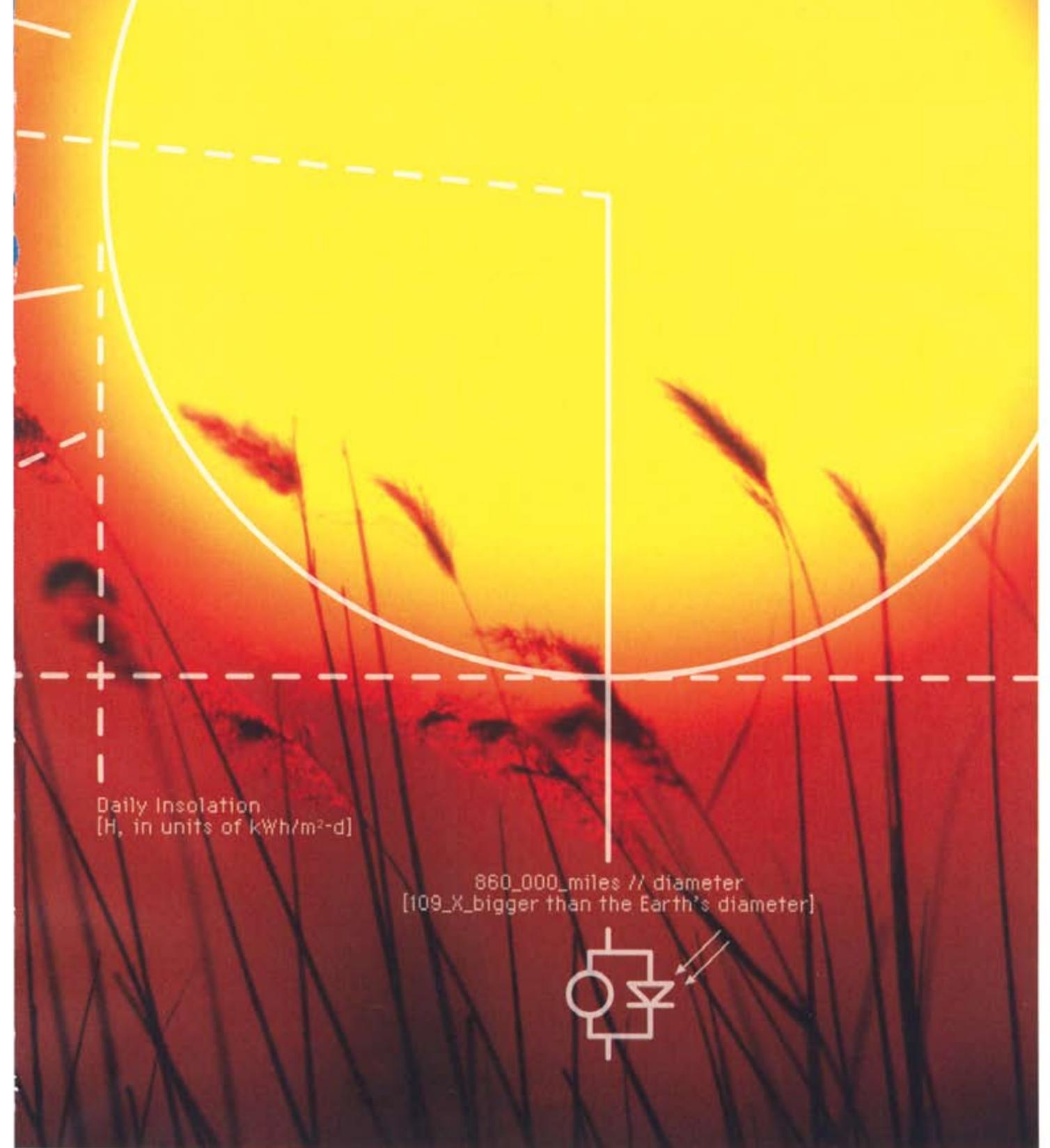
the materials that must be tested for. The next step may be mandatory annual testing. "New York has a tendency to swing like a pendulum very far in different ways: very lax to very strict," Bates says. "Now they want test results in five days. You can't get it back in five days. It's impossible." The new crackdown on private wells comes at a time when wells are not only still safe sources of drinking water, but small towns are joining strictly controlled municipal systems anyway.



Power of Preference

The spring on the side of Route 79 near Lisle holds few similarities with the images of idyllic springs pasted on the sides of Poland Springs and Arrowhead brand water bottles. Cold, clear water gushes from a PVC pipe that sticks out of the side of a mountain. Cigarettes and trash sit scattered on the ground below the pipe. The hundreds of people who visit the spring every day believe it's better than what comes from their kitchen faucet. On a sunny Saturday morning in May, the spring remains crowded. Every few minutes a car pulls off the road, and its occupants hop out toting empty containers to be filled with spring water. A few children and dogs drink straight from the pipe. No one questions the safety or purity of the water, and no one asks if local officials test the water. If their neighbors have consumed it for 50 years, they figure it must be safe enough.

Consumption — be it soda or more noble drinks — relies on preference and taste. Those caveats also play a role in the use of water. John Beaulieu and his daughter Breanna arrive at the spring



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in a white Chevy Beretta with their dog, Brown. They drove from Whitney Point, a town a few miles down the road. Beaulieu says he's visited the spring every week for eight years. His family doesn't drink the water pumped from their 150-foot well at home — it reeks of sulfur and has a copper taste and color, he says. He collects all of their drinking and cooking water in milk containers before leaving.

The next two people who stop at the spring have municipal water in their homes. They come because they dislike the taste of the water from their taps. One man brought two dozen jugs from Endicott to replace his treated water. "It tastes better than water with all the chemicals in it," he says. "When I make coffee with it, it's like night and day." He first tasted the spring water 50 years ago with his brother and has been coming back for it every week since. Visitors travel miles from their homes to drink from a spring of unknown cleanliness, solely because it tastes better to them. For some New Yorkers, personal taste dictates whether they pay for municipal water or manage a well. As unpalatable as people find them, chlorine and other chemicals have revolutionized water in America to the point where most serious contaminants — and therefore diseases — can be avoided. Shortly after chlorination was first instituted in Philadelphia in 1913, other water treatment systems followed suit. It drastically changed our society. "Now, for the first time in human history, clean, potable water could be had by just about anybody in the United States," says Francis Chapelle in his book *Wellsprings: A Natural History of Bottled Spring Water*. "It was a triumph of American ingenuity and technology over the most pervasive problem in human history." More Americans will have to become accustomed to that chemical taste as population increases necessitate the pumping of municipal water to dry communities. Even though people care about the taste of their water, they may ultimately have to abandon it as a serious criterion of evaluation.

The next great concern for water experts and health officials, Hassett says, is synthetic chemicals in the water supply. These contaminants could seep into both

surface and groundwater reservoirs. He cites the widespread use of the pesticide DDT and the industrial cooling fluid PCBs as two examples of commercially produced chemicals that made their way into the environment and are now identified as possible carcinogens. "Especially in groundwater, you have to be vigilant about keeping that sort of stuff from getting in there," Hassett says. Many regulations are now aimed at doing just that. "With things like PCBs and DDT, it's more about keeping them out of the environment, period." The next wave of possibly harmful chemicals is in the form of pharmaceuticals, cosmetics, and antibiotics. Scientific studies in the United States and Canada have already shown that synthetic and natural estrogen hormones are making their way into the waterways and altering the sex ratios of fish.

For the record, Hassett now drinks municipal water. "It's less of a hassle," he says. He thinks it is inevitable that everyone will eventually drink municipal water, regardless of whether it's more or less safe at the moment. What is happening now in towns like Bristol will happen someday to every town when the population reaches a tipping point. That snapshot of the future offers many implications — one of which brings us back to Simmons. If the number of wells in New York keeps decreasing, all drillers will be out of business one day.

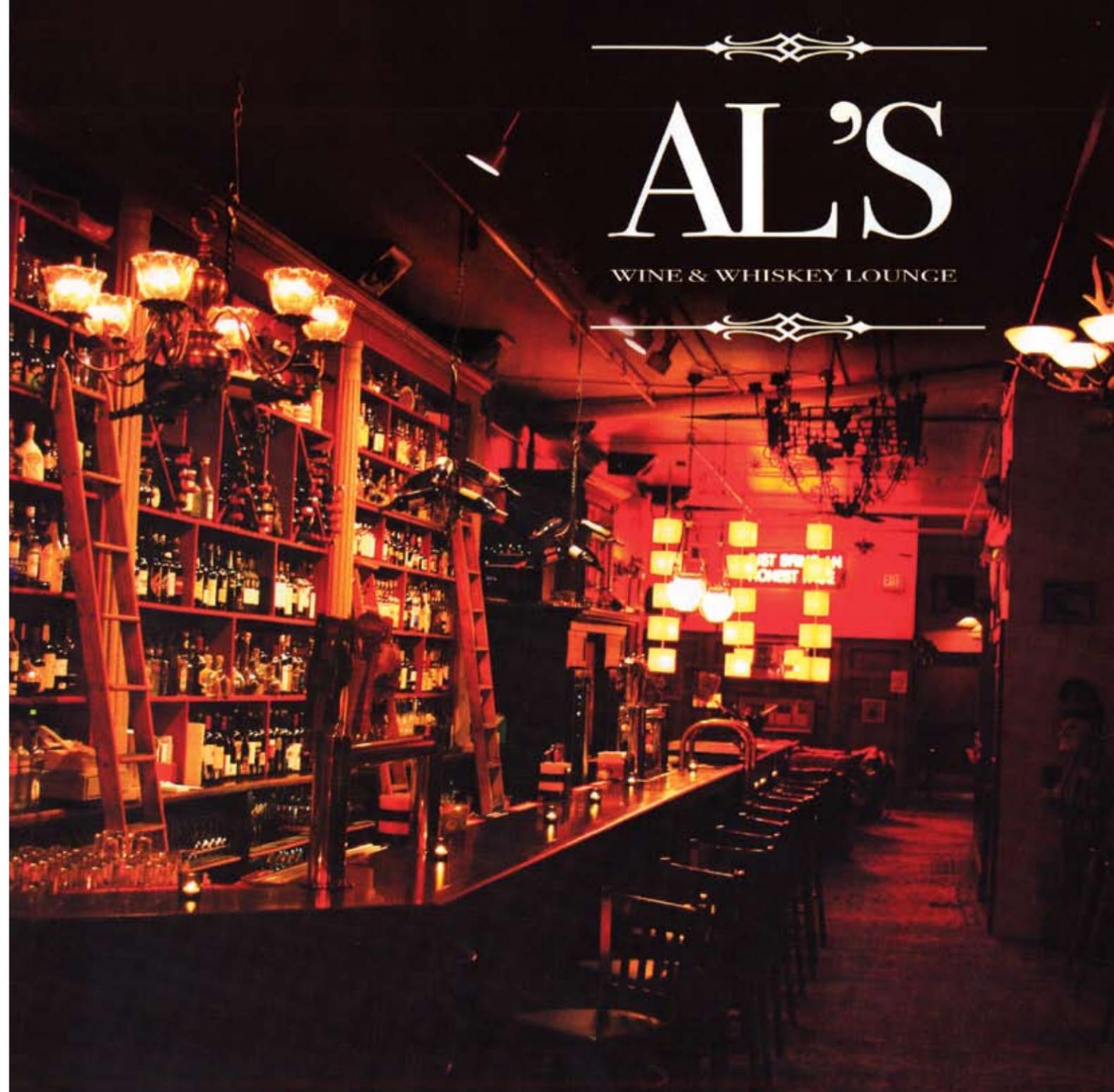
When drillers strike water, it erupts up out of the hole like a geyser. Sometimes Simmons and his crew get so muddy they have to spray each other with a nearby garden hose to clean up. That doesn't happen as much as it used to. At the peak of his business, Simmons drilled 140 wells a year. Now, he's down to fewer than 50. The lighter schedule is only partly by choice. "It's not as busy now as it used to be," he says. "All those little country towns are hookin' up to municipal systems — more'n I can count. It cuts into our business." He takes off his glasses and wipes at the dirt. "I'm 64," he says. "I'm much too young to be this old."

On that humid day in Marcellus, there is no geyser. By late afternoon, Simmons calls it a day. The water, he figures, will be there tomorrow. ■

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