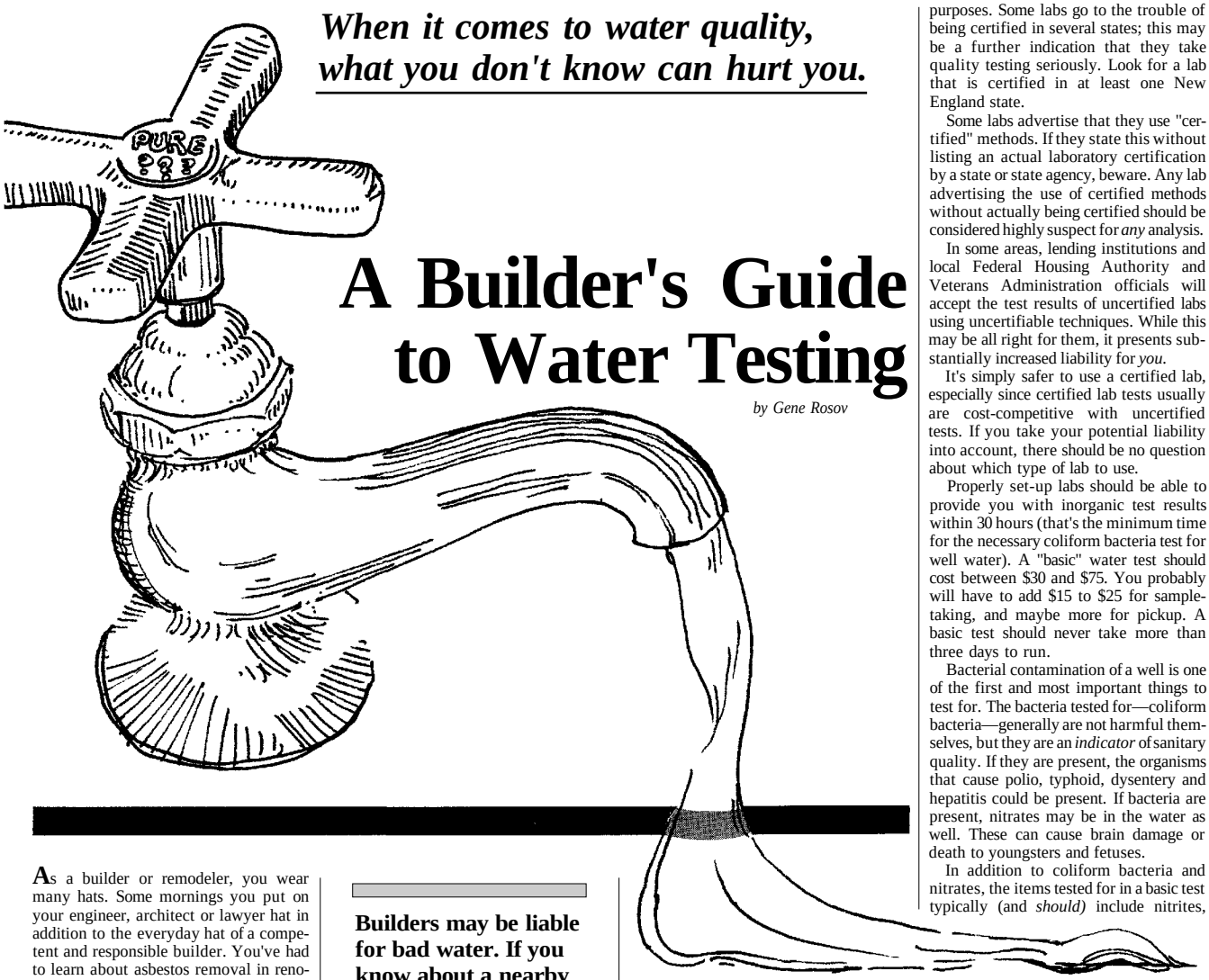
When it comes to water quality, what you don't know can hurt you.



A Builder's Guide to Water Testing

by Gene Rosov

As a builder or remodeler, you wear many hats. Some mornings you put on your engineer, architect or lawyer hat in addition to the everyday hat of a competent and responsible builder. You've had to learn about asbestos removal in renovations and about fire protection and toxic fumes from PVC piping. You've had to learn that urea formaldehyde is a no-no for wall insulation and carpet underlayment (to say nothing of paneling and sheathing), and you've had to learn how to prevent being sued for malpractice.

Now it's time to add another hat to your wardrobe—the water-quality hat—for builders may be liable for bad water. The legal concept of "due diligence" prevails in many circumstances.

For example, if you know about a nearby toxic-waste dump or gasoline spill and don't test for toxic chemicals and gasoline before digging a well, you may be lining yourself up for a lawsuit. Since the liabilities may involve potentially serious health effects and potentially life-threatening situations, the prudent builder will take steps to avoid liability—and chief among these is having the water tested by a certified lab.

Pollution & Lead Solder: Two Prime Culprits

What's causing the water-quality problems we hear so much about today?

First, private and public water supplies throughout the U.S. are starting to feel the impact of two centuries of industrialization. The federal Environmental Protection Agency (EPA) has found that some groundwater in every state has problems, and that most states have some serious and health-threatening problems in private wells and public supplies. The problems include herbicides, pesticides, and more typically the by-products of industrial wastes: chemical solvents and heavy metals.

The solvents are chemicals now familiar to most of us: carbon tetrachloride, trichloroethylene, benzene, chloroform and methylene chloride. The heavy metals include lead, arsenic, mercury, cadmium, chromium and selenium. They come from any of the 186,000 industrial toxic-waste lagoons, the 100,000 landfills or the 100,000 leaking underground gasoline tanks spread throughout the nation. Most of these solvents and metals increase our risk of cancer; they also can make us feel terrible.

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Second, health officials now realize that lead-soldered copper pipes can contribute high and continuing levels of lead and copper to drinking and cooking water. Lead levels in new plumbing tend to be higher than in older plumbing, unless an old lead service pipe connects the well to the house.

In some cases, high levels of copper can be toxic to infants and other sensitive population groups. This is uncommon, but it happens. Lead and other "corrosion by-products" present a clear and immediate health threat, particularly to youngsters and pregnant women.

Properly and carefully soldered pipe joints generally will *not* have problems. But if the water is very corrosive—low in pH (acidic), very soft, low in dissolved solids, and high in chloride and/or sulfates—copper and lead can be sucked from the pipe materials and be dissolved in the water. When highly corrosive water is involved, expert soldering will be of little help; lead will get into the water from the solder joints regardless of what you do.

You can avoid the lead problem altogether by using silver solder—and it is *highly* recommended that you at least use silver solder in pipes connecting the incoming supply line with the kitchen tap (which is the main source of household drinking water).

Some states are requiring the use of silver solder throughout new dwellings, and the federal government recently passed a law aimed at requiring it in *all* homes supplied by community water systems. The law is scheduled to take effect later this year; it first must be adopted by the states.

There are ways to avoid problems through preventive plumbing and septic design, which we'll discuss later. But first, let's look at the critical issue of water testing.

Finding a Good Lab

Fortunately, you can find out about water problems and take steps to remedy them. There are several labs throughout New England that are qualified to test and to recommend solutions.

The qualities you should look for in a lab include certification, fast turnaround time and, of course, reasonable cost.

As of this writing, all New England states (with the exception of Vermont) now have certification programs. By mutual agreement, the states will accept the test results of other states for certification purposes. Some labs go to the trouble of being certified in several states; this may be a further indication that they take quality testing seriously. Look for a lab that is certified in at least one New England state.

Some labs advertise that they use "certified" methods. If they state this without listing an actual laboratory certification by a state or state agency, beware. Any lab advertising the use of certified methods without actually being certified should be considered highly suspect for *any* analysis.

In some areas, lending institutions and local Federal Housing Authority and Veterans Administration officials will accept the test results of uncertified labs using uncertifiable techniques. While this may be all right for them, it presents substantially increased liability for *you.*

It's simply safer to use a certified lab, especially since certified lab tests usually are cost-competitive with uncertified tests. If you take your potential liability into account, there should be no question about which type of lab to use.

Properly set-up labs should be able to provide you with inorganic test results within 30 hours (that's the minimum time for the necessary coliform bacteria test for well water). A "basic" water test should cost between $30 and $75. You probably will have to add $15 to $25 for sample-taking, and maybe more for pickup. A basic test should never take more than three days to run.

Bacterial contamination of a well is one of the first and most important things to test for. The bacteria tested for—coliform bacteria—generally are not harmful themselves, but they are an *indicator* of sanitary quality. If they are present, the organisms that cause polio, typhoid, dysentery and hepatitis could be present. If bacteria are present, nitrates may be in the water as well. These can cause brain damage or death to youngsters and fetuses.

In addition to coliform bacteria and nitrates, the items tested for in a basic test typically (and *should)* include nitrites, chloride, fluoride, iron, manganese, copper, sodium, and water hardness and pH (acidity). This is the test typically required by banks, mortgage companies and government loan programs.

More Comprehensive Tests

Beyond the basic test, a comprehensive "inorganics" test for lead, arsenic and other toxic, heavy metals is desirable and certainly should be done in parts of New England where arsenic is common (particularly in northern Massachusetts and southern New Hampshire). Because lead can be found anywhere, it should be added to all of your basic testing requirements.

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Some labs will add lead to their analysis for $15 to $25, with similar prices for arsenic. (The city of Windham, N.H., now requires an arsenic test for all new wells

and for all property sales, and several towns are expected to follow suit in the near future.) Special "graphite-furnace, atomic-absorption instruments" are required for a lead and arsenic analysis, and many labs do not have this high-technology capability. If the lab does not analyze for lead and arsenic on a routine basis, the results may be suspect.

In addition to testing for lead, arsenic and the other "basic" items, a comprehensive inorganics test should test for mercury, selenium, cadmium, zinc, chromium and barium at a minimum. Comprehensive inorganics tests cost from $75 to $400. Pickup and sample-taking may add $15 to $50.

A few labs in New England offer toxics testing as well. Sophisticated equipment and skilled lab techniques are required for toxic solvents and pesticides, and lab certification is an absolute must here. The compounds tested for include industrial solvents such as carbon tetrachloride and trichloroethylene, gasoline compounds such as benzene, and chlordane, lindane, endrin and other highly toxic pesticides.

Labs do these tests in EPA-specified groupings. Solvents tests (called "toxics" and typically including 26 volatile, chlorinated solvent chemicals) run from $75 to $200. Special glass bottles with Teflon tops are required. Without them, the analysis is invalid.

These test groups typically take from one to four weeks to analyze; some labs are faster than others. Make sure that the lab is certified to perform these tests prior to engaging the lab and paying the fees.

Certified Sampling Techniques

When arranging for water tests, the standard practice is for the contractor (or home owner) to take samples and send them to a lab for analysis. But it is not enough merely to collect water in bottles and ship them off.

The EPA requires that samples for reporting purposes be properly preserved and transported—and analyzed in time for valid results. For metals analysis (lead, mercury, chromium, iron, manganese, arsenic, etc.), samples must be collected in special plastic bottles and preserved with high-quality nitric acid.

Similarly, another preservative—sulfuric acid—must be added to the container for nitrate analysis. Bacteria-sample containers must be chilled in transit to the lab. If they are not, the bacteria die quite quickly, and the test may show that there is no problem even if the water is in fact polluted.

Unless these measures are taken, the results simply are not valid—and in the absence of valid testing, you will substantially increase your liability. Certified labs are required by their certifications to provide proper preservation and transport of samples.

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Well-Drilling Precautions

In addition to testing well water for contamination, there are steps builders can take to minimize the likelihood of problems.

First and foremost, select a good site for the well. The site should be:

- Uphill from septic systems and other potential pollution sources.
- Protected from runoff from roads and fertilized fields. Swales or embankments may be necessary, but neither can beat a good uphill location.
- Relatively close to the house for convenience of electrical and plumbing service.

If you're not absolutely clear on the best well location, don't ask the driller—ask a civil engineer. It may cost you $50, but it could save you thousands.

Second, pick a well driller with a good reputation. Take the time to check around. Insist on a reliable timetable that meets your requirements. If you're flexible, however, don't make unreasonable demands on the driller.

Make sure the driller chlorinates the well *thoroughly.* A lab should be able to provide you with detailed information on proper chlorination techniques.

Third, be aware of toxic-chemical problems in the area. A quick check with local health officials, town sanitarians and state environmental officials is 15 minutes on the telephone well spent. You may find out that a test for certain contaminants is important, which can prevent you from building an unsaleable property or installing a worthless well. No one wants to live in a polluted area.

The office of hazardous-waste management or the office of groundwater protection for any given state often can provide a map of toxic-waste sites. It probably goes without saying that you'll want to avoid building on properties near these areas. Some labs maintain a national database of information on local environmental problems. Sometimes the state laboratories also can help.

In addition, it might be a good idea to talk to the local newspapers—particularly environmental reporters, if any are available. They'll give you the "straight skinny" in a hurry.

Finally, once you've selected a good site and drilled the well (and selected a certified lab with a good reputation), test the quality of the water. Run the well *for at least three full days* before testing the first time. Wells get grossly contaminated during drilling, and thorough "running in" will avoid the expense of unnecessary retesting. Be prepared for at least one bacterial retest, and most likely two complete analyses, however, before a satisfactory test result can be achieved.

Preventive Plumbing & Septic Design

Preventive plumbing and septic design also can help you avoid problems. There are several considerations here:

- Low-water-use toilets can save septic systems *and* water supplies. In general, the less water use there is, the less likelihood of "fouling the nest." Low-flow shower heads also are appreciated by thoughtful home buyers—and by their septic systems.
- When installing the plumbing, run a separate line from the incoming piping to the outside garden-hose taps. If water treatment becomes necessary, there is no reason to treat the water for outside use.
- Again, use silver solder for kitchen-sink lines if at all possible. This will avoid lead contamination of the primary source of water for drinking and cooking.
- Make sure the septic system is properly sized and well-sited relative to the well location. An appropriate sanitary/civil-engineering design can be worth 10 times its weight in gold.

Some Final Thoughts

Test the water as soon as possible. This will ensure that you have plenty of time to install any treatment equipment that may be necessary. In addition, make sure that the test is as comprehensive as you need and that the lab will give you rapid turnaround. (Some labs *say* they'll give you a two-day turnaround but then take two weeks; this can kill a sale or a mortgage.)

Get help from the lab if there are problems that need treatment. Some labs specialize in providing objective advice about treatment equipment. But don't use a lab that is connected to an operation that sells water-treatment services or equipment.

If it turns out that the water requires treatment, get a written contract from the treatment supplier about the cost and the water quality that is to be achieved after the equipment is installed. There also should be a written guarantee on the equipment. Some labs can help provide this kind of guarantee advice, and they also may provide posttreatment tests to make sure any problems have been resolved. ■

Gene Rosov is president of the WaterTest Corp. in Manchester, N.H. For more information on WaterTest's services (which include a patented package of containers for water samples), call the company toll-free at 800/H20-TEST (800/426-8378).