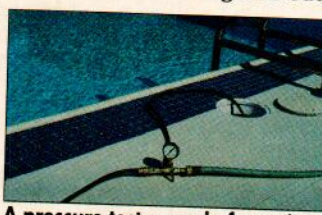


# LEAK TECHNIQUES

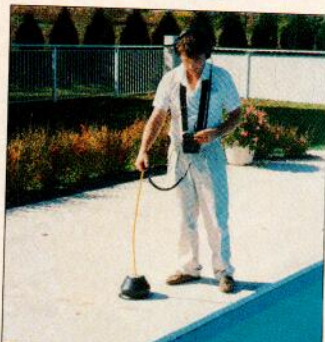
*Looking, listening and otherwise searching for swimming pool leaks*

By Elissa Sard Pollack

**A** backyard swimming pool should be an aquatic haven. But when water seems to disappear, or chemical and water bills skyrocket, or if algae is suddenly uncontrollable,



A pressure tester ready for action.



Electronically listening for leaks.



Dye-testing tile cracks.



A new vinyl-liner leak locator.

pool owners may question their investment. Yet the whole pool isn't the problem — it may just be a tiny hole somewhere. Finding — and repairing — that hole is the key to reinvigorating your customer's enthusiasm for the pool. And there are several methods available, using tools ranging from a simple plastic bucket to tiny, high-tech cameras.

Start by systematically looking for clues to the cause of water loss. Look for settling ground and encroaching root systems that may have damaged pipes, fittings that may not be glued correctly, or perhaps a worn out filter valve (or one that someone inadvertently left on the backwash-to-waste setting). Other common escape routes for water are fractures in the pool shell hidden by waterline tile, sagging plaster under return fittings, cracked skimmers, old O-rings, leaky light conduits and spring-loaded hydrostatic relief valves jammed open by debris.

Of course, Mother Nature also causes water loss, and in porous plaster pools, the pool itself consumes some water. In your initial fact finding, don't overlook the possibility that the pool isn't getting enough make-up water. To determine how much water loss can be attributed to evaporation, conduct (or instruct the pool owners to conduct) this simple test:

Fill a bucket — one without any leaks of its own — with water and mark the water level of both the bucket and the pool. Floating the bucket in the pool should eliminate any temperature difference, which would otherwise affect the evaporation rate. If the water level in the pool and the bucket lower at the same rate, the mystery is solved. Evaporation is the culprit, and the solution is simply to add more water more often.

If the pool's water level dropped more than the bucket's, then there probably is a leak somewhere. If the water loss is greater with the pump on, it's probably a pressure side leak. If the pool loses more water with the pump off, it's probably a suction side leak. If the water loss is the same with the pump on and off, it's probably a static leak, meaning the problem is in the pool shell.

## THE PRESSURE'S ON

To confirm and further isolate a leak, many technicians will conduct a pressure test using a test set with good plugs — both open and closed plugs in a variety of sizes and styles to fit all the various openings in the system. Inflatable plugs, plugs designed for skimmers, valves, etc., and plugs with quick disconnect features also come in handy because you won't always find perfectly round, standard-size pipe or like-new fittings.

After sealing off the system — and retesting the plugs to be sure they're completely sealed (which some say is nearly impossible) — fill the system with water. (Some technicians will use air, but others warn that because air compresses under pressure, it adds variability to test results, especially when the line is filled with a mixture of air and water.)

With the line isolated and filled with water, hook up the pressure tester and use a garden hose to pressurize the line. Allow more water to enter the system, then close the valve. If you sealed everything well, the only place for the water to escape is through a leak. As it escapes, the pressure will drop. In a more basic version of this test, simply watch the water level in the pipe, regardless of pressure.

Alternatively, helium gas can be injected into the line under pressure. But it may be difficult to find an affordable, field-portable gas detector to sniff out leaking helium.

If your test reveals a plumbing leak, you still have to further isolate its location. A common technique is a sonic test using either a mechanical geophone or an electronic listening device.

One way to hear the leak is to force air through it into water-saturated soil. Note that water above the leak level in the line must be purged before air will escape. You can insure this condition by purging the line of water. Alternatively, air can be injected into the water-filled line without removing the plugs. In this scenario, the pressure gauge will indicate when air has reached the leak because it will be more difficult to maintain pressure.

In either case, once you are assured air is being blown from the leak, a constant stream of air must be induced to maintain steady pressure — you may use

a compressor, a nitrogen tank or a carbon dioxide tank. In situations where pressure can't be maintained, or where the soil will not remain saturated, it may be necessary to add a small amount of water to the line while the air is being induced.

Then use a listening device to further pinpoint the leak. Geophones, an older technology, rely on two brass discs placed on the deck and vinyl tubing running up to your ears, like a stethoscope. Some technicians find this method frustrating because it

often picks up other noises. That's because sound travels through solid objects, and if pipe is touching the concrete (because it was plumbed close to grade or the ground has shifted), noise will travel to that spot when it's actually originating 10 feet away. However, an educated ear may be able to differentiate between this vibration and the actual gurgling noise.

Electronic listening devices allow the user to cancel out certain frequencies and filter out unwanted sounds. With stereo-type headphones and an ampli-

fier, you can control what you're hearing to a certain extent. However, you may inadvertently filter out the sounds you want.

With either type of listening device, the objective is to move along the path of the pipe and find the loudest spot. That may be the leak. If there's more than one loud spot, try to determine if it's really two leaks, or if one of the sounds is an echo or air gurgling through standing water in the pipe.

Keep in mind that the more accurate your leak locating procedure, the less deck you'll have to destroy doing the repair, if you have to destroy it at all. Whenever possible, pick up intact pieces of decking, even if it's concrete, and replace the same piece. That way, you avoid having to color match, which can be difficult with some deck styles.

### STRUCTURAL LEAKS

If the pressure test confirms that the circulation systems are intact, use a dye test to locate a structural leak. The dye can be almost any liquid — food coloring and phenol red water testing solution are among the substances used for dark dye tests for light surfaces; white shoe polish and milk have been used as light dye for dark surfaces or shady areas.

Whatever your substance of choice, you'll have to get in the pool to apply it. If SCUBA isn't an attractive option, you can use a compressor-operated dive unit (or hold your breath, says one expert). You have to get within one-quarter inch of the suspected leak. Use a syringe or a squirt bottle to squirt dye where you suspect the leak might be, and watch where the dye escapes. The trick to dye testing is to let a very small amount of dye out into the crack, be it in a light niche, under a fitting, near a skimmer or main drain, etc. Also, you need a steady hand. Turn off the pump and, once you're in position, hold still until the water stops moving. Then apply the dye.

Alternatively, some say a cloud of dye will work, but opponents of that method say you'll miss a lot that way.

### HIGHER-TECH METHODS

An alternative to dye testing has recently been made available for use in vinyl-liner pools. Because vinyl is a good electrical insulator, the only electrical connections to ground from inside the pool (other than light niches, fittings and other metal) are through conductive holes in the liner. This is the theory behind LeakTrac 2100, a pool-specific device from Anderson Manufacturing (see photo, previous page). The device emits a small electrical charge into pool water, which

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seeks out ground. If there's a leak, electricity will be pulled toward it.

Before using the device, however, it is still necessary to dye test around light niches, fittings and other connections to ground that are not leaks. Once you've determined those items are not leaking, insulate them with a cover (which Anderson provides). Then use the patent-pending LeakTrac 2100. Its brass plate floats in the middle of pool and emits an electrical charge. A probe that attaches to a telescoping pole detects the electricity and makes an audible beeping sound when it is pointed in the same direction as the current. By moving the probe in the direction of the most intense beeps, the operator is led to leaks.

Other high-tech leak locating methods — borrowed from other industries — also have been used to find pool leaks. Among them are fiberscopes and infrared thermography, and opinions of them vary widely. (For more on these methods, see "Leaks in the '90s," Tech Notes, March 1993, page 26.) Some say the level of sophistication required is not necessary to find most leaks and discourages the average pool technician from getting into leak detection. Others say these methods — typically used in this industry through franchise arrangements — are the most sophisticated, and therefore the best, ways to find leaks. They also allow the client to see the leak. Plus, because the franchisors typically supply the necessary equipment and training, they essentially distribute the expense.

Yet, many technicians still view fiberscopes, infrared cameras and other methods used by franchises as being most appropriate for finding leaks in large water features or other expensive, industrial applications.

#### FIXING LEAKS

Of course, locating a leak is only part of the job — albeit a big part. Once you've found it, repair the leak so that it won't leak again. That often means a little more detective work to determine what caused the leak. For example, if rocks shifted and damaged pipes, be sure to repack the dug out area with sand to prevent a reoccurrence of the same problem.

Here are some additional repair tips:

- Cut fittings in a clean, squared-off manner, and make sure the pipe is really buried in the fitting.
- For structural leaks, use good-quality pool patch and match the color of the surface as well as possible. If you use a repair putty, make sure it will apply under water and is easily molded by hand. Also, quick-set putties are advisable because you have to test the

repair to be sure it will hold, and you don't want to wait all day.

- When clamping lines, use stainless steel clamps.
- Use fresh glue, and always use primer.
- If the leak is around the skimmer where it meets the pool wall, consider reinstalling it. For example, if the skimmer was originally installed as part of the deck, and the deck is shifting, try making the skimmer a structural element of the pool wall instead by using an expansion joint

between the skimmer and the surrounding deck.

Above all, avoid temporary repairs, because water is persistent. If it found its way out of a poorly engineered situation once, it'll find its way out of a badly repaired hole in almost no time. ■

*This article was written with help from Lance Anderson, Anderson Manufacturing, St. Paul, Minn.; Michael Shand, Mike's Pool & Spa, Novato, Calif.; and Courtney Triptree, Triptree Pool & Spa, Coarsegold, Calif.*

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