

SAFETY



Working Lead-Safe

Containment and cleanup can safeguard clients and their children, but are we doing enough to protect ourselves?

BY TOM O'BRIEN

None of us are getting any younger. And for some remodelers, the years seem to have taken a heavier toll: High blood pressure, kidney trouble, memory problems, mood disorders, and erectile dysfunction are all age-related maladies. But each of those is also a symptom of lead poisoning. If you work on old houses and haven't been as scrupulous with your personal protection as you have been with your containment measures, you might not be as old as you feel. And it's probably not too late to do something about it.

THE TROUBLE WITH LEAD

Lead is not nuclear waste. In solid form—be it a car battery, a water pipe, or an intact paint film—it poses no danger. But if it's broken up into tiny particles, small enough to be absorbed into the bloodstream, it becomes poisonous. "Lead is medically classified as a poison when it gets in your body; so it's not a hazardous material, not a cancer-causing product, it's a poison," says Peter Lawton, a former remodeling contractor, who founded LeadSmart

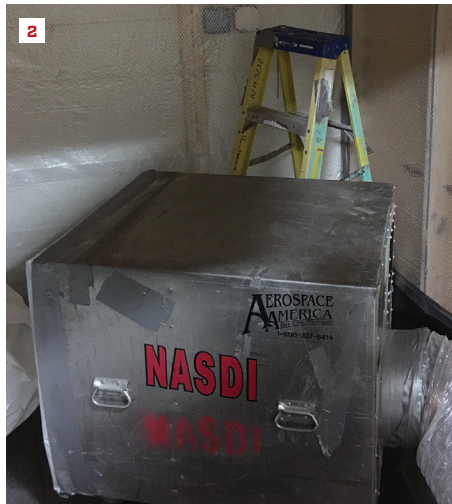
Training Solutions after a doctor informed him that his blood lead level (BLL) was dangerously high.

To function properly, the human body requires trace amounts of metallic nutrients such as iron, magnesium, and calcium. It has no use for lead, but is unable to distinguish it from the others. So if a lead molecule is floating around in the bloodstream, and there isn't enough calcium to go around, the body will grab hold of the lead and plug it into a place where it just gums up the works (sort of like hiring your out-of-work brother-in-law for a stain-grade trim job).

In young children, the effects of lead exposure can be devastating and permanent because it interferes with brain development. Adults who have ingested extreme doses of lead in a short period of time have also suffered irreversible damage, from heart attacks, strokes, and organ failure. Most adult lead poisonings, though, are of the chronic variety, caused by small exposures that build up in the body over time, giving rise to the symptoms mentioned above that mimic those of aging.

Other health problems that chronic adult lead poisoning can

Photos by Tom O'Brien except where noted



Capture lead dust at the source using vacuum-attached power tools. If a tool wasn't engineered at the factory for dust-collection, aftermarket manufacturers, such as Dustless Technologies (maker of the recip-saw attachment shown here), might be able to provide a retrofit dust shroud **(1)**. Costing about the same as a top-of-the-line miter saw, a negative air machine significantly reduces airborne pollutants, making the jobsite safer and the cleanup easier **(2)**. This BuildClean unit **(3)** pulls air from all sides, first through a prefilter and then through a HEPA filter, before clean air is discharged through the port at lower right in the photo above. For lead-safe operation, this port must be hooked up to a discharge hose to eject the filtered air outdoors.

lead to include type II diabetes and nerve damage. "Lead will actually situate itself in the synapses between nerve endings and slow down the transmission of a signal through your body's nervous system," says Daniel Askin, president of ESCA Tech, a manufacturer of testing and cleaning products for the lead industry. For instance, some people with lead poisoning "have noticed that, if they decide to pick up a pen, they have to wait for their hand to start moving," he adds.

GOT LEAD?

Studies have theorized that lead could be absorbed through the skin or the eyes if either of these organs is damaged or bleeding, but no evidence of poisoning as a result has emerged. Generally speaking, lead gets into the body in one of two ways: by ingestion (eating or drinking) or inhalation.

Ingestion is the cause of most child-

hood, paint-related lead poisonings. Dust accumulates on surfaces—because of poor housekeeping practices, lack of proper maintenance, or sloppy renovation work—and it gets on children's hands and is ingested when they put their fingers in their mouths. Adult workers are less susceptible to this type of poisoning, unless they eat or smoke without first washing their hands and face.

Inhalation is generally how workers are most at risk. "Dust in the air is responsible for most of the instances of adult lead poisoning," says Ronald Kraatz, senior manager of Connecticut Children's Medical Center's Healthy Homes Program. He adds that the amount, and the toxicity, of the dust "are directly related to the method you're using to get loose paint off."

An open flame or a high-temperature (+1,100°F) heat gun is the most dangerous method of paint removal because it creates

lead fumes, which are not gases, but tiny dust particles (less than 1 micron) that are small enough to penetrate into the deepest recesses of the lungs where they are easily absorbed into the bloodstream.

Sanding, scraping, and grinding produce larger dust particles that aren't as easily sucked deep into the lungs and are more likely to be trapped by the cilia and coughed up. But if you inhale enough of it, some of this dust will get into the bloodstream, and some of what's coughed up will get a second chance if it's swallowed.

DETERMINING YOUR BODY BURDEN

For contractors who often work on houses where lead paint is likely to be present, regular blood testing is the best way to determine if they, or their employees, have a chronic lead problem. "We recommend that you get your Blood Lead Levels tested

Photo 3 courtesy BuildClean



Use a respirator. Reusable, half-mask respirators provide reliable protection for workers, but only if they fit properly—so they require careful fit testing. They are available in a variety of sizes; this one is sized “medium” (4). Workers who are not willing, or able, to get professionally fitted and trained should consider a high-quality disposable respirator such as this N100 (5). An N95 (6) is one of the least expensive alternatives for workers who are unable to get professional fit testing.

every six months,” says Thomas St. Louis, the Occupational Health Program supervisor for the state of Connecticut.

Unless you do the same type of work on a regular basis, a single BLL test may not tell you very much. “BLL just tells you what’s running in your veins at that given moment,” says Peter Lawton. This is because the human body has the means to excrete moderate amounts of lead (by perspiration, urination, and defecation). According to St. Louis, “The way the body works is that [after an acute dose] your BLL will spike, but once you eliminate the exposure, every month the body will eliminate half the burden.” That’s the upside. The downside is that some of the lead that’s circulating in the bloodstream may be picked up by the corpuscles and put to use somewhere, or be stored in fat cells or bone tissue.

The amount of lead that isn’t purged is what’s known as “body burden.” It’s pos-

sible to do a bone scan to determine how much of this an individual might be carrying around, but such testing is not widely available and is unlikely to be covered by insurance.

Although it’s not perfect, regular BLL testing for yourself and your employees will provide clear evidence as to whether your lead-safe work practices are effective; it can also protect you from liability if a new hire is carrying around lead from a previous job, or if a current employee picks it up on a side job.

If the family doctor is no help, your local health department should be able to provide blood-testing advice.

GET THE LEAD OUT

BLL is measured in terms of micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dL}$). For children, the growing medical consensus is that there is no safe BLL. For adults, the

mainstream medical community generally agrees that 40 $\mu\text{g}/\text{dL}$ is the danger level.

Providers of alternative medicine offer a variety of treatments that claim to rid the body of lead and other toxins, and some of these may be effective, but it’s difficult to find evidence to back up the claims.

At this time, the only treatment for lead poisoning that’s recognized by most medical authorities is chelation, which uses chemicals that bind themselves to lead and promote its excretion. Because these chemicals also scoop up vital nutrients, chelation can be a painful, debilitating experience that’s medically frowned upon unless a patient’s BLL is above 50 $\mu\text{g}/\text{dL}$.

“In the vast majority of cases, the answer is to remove the individual from the risk and let the BLL go down naturally,” says St. Louis. He says he has seen workers who showed up with a BLL of 50 and just a



Clean and cool. In order for any of these respirators to seal tight to the face, you must be clean-shaven **(7)**. To prevent a shower of toxic debris from falling into your mouth, remove the mask by first bending over and then pulling it down and away from your face **(8)**. A cooling vest can make the experience of wearing disposable coveralls tolerable, if not enjoyable **(9)**.

month later had a level that was down to 25, after they had stopped doing the lead work and perhaps had started taking better care of themselves.

A healthy lifestyle can also reduce the body burden. Good nutrition makes it less likely that the metabolism will seek out a lead molecule as a calcium substitute. A regular program of exercise increases the excretion of lead through sweating (just make sure to take a shower immediately afterward to wash off the lead). And don't forget to stay hydrated: "If you have lead in your body, and you're well-enough hydrated so that your urine is running clear instead of dark yellow, then you're maximizing the amount of lead that your kidneys can remove," says Daniel Askin.

The other crucial step in reducing your body burden is to not add any more to it.

DAMP DOWN THE DUST

The best form of personal protection is not a respirator, but a plan. As the late Dennis Livingston, a groundbreaker in the field of lead-paint safety, used to say: "Generate the least amount of dust in the smallest space for the shortest length of time."

Identify the leaded surfaces that will be disturbed, including by subcontractors. And create a work plan that gets all of the dirty work done at the beginning of the job. Then you can clean up, check

your work, and proceed as if it were a typical remodeling job.

During the "lead work" portion of the job, the single best thing you can do to protect yourself and your workers is to minimize airborne dust. Here are a few proven techniques.

- Mist surfaces with water before disturbing the paint layer.
- Use a sharp knife to separate paint joints before removing trim elements.
- Never use open flames or high-temperature heat guns to strip paint.
- Use only power tools that have effective, vacuum-operated, dust-collection systems **(1)**.
- Consider purchasing a negative air machine to capture airborne dust **(2, 3)**; don't put a fan in the window, because it might blow lead dust all over the neighborhood.
- Regularly HEPA-vac the floors so you don't crush paint chips and create more dust.

Studies have been done that conclude that if you were to scrupulously follow these rules, you could safely dispense with respiratory protection altogether. However, OSHA will not let you off the hook unless you conduct dust-sampling tests to prove that every one of your planned dust-generating activities produces less than the permissible limit (50 micrograms per cubic meter of air) for airborne lead dust.

RESPIRATOR 101

Absent a foolproof system for working dust-free, everybody who's on site during the lead portion of the job must be outfitted with eye protection—either goggles or wraparound safety glasses—and a respirator. Theoretically, a reusable half-face respirator (4) provides superior protection compared with a disposable. But these devices are more difficult to breathe through and come in different sizes. So in order to use one properly, every wearer needs the following:

- Medical clearance from a doctor
- Training on how to use and maintain a respirator
- Fit-testing

Experts agree that the best respirator in the world will do more harm than good if it doesn't fit properly. "When I worked in the lead industry in the 1970s, respirators came in one size only and it was 'Not Mine,'" says Daniel Askin. "Several years later, I came upon one of those respirators and I had myself fit-tested and my fit factor was 2" (meaning that the filter was capturing only 2% of the pollutants he was breathing in). Askin points out that a half-mask respirator can also inhibit one's ability to talk to co-workers. "If you have trouble communicating, you're going to be taking it off and putting it back on, giving you no protection for the time that it's off your face."

If you're not in a position to have all of your employees professionally certified, Askin and others suggest using N100 disposable respirators (5), which meet the same HEPA filtration standards, but in a simpler, one-size-fits-all configuration. N100s aren't cheap though. Even when purchased in bulk, they can cost as much as \$10 each.

Thomas St. Louis, of the Connecticut department of health, worries that the high cost of an N100 makes people use them too long. "We recommend that you find a NIOSH Certified N95 disposable respirator." He says that this less expensive alternative (6)—costing as little as \$3 each in bulk—is "sufficient to capture lead dust" and cheap enough to be a true throwaway. "Every time you come off the job for a break, I recommend disposing of it and putting on a new one when you get back to work."

Regardless of which respirator you choose, you have to lose the beard. None of these will form a tight seal to the face unless the wearer is clean-shaven (7).

Also, be mindful that after a long day's work, the mask may well be covered in lead dust. To prevent being showered by dust while removing the mask (8), Askin says, "I bend over at the waist and I take the respirator off by grabbing the bottom and pulling it down and away from my face." If yours is a reusable respirator, make sure to clean it properly and replace the filters often.

HYGIENE

Most other techniques for working lead-safe fall under the category of good hygiene. If in doubt, ask yourself: "What would mom expect of me in this situation?"

Coveralls. Nobody likes to wear Tyvek suits. These garments

are infamously confining and stiflingly hot. But they do make it simpler to ensure that lead dust clinging to workers' clothing does not escape the worksite. "If you have to put a suit on, it's only so you don't become a walking source of poison," says Peter Lawton. Although he has no suggestions for how to add style points, he says that if you wear a cooling vest (9) underneath, you won't break a sweat, even in an attic in August.

Instead of wearing disposable coveralls, Catherine Brooks, owner of Eco-Strip, a distributor of lead-safe paint-removal products, brings a change of clothes (including boots) to the job, leaves them inside the containment area until the dirty work is done, and carries all of the soiled items out in plastic bags. She also puts down "tacky mats" (such as Poly-Tak "Clean Mats" from Surface Shields) outside the entrance to the work space to catch any dust on the bottom of shoes. Whether or not you choose to wear the suit, Thomas St. Louis recommends having "a dedicated set of boots that only get used on lead jobs."

Tobacco. Don't smoke on the job. Beyond the obvious health risks, smoking a cigarette in a leaded work area means that the lead dust on your fingers will be transferred to the paper, ignited, and inhaled deep into the lungs, where it's likely that all of it will go right into the bloodstream.

Liquids. As mentioned earlier, staying well hydrated helps the kidneys excrete toxins. Just make sure that your water bottle is not dust-covered. Store it in a box with a cover, remove your dust mask carefully, and rinse your mouth out before you swallow the first drink.

Break time. "Never bring food into the work space," says Mike McKinnon, manager of Hygenall Corp., a maker of lead-cleaning products. Unless you're confident that the lead work will be completed and cleaned up by lunchtime, you should designate a separate space—elsewhere on the jobsite or outside—to serve as the break room.

If running water is not available to enable the workers to wash their hands and faces before eating, you can set up a makeshift washing station, with soap, paper towels, and a few buckets of water. "There's no question that you need to clean your hands before eating lunch and you need to eat lunch anywhere but in the work area," says Daniel Askin.

CLEANUP TIME

The RRP (Lead Renovation, Repair and Painting) regulations are very clear on how the jobsite should be cleaned before the warning signs are put away and the barriers taken down. But you must also account for the debris that has settled on your tools, your clothes, and your skin.

Tools. If this is a one-and-done lead job, be sure to vacuum all of the tools and scrub them with a wet wipe before taking them out. But if any tools are going on to another job where lead paint is likely to be encountered, simply put each one in a heavy-duty plastic bag and seal it up to contain the mess. For remodelers who routinely work on old houses, Peter Lawton suggests setting up

10



11



Cleanup. Dedicating a set of tools (such as wrecking bars, extension cords, recip saw, toolbelt, paint removers) strictly for lead work saves significant cleaning time and lessens the chances of spreading the dust around (10). A variety of products are available that may ease the drudgery of removing “sticky” lead dust from surfaces, skin, and clothing (11).

a dedicated bin for all tools that are used only for lead jobs (10).

Vac. The HEPA vac should also be thoroughly cleaned or wrapped in plastic before it’s taken out. If the bag needs to be emptied on the job, it should be done before any other cleanup measures have begun. And whoever does it must be fully protected and extremely careful to contain the contents, which are likely to be heavily leaded.

Clothing. Sadly, the incidences of family members being sickened by lead from a parent’s or spouse’s work clothes are well documented. If you need to wash your lead-covered clothing at home, follow these guidelines:

- Keep clothing items in plastic bags until they’re ready to go in the washer.
- Handle contaminated clothing gently to prevent creating airborne dust.
- Wash the clothing separately from everyone else’s clothes.
- Scrub your hands thoroughly after putting lead-covered clothing in the washer.
- Run a rinse cycle before adding detergent, to remove loose dirt.
- After removing the work clothing from the washer, run another rinse cycle—before doing a load of household laundry.

Skin. Lead dust has often been described as “sticky,” meaning that once it gets on a surface, especially skin, you have to scrub

vigorously to get it all off. I never understood why this was so until Mike McKinnon explained it in terms of chemistry: “Lead is a cationic metal, which means it has a strong positive electrostatic charge. This property makes it stick to skin and other surfaces that have a negative charge.” His company and ESCA Tech both offer a variety of surfactants (a fancy name for detergents) that claim to easily strip lead from skin as well as other surfaces (11).

Regardless of the soap you choose and of whether you’re washing up for a lunch break or in an after-work shower, make sure you get clean.

NEVER TOO LATE TO QUIT

Lead is worse than tobacco—about that, there’s no doubt. But, for those of us who work on old houses, and who haven’t protected our personal safety as diligently as we have the safety of the innocent bystanders, the good news is that if we quit our bad habits now, and don’t put more lead in our blood, our bodies are capable of reversing the damage—maybe even eliminating the need for that Viagra prescription.

Tom O’Brien is a freelance writer and a restoration carpenter in New Milford, Conn.