Is your home a health hazard?

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By Chris Berdik, Globe Correspondent | February 17, 2005

Back in 1980, Peggy Wolff's home slowly started poisoning her. Soon after moving into the newly constructed house in Leverett, Wolff, now 59, began to have short-term memory loss and severe problems with her digestion. In a scenario that sounds like a horror-movie plot, the house, built to be airtight and energy efficient, had become a closed system of air contaminated by mold and chemicals emitted by particleboard furniture, paint, carpets, and insulation.

Wolff saw "tons" of doctors, but says, "I didn't fit into any of the usual categories, and I never really got much better."

Wolff was experiencing something that more and more public-health officials, interior designers, and home builders are recognizing: the air inside a home, especially a new or remodeled one, can be more polluted than outside air and can sometimes endangerthe health of its occupants. And one of the main culprits is a class of chemicals most people have never heard of, even though they're in all sorts of building materials and household products: volatile organic compounds.

Concerns about VOCs and indoor-air quality are a growing part of the environmentally conscious green-building movement. A national green-building standard has existed for commercial and institutional buildings for nearly five years. But the focus is only now turning to residences, where no national guidelines exist for building "green" with good indoor air quality. Plus, the regulatory definition of VOCs set by the Environmental Protection Agency is based on a chemical's contribution to smog, an outdoor phenomenon. And finally, there are still relatively few contractors who know much about low- or no-VOC products. That leaves homeowners wondering just how to clear their air with confidence.

VOCs are carbon-based chemicals -- including benzene, toluene, and formaldehyde -- that evaporate easily at room temperature and are widely used in products from particleboard to carpeting. Most of us can tolerate a moderate amount of them. However, intense exposure, or even low-level exposure over time, can trigger what's known as Multiple Chemical Sensitivity, like that experienced by Wolff, who eventually had to move from her house. In addition to the risk of triggering severe chemical

sensitivities, many VOCs are listed by the Environmental Protection Agency as probable carcinogens. Additionally, studies suggest a link between indoor air contamination and asthma, which grew 60 percent among Americans between 1992 and 2002, to more than 20 million cases, according to the American Lung Association.

While the precise health effects of indoor air contaminants such as VOCs -- particularly the mixtures of chemicals in most homes -- are not currently known, toxicologist Mark Goldman, senior air-quality specialist for the insurance adjustment firm EFI, says that the 4 percent to 6 percent of the population estimated to be chemically sensitive are "the canaries in the coal mine amongst us," suggesting that more people could be affected over time. He adds, "We're dealing with a lot of stuff we don't understand very well."

This is why environmental health specialists like Jack Spengler of Harvard's School of Public Health believe that even people who aren't striving to have an all-out "green" home should be aware of indoor-air quality when building, remodeling, or stocking up on kitchen, bathroom, and home-improvement products.

"In general, we should aim to greatly reduce the chemical mix around us," says Spengler, who is helping to direct research in which volunteers wear air-sampling backpacks to measure contaminant levels in their homes, schools, and office environments. The EPA estimates that indoor air can be up to five times as contaminated with VOCs as outside air, even in cities like Boston.

The time to worry about VOCs is when a house is new or newly refurbished, says Andrea White, a sustainable-design consultant who teaches classes on indoor-air quality at the Boston Architectural Center. This is because VOCs used as solvents or adhesives get into the air by evaporating, or "off-gassing," which decreases over time but can continue for weeks, months, or even years. "Some of the biggest offenders are found when you're really finishing off the house, like paints and floor finishes," advises White.

When paints and stains dry, they can off-gas VOCs such as toluene. Fortunately, paint is one product where most mainstream manufacturers now offer a low- or no-VOC option, such as Benjamin Moore's Eco Spec (suggested retail, $26 per gallon) and Pure Performance from Pittsburgh Paints (suggested retail, $25 a gallon).

There are also companies that focus on maintaining healthy air, such as AFM Safecoat paints and stains. Some professional painters say low-VOC paint may not provide quite the coverage of regular paint or may dry too quickly. But nonprofits like

Greenseal and BuildingGreen that promote eco-friendly building recommend low-emitting paints that "work just as well and cost well in line with other high-quality paints," according to Nadav Malin,editor-in-chief of BuildingGreen's trade publication, Environmental Building News.

Malin considers no-VOC paint to be the "low-hanging fruit" when it comes to improving a home's air quality. Things get trickier, however, when it comes to another prime source of VOCs, particleboard and medium-density fiberboard, often used in kitchen cabinets and furniture. For decades, particleboard has been held together with adhesive containingformaldehyde, a probable carcinogen whose inhalation can cause coughing, nausea, and a burning sensation in the eyes, nose, and throat.

The EPA recommends purchasing solid-wood furniture and cabinetry or opting for "exterior grade" particleboard that contains a lower-emitting type of formaldehyde resin. Other options include products made with strawboard or wheatboard that contain no formaldehyde. There are also sealants, such as those made by AFM, that can be applied to normal particleboard to prevent off-gassing. The trade-off for these alternatives is a higher price. "It's more expensive, because you usually have to go out and search for [non-formaldehyde] products as a special item," notes White, the sustainable-design consultant. Malin, however, notes that homeowners can also avoid formaldehyde by being "more flexible aesthetically," and opting for metal cabinets or furniture.

The air we breathe may also be affected by what's beneath our feet. In one year, American mills produce enough carpet to cover nearly half of Rhode Island, and for more than a decade environmental health advocates and the carpet industry have been debating the toxicity of what all that carpet puts into the air (primarily, styrene and 4-phenylcyclohexene). In a 1992 agreement with the EPA, the carpet industry agreed to test carpets for VOCs and to provide a "Green Label" only to those with low emissions. Many environmental health advocates remain wary of carpets, however, due to concerns over carpet's ability to harbor mold and other pollutants.

And it's not just how you build and furnish your house that can affect its air quality, it's how you clean and maintain it as well. Many disinfectants, cleansers, paint strippers, and air fresheners contain a cocktail of organic chemicals. A recent study by British researchers, for instance, published in the December issue of the British medical journal Thorax, correlated breathing problems in infants with the use of various cleaning products in the home. Indeed, the Toxic Use Reduction Institute at UMass-Lowell has been partnering with public-housing authorities and school districts around Massachusetts to test low-emitting cleaning and building products, measuring the

performance of these products in their "solvent substitution lab."

Of course, environmental health advocates emphasize that indoor-air quality isn't just about VOCs. There's also mold, fumes from attached garages, and proper ventilation to consider. Unfortunately, there aren't many easy answers.

Seven years ago, when John McTernan, 56, of Wrentham had been diagnosed with cancer, he wanted to build a home with healthy indoor-air quality as part of a holistic approach to healing. Finding resources and expertise was difficult. "We bought books, got on the Internet. It was hard to find an architect who was familiar with [green building]," says McTernan.

He and his wife, Charlet, 54, eventually found an architect in Amherst, Mary Kraus, who knew how to minimize indoor-air contamination. They avoided particleboard by going with solid-wood flooring and antique furniture. They installed a ventilation system and used no-VOC paint. McTernan estimates that he spent about 25 percent more to ensure good indoor-air quality, which he partly blames on how difficult many products were to find at the time.

Today, there are more resources for homeowners looking to build green and improve the health of their indoor environments. Over the past few years, there has been a surge of interest in green building and healthy indoor-air quality in the commercial and institutional realm, as exemplified by the Green Building Task Force convened last fall by Boston Mayor Thomas Menino. Some of that expertise has slowly filtered into the consumer market. This year, the US Green Building Council, which created the national green standard in commercial buildings, will pilot a residential standard called LEED for Homes.

Malin, of Environmental Building News, thinks having a national standard for homes will make a big difference, offering corporations, consumers, and homebuilders the consistency needed to create demand and market incentives. "I think for a lot of people, the health of their families is a top priority. It's a good hook to get a lot of people interested in green building," says Malin. "But there's a lot to understand. It's not simple stuff. And unless there's a clear, simple path a homeowner can follow to make their home a green home, it's going to be the rare person who's willing to do the research." ■