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Study sees parking lot dust as a cancer risk

Sealant doesn't stay put on pavements, raising health concerns

Peter Van Metre

Coal tar sealcoat is applied at a test site at the University of Austin in Texas, where it was studied for a year.

By Robert McClure
InvestigateWest
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Chemicals in a cancer-causing substance used to seal pavement, parking lots and driveways across the U.S. are showing up at alarming levels in dust in homes, prompting concerns about the potential health effects of long-term exposure, a new study shows.

The substance is coal tar sealant, a waste product of steel manufacturing that is used to protect pavement and asphalt against cracking and water damage, and to impart a nice dark sheen. It is applied most heavily east of the Rockies but is used in all 50 states.

But scientists with the **U.S. Geological Survey** say the sealant — one of two types commonly used in the U.S. — doesn't stay put. It slowly wears off and is tracked into homes on the shoes of residents.

Story continues below ↓

The USGS study, which found high levels of chemicals used in the sealant in house dust, marks the first time researchers have raised alarms about

potential health effects for humans — especially young children — from the parking-lot coatings.

Taken with previous studies indicating that the chemicals contaminate waterways, where they have been shown to harm insects and tadpoles, the finding raises serious questions about the advisability of using coal tar as a sealant, the scientists say.

"This is the kind of thing where, when you give a presentation, people's eyes get big — even scientists," said Barbara Mahler, a USGS hydrologist who directed the latest research.

The scientists' published their research Monday in the journal **Environmental Science & Technology**. The research, which examined both parking lot dust and dust tracked into homes, focused on a class of chemicals known as polycyclic aromatic hydrocarbons, or PAHs, which are a significant component of **coal tar**.

A known carcinogen

Coal tar is known to cause cancer in humans. That finding dates to the 1770s, when chimney sweeps in London were found to have high levels of scrotal cancer. Late the next century, it was associated with skin cancers among creosote workers. PAHs themselves are listed by the U.S. Environmental Protection Agency as a probable human carcinogen, based on laboratory studies in which they caused cancer in animals.

Emerging evidence also suggests that babies exposed to PAHs while in the womb may be more prone to asthma and other ailments, and may have **lowered IQs**.

Peter Van Metre

A researcher vacuums up dust from an Austin apartment used in the house dust study.

The new U.S.G.S. study compared house dust from 23 ground-floor apartments in Austin — 11 with coal tar-sealed parking lots and 12 coated with other substances, or not sealed at all. The study found that dust in the apartments next to the coal-tar-sealed lots had PAH pollution levels 25 times higher, on average, than the other lots.

More than half the apartments with the coal tar-sealed lots contained dust with levels of PAHs that would increase the risk of cancer if ingested by preschoolers, the researchers said. They came to this conclusion by comparing their results to a **2008 study** that estimated those risks based on lab tests on animals. The increased risk means one additional child in 10,000 would develop cancer if exposed to that level of toxins over a lifetime.

Although adults are at risk from toxic pollutants in house dust, young children are especially vulnerable, studies have shown. That's because they have a higher metabolic rate, they get a bigger dose per pound of body weight, their organs are still developing and they play on or near floors where carpets concentrate and retain toxics. Stanford University researchers have **recorded children** putting their hands on contaminated surfaces, such as floors, and then into their mouths up to 60 times an hour.

The new research on parking lots is important because scientists have been trying to figure out the sources of PAHs for years, said Ted Schettler, science director of the **Collaborative on Health and the Environment**, a group of medical professionals trying to reduce environment-related diseases.

"This parking lot (research) is very interesting because it could be there's a large contributor out there that people didn't know about," said Schettler,

who was not involved in the research.

Components of coal tar escape parking lots and driveways — not from most public roads — and get into the environment, causing stunted growth in creatures that live in streams, scientists have shown. Research also reveals that the chemicals in coal tar kill tadpoles, cause tumors on fish and eliminate whole species of tiny aquatic creatures near the base of the food chain.

Congressman calls for national ban

One congressman — **Rep. Lloyd Doggett**, D-Texas — is calling for a nationwide ban of the coal tar pavement sealants, which are applied by big contractors as well as operators with little more than a truck and a spray tank.

Not only was the toxic house dust found in apartment units surrounded by paved parking lots, but USGS researchers also measured contamination in dust from apartment house parking lots and the driveways of a few single-family homes. The most dangerous coal tar component — a PAH chemical called benzo[*a*]pyrene – was found in driveway dust at two suburban single family homes at thousands of times the level that would trigger a cleanup at a toxic-waste site.

The United States has no standard for benzo[*a*]pyrene in house dust, but Germany has an official guideline of 10 parts of the chemical for every 1 million parts of dust, which it says is necessary "to avoid adverse health effects." In the U.S.G.S. tests of apartments near coal-tar lots, a third of the apartments showed levels of the toxic chemical exceeding that standard.

Some PAHs, including benzo[*a*]pyrene, are "highly potent" when it comes to causing cancer, according to the EPA.

The EPA did not provide a representative to discuss the new findings with **InvestigateWest**, despite repeated requests. Doggett began asking for EPA action in 2003. In 2009 the agency launched research on coal tar sealants that is expected to be completed this year. In a July letter to Doggett and answers to written questions from InvestigateWest last month, the agency did not offer an explanation for the delay.

No solid figures on usage

While there are no reliable estimates of the total amount of the coal tar sealants applied to pavement nationwide, the industry has said that some 59 million gallons — enough to fill nearly 90 Olympic-sized swimming pools — are applied in Texas each year. In the much-smaller watershed surrounding New York City's harbor, something like 1.4 million gallons is estimated to be applied annually, according to a 2007 study for the New York Academy of Sciences.

Local governments in Austin, Washington, D.C., and the county that includes Madison, Wis., have banned pavement sealants containing coal tar after findings of PAHs in local waterways. In its place, they rely on the second main type of sealant used in the U.S., which is asphalt based.

But a spokeswoman for a trade group of companies that apply the coal tar sealants said research has not been comprehensive enough to justify such bans. Anne P. LeHuray, director of the **Pavement Coatings Technology Council**, said people who advocate bans are looking for a "magic bullet" to solve a complicated problem.

She points out that cancer-causing chemicals contained in the pavement sealants also get into cities and suburbs from a number of other sources, including motor oil, vehicle exhaust and tires.

"Right now the research is not that convincing that this is that important a source of PAHs relative to all the other sources that are out there," LeHuray said. "They didn't look at all the potential sources."

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A tiny toxic creek

The path that led to the discovery of the toxic dirt inside Americans' homes traces back to a tiny creek in Austin, Texas.

When researcher Mahler saw test results on dirt scooped from the bottom of a tributary of Barton Creek in 2001, the pollution readings for PAHs were so high she felt certain someone had made an error. The concentrations found in a drainage ditch leading from a parking lot to Barton Creek were higher than levels typically measured at toxic-waste sites — higher even than Boston's notoriously polluted Charles River, where PAHs are listed as among the "contaminants of concern" on that major industrial waterway.

Further testing showed the high readings were accurate. But what was the source?

Story continues below ↓

Barton Creek feeds Barton Springs, a public bathing site cherished by Austin residents because it offers a cool respite from tyrannically hot Texas summers. Levels of PAHs measured in Barton Springs were high enough that the Austin American-Statesman dispatched reporters to track down what was suspected to be a hidden toxic waste dump.

On Aug. 16, 2002, Tom Bashara of Austin's **Watershed Protection Department** went to check spots along Barton Creek where city biologists had pinpointed extremely high levels of PAHs.

"I spent a good half an hour walking around looking for cars gushing out fluid or someone dumping stuff, but none of that was happening," Bashara recalls.

He did notice that the parking lot was a rich black color. Then he noticed the deep black color had been rubbed off by cars' tires in some places. So it was newly sealed.

He moved on to other pollution hot spots on the creek, where he found more parking lots colored the same deep, rich black.

"That's when it dawned on me: There's some connection between the seal coat and the hot spots," Bashara said.

Tadpoles in toxic Dixie Cups
A series of scientific studies followed.

In one, Mahler and her colleagues demonstrated that the particles of dirt in water running off a parking lot with coal tar sealant had PAH levels about 65 times higher than those from water running off lots where no sealant had been applied.

In another, tadpoles were put into containers with high, medium and low levels of PAHs pollution. The tadpoles in the cups with the highest concentration all died within six days, said Mateo Scoggins, a City of Austin biologist. The ones exposed to medium and low levels of PAHs, comparable to the concentrations in Barton Creek, showed stunted growth.

Researchers from the city of Austin and **Texas Tech University** also looked at how the PAH pollution was affecting life in the creeks in Austin, and found a reduced number of insects available for birds, frogs and other creatures to eat.

That, said Scoggins, indicated that "there is more of a problem . . . than we thought."

Sweeping the parking lot
Scientists from the USGS **Texas Water Science Center** involved in the Barton Creek findings measured pollution in lakes around the country, noting an increase in PAHs. In the next phase of their inquiry, they swept up dust in parking lots in Seattle, Portland, Salt Lake City, Minneapolis, Austin, Chicago, Detroit, Washington and New Haven, Conn.

Coal tar sealants are used predominantly in the East, and that's where the highest PAH readings were found — roughly 1,000 times higher than those in the West, where it's much more likely that a driveway or parking lot will be coated with an asphalt sealant.

That figures, because the levels of PAHs in coal tar sealants is about 1,000 times what it is in asphalt sealants, researchers have found. One parking lot near Seattle had high pollution levels, while the other Western readings were relatively low.

The big question is how do parking lots figure into the big picture on these growing levels of PAH contamination?

USGS researchers, led by hydrologist Peter Van Metre, expect they will soon have an answer. Research expected to be finalized in coming months will analyze the "fingerprint" of PAHs in various lakes to determine the source of the chemicals.

"We're able to isolate the (parking lot) seal coat in some of these settings as the only really logical source," Van Metre said.

The 'poster child' community
The "poster child," he said, may be **Lake in the Hills**, a town northwest of Chicago. In the last two decades it went from a small town tucked amid cornfields to a sprawling suburb dotted with big-box stores. Roughly 40 percent of the paved areas that drain into the town's manmade lake had been covered with seal coating. PAH pollution levels in the lake went up tenfold, Van Metre said, and the contamination included the two homes with PAH levels in their driveways at thousands of times the amount that would trigger a toxic-waste site cleanup.

That **earlier study** in the Journal of Environmental Science and Technology found that on average, the PAHs were 530 times higher in the parking lots sealed with coal tar.

For his part, Doggett, the congressman representing the Austin area, is glad that EPA is finally taking seriously the threat posed by the coal tar sealant.

"Under the prior administration, I confronted EPA inaction and excuses. I am pleased my repeated efforts have resulted in the EPA now initiating this

long-overdue work, and we might finally move toward a nationwide ban on this dangerous substance," Doggett said in a written statement.

Researcher Van Metre said the public doesn't have to accept increasing levels of pollution as a price of development.

"Just because we live in urban environments — and most people do live in urban environments — doesn't mean they have to be polluted," he said.

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