Pavement sealant identified as major pollutant

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A black sealant sprayed on parking lots, driveways and playgrounds turns out to be the largest contributor to the rise of a toxic pollutant in urban lakes and reservoirs across America, according to a U.S. Geological Survey study.

Scientists saw concentrations of polycyclic aromatic hydrocarbons (PAHs) going up rapidly in the 1990s in areas of urban sprawl. PAHs have been known as a probable human carcinogen since the 19th century, when cancer struck chimney sweeps, said Peter Van Metre, a USGS scientist and a principal author of the report. PAHs also are toxic to fish and other aquatic plant and animal life.

The research was based on sampling of sediments from the bottom of 40 lakes and reservoirs in commercial and residential areas in cities and suburbs typical of where most Americans live - not near old industrial sites. Among the cities tested were Anchorage, Alaska; Fort Worth, Texas; Portland, Ore.; Seattle; Orlando, Fla.; Raleigh, N.C., Chicago, Newark, N.J., Detroit; Milwaukee and Boston.

What was striking about the findings was that lakes that had high levels of PAHs also had a large fraction of those PAHs coming from coal-tar-based sealants. The opposite also was true - lakes that had low PAH levels also had a very low fraction of them from the sealant.

For example, Middle Tanasbrook Pond in suburban Portland had very low levels of PAHs, but Palmer Lake, in suburban Minneapolis, had PAH levels 25 times higher. Both communities have major highways and about the same population density.

Hillstrand Pond in Anchorage and Sweetwater Reservoir in San Diego were among the bodies of water that tested low in total PAHs. Higher levels ranged from 7.3 parts per million in Westchester Lagoon in Anchorage and 14 ppm in Fosdic Lake in Fort Worth, Texas, to cities with some of the highest readings - 53 ppm in Lake Killarney in Orlando, Fla.; 79 ppm in Upper Mystic Lake outside Boston, 80.6 ppm in Newbridge Pond outside New York.

The scientists found that coal-tar-based sealants contribute, on average, about half of the PAHs in U.S. urban lakes. Vehicles account for about a quarter, on average. Coal combustion, the next highest source, is about 20 percent, but varies greatly because of different levels of coal use around the nation.

The study was published in the current issue of the journal Science of The Total Environment.

It's only been in the past five years that Van Metre and other scientists pinpointed the commonly used coal-tar-based sealant as a major source of PAHs in urban lakes.

Van Metre said a lucky break of discovery came about eight years ago in Austin, Texas, when tests of sediment in drainage ditches showed stunningly high levels of PAHs.

"We said, 'No way - you've got a problem with your lab.' We'd never seen numbers like that," he said. He and other scientists reported in 2005 that runoff from parking lots with coal-tar-based sealant was a major source of PAHs in the Austin streams.

Austin, Washington, D.C., and several other cities and towns have banned coal-tar-based pavement sealants.

An alternative sealant, an asphalt-emulsion-based one, has PAH levels about 1,000 times lower.

Coal tar is a waste product of the coking of coal, a process used in making steel. Coal-tar-based sealant is more commonly used in the Midwest,

South and East, and asphalt-based sealant is used more widely on the West Coast.

Van Metre is an environmental chemist who has studied water quality for the USGS since 1980. He said he's not a health expert, but that the concentrations of PAHs are high enough to be of concern based on other scientific reports.

Identifying where contaminants are coming from is the first step in any plans to deal with them, he said.

PAHs don't mix well with water, but rather settle and accumulate in sediment. They are rarely a risk to humans in drinking water, but people could be exposed to them by touching or breathing in dust from driveways or parking lots, or by inhaling fumes that volatize from sealed parking lots, the USGS said in an online fact sheet.

A study by the same USGS group published earlier this year found that PAH levels in dust in apartments that had coal-tar sealant on the parking lot were 25 times higher than apartments that didn't have the sealant outside. Another study has found that high levels of PAHs have been linked to high rates of tumors in fish.

Home Depot stopped carrying coal-tar-based sealant about five years ago, around the same time Austin banned it, said company spokeswoman Jennifer King.

The USGS, however, said that coal-tar-based sealants are still widely used commercially and by homeowners.

Urban lake data at a glance:

Five of the lakes studied were large bodies of water and had relatively low levels. They are the first five listed. The other 35 are relatively small urban lakes.

According to the USGS, the Probable Effect Concentration, or the concentration that is expected to harm bottom-dwelling plants and animals, is 22.8 milligrams per kilogram of sediment, or parts per million.

Names of lakes and total PAH levels in milligrams per kilogram (parts per million) and amount of that total from the sealant:

Lake Washington, Seattle: 0.40 total PAH, 0.24 sealant

Lake Mead, Las Vegas: 0.10, 0

Great Salt Lake and Farmington Bay, Salt Lake City: 0.37, 0

Lake Pepin, Lake City, Minn., 1.14, 0.21

West Point Lake, LaGrange, Ga., 2.21, 0.92

Westchester Lagoon, Anchorage, 7.34, 2.88

Hillstrand Pond, Anchorage, 1.73, 0.94

Lake Ballinger, Montlake Terrace near Seattle, 16.61, 11.83

Middle Tanasabrook Pond, Beaverton, Ore, 1.34, 0.80

Railroad Canyon Lake, Los Angeles, 0.15, 0.02

West Street Basin, Los Angeles, 10.63, 4.87

Sweetwater Reservoir, San Diego, 1.48, 0.07

Decker Lake, Salt Lake City, 0.69, 0.26

Sloans Lake, Denver, 16.74, 9.18

Palmer Lake, west lobe, Minneapolis, 33.29, 24.02

Lake Harriet, Minneapolis, 39.88, 20.71

Northridge Lake, Milwaukee, 37.75, 27.01

Lake Whitnall, Milwaukee, 2.94, 1.38

Beck Lake, Glenview, Ill., 2.03, 0.93

Lake in the Hills, Lake in the Hills, Ill., 10.07, 7.10

Lake Como, Fort Worth, 9.48, 4.93

Echo Lake, Fort Worth, 6.06, 2.86

Fosdic Lake, Fort Worth, 13.99, 9.34

White Rock Lake, Dallas, 2.03, 1.27

Lady Bird Lake, Austin, 7.07, 5.46

South Commerce Lake, Detroit, 5.75, 1.39

Charles River at Maple St. Pond, North Bellingham, Mass., 3.64, 0.73

Upper Mystic Lake, Winchester, Mass., 79.01, 55.98

Charles River, Boston, 104.67, 48.93

Harris Pond, Blackstone, Mass., 8.84, 3.30

Lake Whitney, Hamden, Conn., 49.82, 28.76

Newbridge Pond, New York City, 80.57, 56.96

Clyde Potts Reservoir, Ironia, N.J., 4.51, 1.12

Orange Reservoir, West Orange, N.J., 10.01, 4.72

Lake Anne, Reston, Va., 17.08, 14.22

Wheeler Lake, Raleigh, N.C., 0.74, 0.52

Lake Berkeley, Atlanta, 2.74, 1.45

Lakewood Park Lake, Atlanta, 15.88, 7.58

Lake Killarney, Orlando, Fla., 53.03, 46.49

Lake Orlando, Rosemont, Fla., 32.76, 26.86