



Testimony in Support of House Bill 77 (Delegate Stewart)

Environment - Driveway Sealers - Prohibitions (Safer Sealant Act of 2021)

March 24, 2021

Dear Chairman Pinsky and Members of the Committee:

Thank you for this opportunity to submit testimony in support of House Bill 77 on behalf of Chesapeake Legal Alliance and Waterkeepers Chesapeake, two organizations working to protect and restore the Chesapeake Bay and the health of its communities.

We write to express our resounding support for this key bill which would prohibit a person from applying a coal tar sealant to pavement or a similar surface if it contains specified high levels of polycyclic aromatic hydrocarbons (PAH). Coal-tar-sealcoat contains elevated levels of PAHs and is commonly applied to parking lots, driveways, and some recreational areas across the central and eastern parts of the United States. Coal-tar-sealcoat is dangerous to the environment and to human health. Safer alternatives are readily available and are already sold throughout the state. Similar bans already exist in Anne Arundel, Montgomery, Prince George's, and Howard Counties, as well as Washington, D.C., Minnesota, Maine, Washington, and more than thirty local governments around the country.¹ This ban should be extended statewide in Maryland.

Coal-tar-sealcoat poses a threat to human health and the environment.

Friction from vehicle tires erodes sealcoat into small particles that can be tracked indoors or washed down storm drains, and into streams, potentially harming human and aquatic life in and around the Bay.

The U.S. Geological Survey (USGS), which has been studying the issue for years, has made the following key findings regarding the harmful effects of these products:

Human Health Concerns—As coal-tar-based sealcoat ages, it wears into small particles with high levels of PAHs that can be tracked into homes and incorporated into house dust. For people who live adjacent to coal-tar-sealcoated pavement, ingestion of PAH-contaminated house dust and soil results in an elevated potential cancer risk, particularly for young children.

¹ See <https://coaltarfreeusa.com/bans-2/>

Exposure to PAHs, especially early in childhood, has been linked by health professionals to an increased risk of lung, skin, bladder, and respiratory cancers.

Aquatic Life Concerns—Runoff from coal-tar-sealcoated pavement, even runoff collected more than 3 months after sealcoat application, is acutely toxic to fathead minnows and water fleas, two species commonly used to assess toxicity to aquatic life. Exposure to even highly diluted runoff from coal-tar-sealcoated pavement can cause DNA damage and impair DNA repair. These findings demonstrate that coal-tar-sealcoat runoff can remain a risk to aquatic life for months after application.²

Coal tar sealants are one of the largest sources of PAHs in municipal separate storm sewer (MS4) discharges. According to the USGS, coal-tar-based sealcoat contains from 50,000 to 100,000 mg/Kg PAHs, about 1,000 times higher than PAH concentrations in asphalt-based sealcoat products, and hundreds of times higher than PAH concentrations in tire particles, used motor oil, or other urban sources.³ More than 85 million gallons of coal tar pavement sealants are sold nationwide each year.⁴ In 2011, the U.S. EPA released a study confirming that coal tar pavement sealants release hundreds of times more PAHs into the environment than other kinds of sealant.⁵ Recent studies by the USGS have found that coal tar sealants emit more PAHs into the air every year than the entire U.S. vehicle fleet, that these sealants are the largest source of PAH contamination in urban lakes, and that the use of coal tar sealant “likely is the primary cause of upward trends in PAHs in response to urban sprawl in much of the United States.”⁶

Coal tar sealant use dramatically increases the cost to MS4s of managing, remediating, or disposing of polluted sediments and street sweeping debris. In

² USGS, Coal-Tar-Based Pavement Sealcoat—Potential Concerns for Human Health and Aquatic Life, Fact Sheet 2016-3017 (April 2016) (see enclosure).

³ USGS, “You’re Standing On It! Health Risks of Coal-Tar Pavement Sealcoat” (2013), available at: http://www.usgs.gov/blogs/features/usgs_top_story/youre-standing-on-ithealth-risks-of-coal-tar-pavement-sealcoat/

⁴ See Cheryl Hogue, “Dustup Over Pavement Coatings; Texas city tracks stream pollution to sealant, then bans coal-tar-based coating” 85 *Chem. & Eng’g News* 61 (2007), available at <http://pubs.acs.org/cen/government/85/8507gov1.html>.

⁵ Assessment of Water Quality of Runoff From Sealed Asphalt Surfaces, EPA, September 2011, available at www.epa.gov/ORD/NRMRL/pubs/600r10178/600r10178.pdf

⁶ See Peter C. Van Metre, Barbara J. Mahler, “Contribution of PAHs from coal-tar pavement sealcoat and other sources to 40 U.S. lakes,” 409 *Science of the Total Environment* 334, 342 (2010)

Texas, the City of Austin spent over \$1 million to treat soils contaminated with PAHs from just three parking lots.⁷ City engineers in Springfield, Missouri calculated that the cost of removing coal tar sealant contaminated sediments from the City's detention basins could exceed \$130 million.⁸ And Minnesota state officials estimate that sediment disposal cost increases attributable to PAHs from coal tar sealants in the Twin Cities area may exceed \$1 billion.⁹ For a state the size of Maryland, it is not unreasonable to think that the total potential cost to MS4s from these sealants could reach into the hundreds of millions or billions of dollars.

Banning high-PAH sealants makes economic sense.

By banning the use of high-PAH sealants, the state legislature could drive reductions in sediment PAH concentrations that ultimately save Maryland municipalities hundreds of millions of dollars in avoided remediation and disposal costs. The evidence shows that banning coal tar sealants works. In recent years, the USGS has published data proving that a ban on coal tar sealants can have a significant impact on PAH concentrations in receiving waters. The City of Austin banned coal tar sealants in 2006. USGS compared PAH concentrations in sediment cores and bottom sediment samples collected from Austin's Lady Bird Lake, between 1998 and 2014. The USGS found that Austin's coal tar ban led to a decline of about 50% in PAH concentrations and reversed a 40 year upward trend in PAH concentrations.¹⁰

Safe and affordable alternatives are readily available.

There are safe and affordable alternatives to high-PAH and coal tar sealants, principally asphalt based sealants and acrylic sealants. Asphalt and coal tar sealants are basically equivalent in cost and performance and are often sold side-by-side. In jurisdictions where coal tar sealants have been banned, cities, businesses and landowners have found easy and effective replacements.

⁷ See Kevin Carmody, "Barton Creek cleanup costs rise; Projected price tag for tending to tainted soil jumps to \$1.1 million," *Austin American-Statesman*, Wed. Dec. 31, 2003. Available at: <http://www.statesman.com/specialreports/content/specialreports/bartonsprings/1231barton.html>

⁸ See Jess Rollins, "Cost of Coal Tar Concerns Springfield Councilman," *Springfield News-Leader* (Feb. 22, 2014), <http://www.news-leader.com/article/20140223/NEWS06/302230064/coal-tar-Springfield-councilman-Hosmer>

⁹ Mahler, B.J.; Van Metre, P.C.; Crane, J.L.; Watts, A.W.; Scoggins, M.; Williams, E.S., "Coal-tar-based pavement sealcoat and PAHs: Implications for the environment, human health, and stormwater management," 46(6) *Environ. Sci. & Technol.* 3039, 3043(2012).

¹⁰ Peter C. Van Metre and Barbara J. Mahler, "PAH Concentrations in Lake Sediment Decline Following Ban on Coal-Tar-Based Pavement Sealants in Austin, Texas."

The Chesapeake Bay is a unique and precious resource, and the use of coal tar-based sealants in Maryland pose a threat to the Bay watershed's environment, biodiversity and the health of its residents. A statewide ban on coal tar sealants would best serve the Chesapeake Bay and surrounding communities.

Our organizations are presently involved in advocating for a stronger industrial stormwater permit in Maryland. In conversations with the Maryland Department of Environment, we have learned that it does not want to include provisions to protect Marylanders from PAHs because several local bans already exist and they do not believe they should be getting ahead of the legislature on this issue. Therefore, critical protections from Marylanders await legislative action.

For all of these reasons, we urge a favorable report on House Bill 77.

Respectfully Submitted,

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Enclosure: USGS Coal Tar Fact Sheet

Coal-Tar-Based Pavement Sealcoat—Potential Concerns for Human Health and Aquatic Life

Sealcoat is the black, viscous liquid sprayed or painted on many asphalt parking lots, driveways, and playgrounds to protect and enhance the appearance of the underlying asphalt. Studies by the U.S. Geological Survey (USGS), academic institutions, and State and local agencies have identified coal-tar-based pavement sealcoat as a major source of polycyclic aromatic hydrocarbon (PAH) contamination in urban and suburban areas and a potential concern for human health and aquatic life.¹

Key Findings:

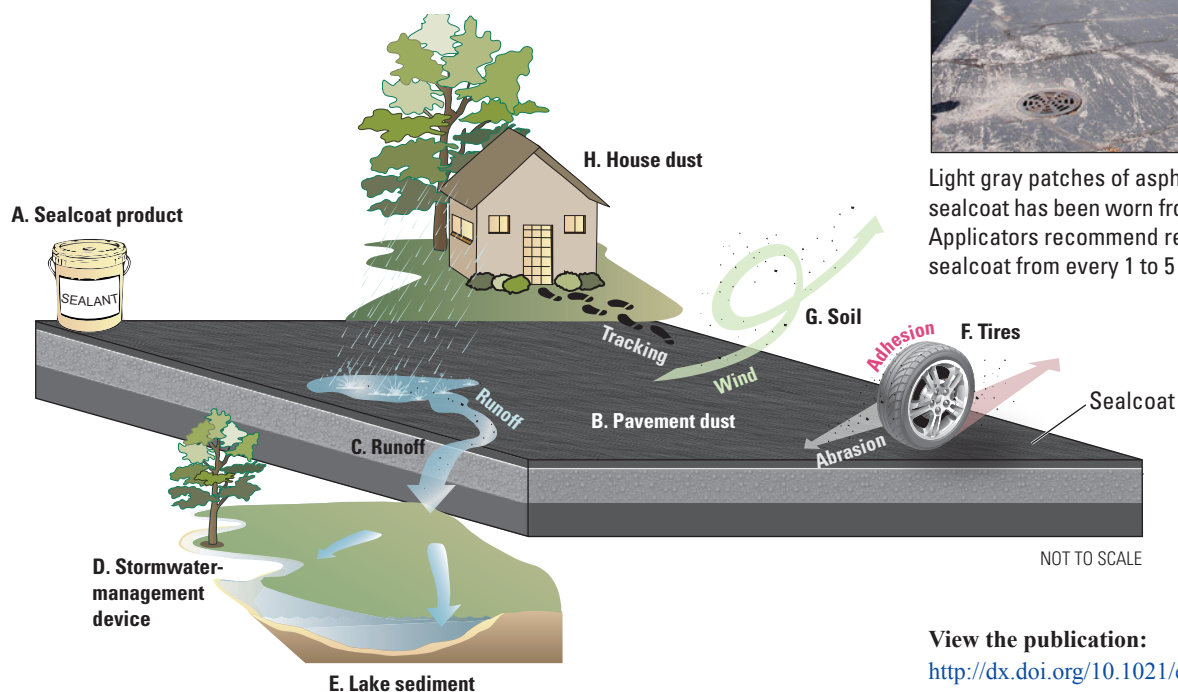
Human Health Concerns—As coal-tar-based sealcoat ages, it wears into small particles with high levels of PAHs that can be tracked into homes and incorporated into house dust. For people who live adjacent to coal-tar-sealcoated pavement, ingestion of PAH-contaminated house dust and soil results in an elevated potential cancer risk, particularly for young children. Exposure to PAHs, especially early in childhood, has been linked by health professionals to an increased risk of lung, skin, bladder, and respiratory cancers.²

Aquatic Life Concerns—Runoff from coal-tar-sealcoated pavement, even runoff collected more than 3 months after sealcoat application, is acutely toxic to fathead minnows and water fleas, two species commonly used to assess toxicity to aquatic life. Exposure to even highly diluted runoff from coal-tar-sealcoated pavement can cause DNA damage and impair DNA repair. These findings demonstrate that coal-tar-sealcoat runoff can remain a risk to aquatic life for months after application.

Coal-tar-sealcoat, which contains elevated levels of PAHs, is commonly applied to parking lots, driveways, and some recreational areas across the central and eastern parts of the United States. Friction from vehicle tires abrades sealcoat into small particles that can be tracked indoors or washed down storm drains and into streams, potentially harming human and aquatic life.



As Sealcoat Wears Off, Where Does It Go?



Light gray patches of asphalt show where sealcoat has been worn from the pavement. Applicators recommend reapplication of sealcoat from every 1 to 5 years.¹

View the publication:
<http://dx.doi.org/10.1021/es203699x>

Worn particles of coal-tar-based sealcoat containing high concentrations of PAHs and related chemicals are transported by rain, wind, tires, and even our feet from pavement to other environmental settings. Sealcoat product (A), after it dries, gradually abrades to a powder and becomes part of the dust on the pavement (B). Pavement dust is transported by rainfall runoff (C) to stormwater-management devices (D) or to receiving streams and lakes (E). Pavement dust also adheres to tires (F) that track it onto unsealed pavement, and wind and runoff transport the dust to nearby soils (G). Sealcoat particles tracked into residences can become incorporated into the house dust (H). Associated PAH concentrations for these settings, from studies by the USGS, other government agencies, and academic institutions, are given below.

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Setting	PAH concentration* (milligrams per kilogram)	
	Coal-tar-sealcoat settings	Non-coal-tar-sealcoat settings
(A) Sealcoat products	66,000	50
(B) Pavement dust	2,200	11
(C) Runoff, particles	3,500	54
Runoff, unfiltered water	62	4
(D) Stormwater-management-device sediment	646	2
(E) Lake sediment	33	0.4
(F) Particles adhered to tires	1,380	3
(G) Soil	105	2
(H) House dust	129	5

*Concentrations are means or medians. References and additional information are provided in Mahler and others (2012).¹

PAH Levels in Asphalt-Based and Coal-Tar-Based Sealcoat

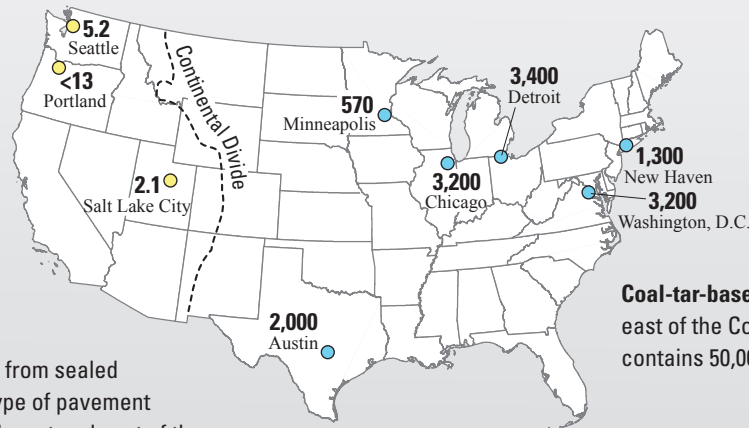
Pavement sealcoat is a commercial product that is applied to many asphalt parking lots, driveways, and playgrounds in North America in an effort to protect and beautify the underlying asphalt. It rarely is used on public roads.

Most sealcoat products are either coal-tar or asphalt emulsion, although some alternative products now are available.³ Coal tar and coal-tar pitch have extremely high concentrations of PAHs as do coal-tar-based sealcoat products, which typically are 20–35 percent coal tar or coal-tar pitch. Asphalt and asphalt-based sealcoat products have much lower concentrations of PAHs.

For historical and economic reasons, use of asphalt-based sealcoat in the United States is more common west of the Continental Divide and use of coal-tar-based sealcoat is more common east of the Continental Divide, except in States, counties, and municipalities where use of coal-tar-based sealcoat is prohibited.³



Asphalt-based sealcoat, primarily used west of the Continental Divide, typically contains about 50 mg/kg PAHs.⁴

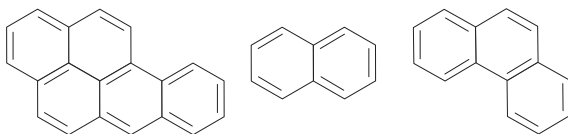


Coal-tar-based sealcoat, primarily used east of the Continental Divide, typically contains 50,000 to 100,000 mg/kg PAHs.⁴

PAH levels in dust swept from sealed parking lots reflect the type of pavement sealcoat commonly used west and east of the

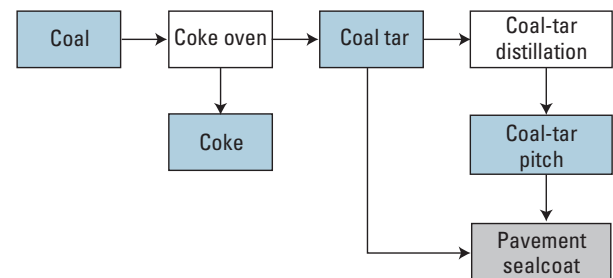
Continental Divide.¹ Concentrations, in units of milligrams per kilogram (mg/kg), also referred to as “parts per million” (ppm), shown here are for the sum of the 16 PAHs listed by the U.S. Environmental Protection Agency as Priority Pollutants. Concentrations are for composite samples from multiple parking lots or a median of several individual samples.⁵

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals created by heating or burning material that contains carbon. The many sources of PAHs to the urban environment span a wide range of PAH concentrations and include asphalt (2–9 mg/kg), tire particles (84 mg/kg), used motor oil (730 mg/kg), and coal-tar-based sealcoat (34,000–202,000 mg/kg).⁶ PAHs are an environmental concern because many cause cancer, mutations, birth defects, or death in fish, wildlife, and invertebrates.⁷ Exposure to sunlight greatly intensifies the adverse effects of several PAHs. The U.S. Environmental Protection Agency (EPA) has classified seven PAHs as probable human carcinogens (Class B2) and 16 PAHs as Priority Pollutants. Environmental and health effects depend on which PAHs are present and their concentrations.



PAHs are made up of various arrangements of benzene rings. PAHs commonly occur in the environment as mixtures, which typically include at least some of the PAHs that are classified as probable human carcinogens.

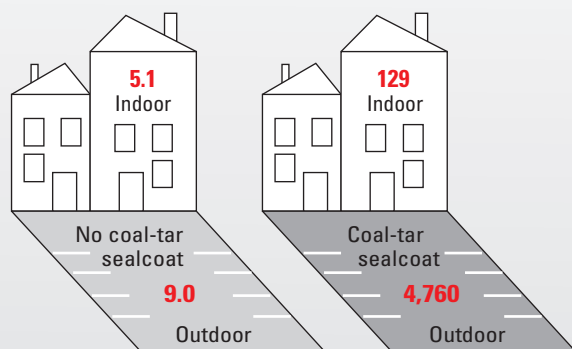
Coal tar is a byproduct of the coking, liquefaction, or gasification of coal and is a complex mixture composed primarily of aromatic hydrocarbons. Coal-tar pitch is the residue that remains after the distillation of coal tar; it is a complex mixture of high molecular weight aromatic hydrocarbons and black carbon solids. The primary use of coal-tar pitch is in electrode manufacturing for the aluminum industry.⁸ Coal-tar emulsion pavement sealants contain either crude coal tar (Chemical Abstracts Service [CAS] Registry Number 8007–45–2) or coal-tar pitch (CAS Registry Number 65996–93–2). Coal tar and coal-tar pitch are known human carcinogens.⁹



Potential Risks to Human Health

PAHs from coal-tar-based sealcoat contaminate house dust¹⁰

In a study of 23 ground-floor apartments in Austin, Texas, PAH levels in house dust in apartments with parking lots sealed with a coal-tar-based product were 25 times higher than in house dust in apartments with parking lots with other surface types (concrete, unsealed asphalt, and asphalt-based sealcoat). No relation was found between PAHs in house dust and other



PAH-contaminated dust on coal-tar-sealcoated pavement (right) is tracked indoors.¹⁰ Concentrations shown are median values for the sum of the 16 Priority Pollutant PAHs, in units of milligrams per kilogram, in house dust and parking lot dust.

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<http://pubs.acs.org/doi/pdf/10.1021/es902533r>

Living adjacent to coal-tar-sealed pavement increases cancer risk¹²

The USGS partnered with a human-health-risk analyst to estimate the excess lifetime cancer risk associated with the ingestion of house dust and soil for people living adjacent to parking lots with and without coal-tar-based sealcoat. Excess cancer risk is the extra risk of developing cancer caused by exposure to a toxic substance. The excess cancer risk for people living adjacent to coal-tar-sealcoated pavement (1.1 cancer incidences for every 10,000 individuals exposed) was 38 times higher, on average (central tendency), than for people living adjacent to unsealed pavement. The central tendency excess cancer risk estimated for people living adjacent to coal-tar-sealcoated pavement exceeds the threshold generally considered by the EPA as making remediation advisable.

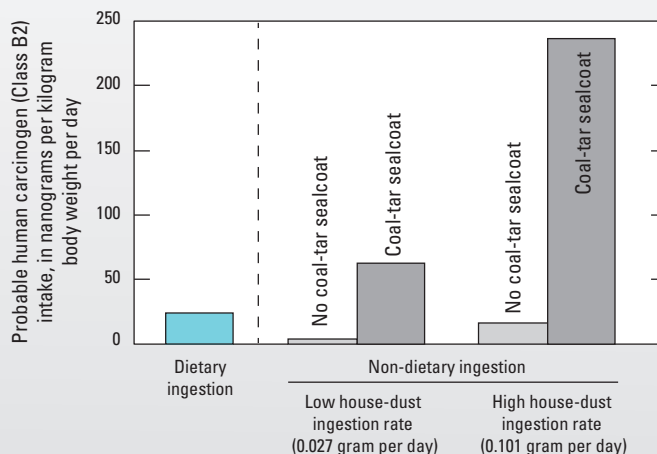
The assessment used measured concentrations of the B2 PAHs in house dust and soils adjacent to coal-tar-sealed pavement (adjusted for relative potency to the PAH benzo[a]pyrene), established house dust and soil ingestion rates, and the EPA-established slope factor to estimate the excess cancer risk. Much of the estimated excess risk comes from exposures to PAHs in early childhood (that is, 0–6 years of age). The study did not consider the excess cancer risk associated with exposure to the sealcoated pavement itself, which has PAH concentrations 10 or more times greater than in adjacent residence house dust or soils.^{5, 10}

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<http://pubs.acs.org/doi/pdf/10.1021/es303371t>

possible indoor PAH sources such as tobacco smoking and fireplace use.

House dust is an important pathway for human exposure to many contaminants, including PAHs. This is particularly true for small children, who spend time on the floor and put their hands and objects into their mouths.



The preschooler living in a residence adjacent to coal-tar-sealed pavement who has relatively low hand-to-mouth activity consumes about 2.5 times more PAHs from house dust than from their diet.¹¹ For the more active preschooler, whose hand-to-mouth activity is higher, the PAH intake from house dust is nearly 10 times more than the PAH intake from their diet.



Children ingest house dust and soil when they put their hands or objects into their mouth. Much of the estimated excess cancer risk associated with the ingestion of PAH-contaminated soil and house dust is incurred during early childhood.

Potential Risks to Aquatic Life

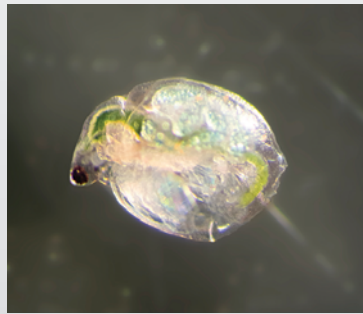
Runoff from coal-tar-sealcoated pavement is acutely toxic to aquatic biota¹³

Exposure to runoff from coal-tar-sealed pavement collected as much as 42 days after sealcoat application resulted in 100 percent mortality to two commonly tested laboratory organisms: day-old fathead minnows (*Pimephales promelas*) and water fleas (*Ceriodaphnia dubia*). In contrast, minnows and water fleas exposed to runoff from unsealed pavement experienced no more than 10 percent mortality. When the minnows and water fleas were also exposed to simulated sunlight, which intensifies the toxicity of some PAHs, runoff collected 111 days (more than 3 months) after sealcoat application caused 100 percent mortality to both species, and caused 100 percent mortality to water fleas even when diluted to 10 percent of its original strength.

The USGS collected samples of runoff from 5 hours to 111 days following sealcoat application to pavement by a

professional applicator. Total PAH concentrations varied relatively little, as rapid decreases in concentrations of low molecular weight and nitrogen-substituted PAHs were offset by increases in high molecular weight PAHs.¹⁴ These results demonstrate that runoff from coal-tar-sealcoated pavement continues to contain elevated concentrations of PAHs and related compounds long after a 24-hour curing time.

A subsequent study by researchers at the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service found that coal-tar-sealcoat runoff is acutely lethal to juvenile coho salmon (*Oncorhynchus kisutch*) and causes a wide spectrum of abnormalities to zebrafish (*Danio rerio*) embryos.¹⁵ They also reported that filtration of the runoff through a biovention system substantially reduced toxicity.



Runoff from coal-tar-sealcoated pavement is acutely toxic to fathead minnows (*Pimephales promelas*; left) and water fleas (*Ceriodaphnia dubia*; right).

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Runoff from coal-tar-sealcoated pavement goes down storm drains to receiving water bodies. The runoff contains high concentrations of PAHs and related chemicals that can harm aquatic life.¹⁶

Runoff from coal-tar-sealcoated pavement damages DNA and impairs DNA repair¹⁷

Simultaneous exposure to runoff from coal-tar-sealed pavement and simulated sunlight damaged DNA in rainbow trout liver cells, even when the runoff was diluted to 1 percent of its initial concentration. The cells were from a cell line developed to assess the effects of PAHs on DNA. The test assessed two types of DNA damage: strand breaks and alkylated bases.

Although cells can repair some DNA damage, a second experiment demonstrated that cells exposed to the coal-tar-sealcoat runoff had an impaired capacity to perform at least one type of DNA repair. The combination of DNA damage and impaired repair capacity intensifies the potential for long-term damage to cell health. DNA damage has many possible consequences, including aging, cell death, and mutations. Mutations can affect the function of genes and can potentially lead to cancer.

Types of DNA damage caused by exposure to runoff from coal-tar-sealed pavement include breaks in the DNA strands.

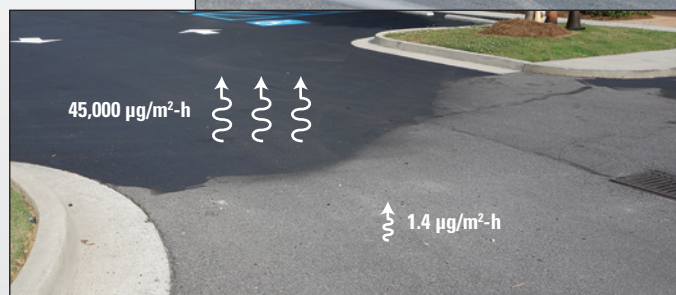


(Image from Genetic Science Learning Center, <http://learn.genetics.utah.edu>.)

Air-Quality Concerns^{18, 19}

Although unseen, releases of PAHs to the atmosphere (volatilization) from freshly coal-tar-sealed pavement are tens of thousands of times higher than from unsealed pavement. Volatilization is a potential human-health concern because inhalation is an important pathway for human exposure to PAHs. Although volatilization decreases rapidly over the weeks following application, it nonetheless continues long after application—PAH releases to the atmosphere from parking lots sealed from 3 to 8 years prior to sampling were on average 60 times higher than PAH releases from unsealed pavement.

Nationwide, the combined PAH releases each year from newly applied coal-tar-based sealcoat are estimated to exceed annual vehicle emissions of PAHs.¹⁸ PAH releases shown here are in units of micrograms per meter squared per hour ($\mu\text{g}/\text{m}^2\text{-h}$).



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By Barbara J. Mahler,* Michael D. Woodside, and Peter C. Van Metre

For more information

Access publications and learn more about PAHs and coal-tar-based pavement sealcoat at <http://tx.usgs.gov/sealcoat.html>.

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