

William & Mary Law School

William & Mary Law School Scholarship Repository

Virginia Coastal Policy Center

Law School Clinics and Centers

Fall 2015

The Use, Impact, and Ban of Coal Tar- Based Sealants

Hannah Needleman

Follow this and additional works at: <https://scholarship.law.wm.edu/vcpclinic>



Part of the [Environmental Law Commons](#), and the [Water Law Commons](#)

Repository Citation

Needleman, Hannah, "The Use, Impact, and Ban of Coal Tar- Based Sealants" (2015). *Virginia Coastal Policy Center*. 28.

<https://scholarship.law.wm.edu/vcpclinic/28>

Copyright c 2015 by the authors. This article is brought to you by the William & Mary Law School Scholarship Repository.

<https://scholarship.law.wm.edu/vcpclinic>

The Use, Impact, and Ban of Coal Tar-Based Sealants

Hannah Needleman
Virginia Coastal Policy Center
at William & Mary Law School
Class of 2016



Contact Us

Please contact Roy Hoagland at rahoagland@wm.edu if you have comments, questions, or suggestions.



About the Author

Hannah Needleman is a member of the 2016 class at the William & Mary Law School. Her experience with the W&M Virginia Coastal Policy Center in the spring of 2015 preceded a summer clerkship with the Environmental Protection Agency's headquarters office in Washington, DC. Her undergraduate degree is in biology from the University of Florida and her past employment has included work with the International Development Law Organization (IDLO) in Rome, Italy. Hannah is on the staff of the W&M Journal of Women and the Law.

About the Virginia Coastal Policy Center

The Virginia Coastal Policy Center (VCPC) at the College of William & Mary Law School provides science-based legal and policy analysis of ecological issues affecting the state's coastal resources, providing education and advice to a host of Virginia's decision-makers, from government officials and legal scholars to non-profit and business leaders.

With two nationally prominent science partners – the Virginia Institute of Marine Science, one of the largest marine research and education centers in the United States, and Virginia Sea Grant, a nationally recognized broker of scientific information – VCPC works with scientists, local and state political figures, community leaders, the military, and others to integrate the latest science with legal and policy analysis to solve coastal resource management issues. VCPC activities are inherently interdisciplinary, drawing on scientific, economic, public policy, sociological, and other expertise from within the College and across the country. With access to internationally recognized scientists at VIMS, to Sea Grant's national network of legal and science scholars, and to elected and appointed officials across the nation, VCPC engages in a host of information exchanges and collaborative partnerships.

VCPC grounds its pedagogical goals in the law school's philosophy of the citizen lawyer. VCPC students' highly diverse interactions beyond the borders of the legal community provide the framework for their efforts in solving the complex coastal resource management issues that currently face Virginia and the nation. Whether it is working to understand the underlying realities of local zoning policies or attempting to identify and reconcile the concerns of multiple stakeholders, VCPC students experience the breadth of environmental lawyering while gaining skills that will serve them well regardless of the legal career they pursue upon graduation.

VCPC is especially grateful to Virginia Sea Grant for providing generous funding to support its ongoing work.

I. Introduction

The new Chesapeake Bay Agreement contains commitments to reduce toxics. One substance receiving an increasing amount of scrutiny is coal tar-based sealant because of its toxic contributions. This sealant is applied to driveways, parking lots, and other paved surfaces. This report investigates the use of coal tar-based sealants, their ban, their impacts, etc., and provides recommendations regarding their future use.

II. Coal Tar-Based Sealants

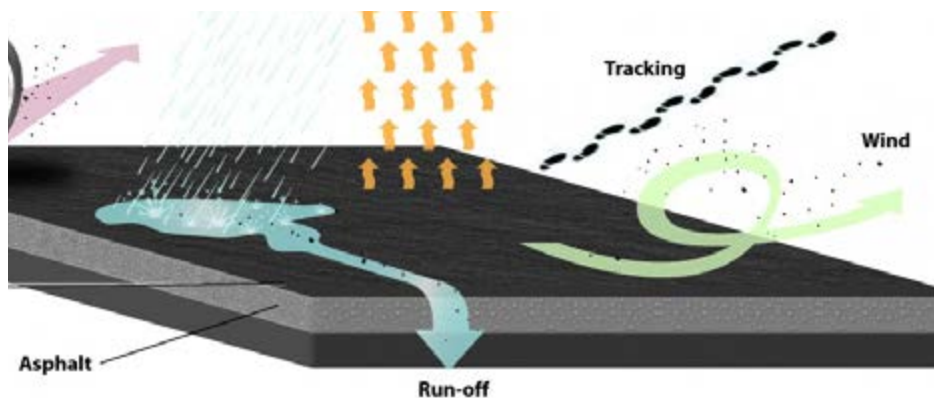
A. Function

Coal tar-based sealant is a black, shiny substance sprayed or painted on top of asphalt pavement—including parking lots, driveways, and some playgrounds—to protect the underlying asphalt.¹ Some consumers also believe that the sealant improves the appearance of the asphalt.² An estimated 85 million gallons (320 million liters) of coal tar-based sealant are applied to pavement nationwide each year.³

Coal tar-based sealant is a potent source of polycyclic aromatic hydrocarbons (PAHs).⁴ Many PAHs are toxic, carcinogenic, and mutagenic.⁵ Moreover, some PAHs are teratogenic (causing birth defects) to aquatic life; there have been no studies on the developmental effects of PAHs on humans, which raises potential concerns.⁶ Coal tar is the byproduct of coking coal for the steel industry, and coal tar pitch is 50 percent or more PAHs by weight.⁷ Coal tar-based sealant is typically 20-35 percent coal tar pitch⁸ and typically contains about 50,000 mg/kg (parts per million, or ppm) PAH.⁹

Coal tar-based sealant is primarily used east of the Continental Divide in the United States and parts of Canada, while the alternative, asphalt-based sealant, is primarily used in the West.¹⁰ Coal tar-based sealant contains about 100 times more PAHs than motor oil and about 1,000 times more PAHs than its alternative, asphalt-based sealant.¹¹ As a result of coal tar-based sealant application, residential and commercial/industrial land uses are major urban PAH sources.¹²

PAHs move from a coal tar-based sealant into our environment by stormwater runoff, adhesion to tires, wind, foot traffic, and volatilization (see graphic below). Coal-tar sealcoat is abraded to a fine dust by car tires and snowplows.¹³ The dust is then blown, washed, or tracked into nearby soil,¹⁴ stormwater ponds,¹⁵ streams,¹⁶ lakes,¹⁷ and into personal residences in the form of settled house dust.¹⁸ Following coal tar-based sealant application, concentrations of PAHs remain elevated for months in runoff from sealed pavement.¹⁹ As a result of this runoff, coal tar-based sealant is the largest source of PAHs to urban lakes.²⁰



Original graphic courtesy of Aaron Hicks, City of Austin, Tex.

Besides coal tar-based sealants, there are many other sources of coal tar and PAHs in the urban environment. However, these other sources are relatively insignificant, compared to coal tar-based sealant runoff and manufacturing exposure. Coal tar is found in some cosmetics and personal care products, such as shampoos and scalp treatments (specifically for dandruff treatment), soaps, hair dyes, and lotions.²¹ Moreover, many household products contain PAHs, including mothballs, blacktop, and wood preservatives.²² In addition, the Austin, Texas, Watershed Protection Department explains:

Besides urban runoff as a pathway, PAH can originate from atmospheric fallout of particulates from naturally occurring combustion sources like forest fires or from fossil fuel combustion - incomplete burning of carbon-containing materials like oil, wood, garbage, and coal. Automobile exhaust and industrial emissions are additional sources. They contain high levels of PAHs. More PAHs form when materials burn at low temperatures such as in wood fires and cigarettes than in high-temperature furnaces.²³

B. Human Health and Environmental Impact

There are significant human health and environmental risks associated with the use of coal tar-based sealants. The use of coal tar-based sealants is associated with a 38 times greater lifetime cancer risk, especially for young children. Moreover, coal tar-based sealants have documented, dramatic effects on the environment, such as inhibiting growth and development of aquatic life, which raises serious concerns for potential effects on human health.

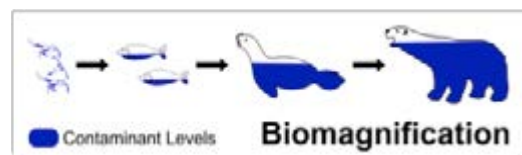
1. Impact on Human Health

PAHs in settled house dust in residences adjacent to coal tar-based sealed parking lots are 25 times higher than those in residences adjacent to unsealed or asphalt sealed lots.²⁴ PAHs are known to cause cancer in humans.²⁵ Living adjacent to pavement with coal tar-based sealant (such as a parking lot or driveway) increases lifetime cancer risk up to 38 times – and much of this increased risk occurs during early childhood (ages 6 and younger).²⁶ There are two main ways individuals are exposed to PAHs in settled house dust: (1) direct ingestion from hand-to-mouth contact and (2) indirect ingestion from mouth contact with inanimate objects such as toys (a serious concern for young children).²⁷ Individuals that live in residences adjacent to coal tar-sealed parking lots are likely exposed to 14 times the amount of PAHs through non-dietary means than residents with unsealed pavement. Further, these high-exposure individuals likely ingest more than twice the amount of PAHs through dietary means.²⁸

Individuals that work directly with coal tar-based sealants face greater exposure to PAHs than the general population. Numerous studies indicate that occupational exposure to coal tar can increase risk of skin, lung, bladder, kidney, and digestive tract cancers.²⁹ Workers are often exposed to coal tar at foundries; during coke production, coal gasification, and aluminum production; and while producing or using pavement tar, roofing tar, coal-tar paints, coal-tar enamels, other coal-tar coatings, or refractory bricks.³⁰ The National Institute for Occupational Safety and Health, the American Conference of Governmental Industrial Hygienists, and the Occupational Safety and Health Administration have all recommended limiting occupational exposure.³¹

2. *Impact on the Environment*

Coal tar-based sealants also have significant, well-documented negative effects on the environment. The use of these sealants is associated with slower rates of growth and diminished ability to swim in salamanders,³² impaired growth and development of frogs,³³ and decreased righting ability and diminished liver enzyme activities in newts.³⁴ Liver damage is a common result of PAH toxicity in fish.³⁵ Moreover, coal tar-based sealants and PAHs are associated with a decrease in species richness and abundance in benthic invertebrates (organisms such as crabs and clams that live on the bottom of a water body or in the sediment and have no backbone).³⁶ As a result, the detrimental impacts of PAHs on marine life could harm industries that depend on these fragile ecosystems. Additionally, there is a possibility of biomagnification ("the sequence of processes in an ecosystem by which higher concentrations of a particular chemical... are reached in organisms higher up the food chain")³⁷ affecting larger animals and humans.³⁸ The dramatic effect of PAHs on marine life also raises serious concerns about the unstudied aspects of PAHs on human health.



3. *Environmental Justice*

The United States Department of the Interior (DOI) has identified coal tar-based sealants as an environmental justice issue. In March 2012, the DOI released its Environmental Justice Strategic Plan for the years 2012-2017, fulfilling a federal requirement under Executive Order 12898 to address disproportionate adverse impacts to minority or low-income communities.³⁹ Their vision statement says the goal is "to provide outstanding management of the natural and cultural resources entrusted to us in a manner that is sustainable, equitable, accessible, and inclusive of all populations." The environmental justice implications of coal tar-based sealants pollution are addressed as part of DOI's Goal #3 to reduce adverse environmental impacts on minority and low income populations.⁴⁰ The report discusses "coal-tar-based sealcoat . . . as a major source of [PAH] contamination in urban areas for large parts of the Nation," and acknowledges that bans like the Washington, DC, coal tar-based sealant ban could provide a remedy for disproportionately-impacted communities.⁴¹

C. *Economic Analysis*

1. *Response from Area Associations*

Gary Hoffman, the Executive Director of Pennsylvania Asphalt Pavement Association ("an industry group devoted to achieving a high level of quality asphalt paving products and services"⁴²) explained there is no economic incentive for consumers to select coal tar-based sealants over asphalt-based sealants. Moreover, a ban on coal tar-based sealants would not negatively affect the members of the Pennsylvania Asphalt Pavement Association (PAPA), including asphalt producers, paving contractors, asphalt suppliers, associates, and engineer and architectural consultants. PAPA supports a ban on coal tar-based sealants.

Patrick Dean, the President of the Associated Builders and Contractors Virginia Chapter (“a statewide, pro-business association representing construction and construction-related firms”⁴³) stated, “[t]here is no economic benefit to using coal tar-based sealants to consumers. It is actually harder for the contractor to attain and costs more.” Moreover, “[c]ontractors would not feel any impact with a ban as they would just switch over to the asphalt-based product or [another alternative].”

Caroline Fahed, a spokeswoman for the Virginia Asphalt Association (whose mission is “to promote the increased use and quality of asphalt pavements in Virginia”⁴⁴) agreed that there are no economic advantages for using coal tar-based sealants over asphalt-based sealants. She noted that while the VAA does not have an official position on banning coal tar-based sealants, it is a decision that “must be based on sound, supported science.”

2. Debunking the “Job Killer” Myth

A 2011 report by the Chesapeake Bay Foundation, *Debunking the “Job Killer” Myth: How Pollution Limits Encourage Jobs in the Chesapeake Bay Region*, maintains that a clean Chesapeake Bay means more jobs—not fewer.⁴⁵ This report concludes that environmental regulations spark economic activity and create jobs, despite the allegations of many opponents. “Virtually all economists who have studied the jobs-environment issue agree. . . . [T]here has simply been no trade-offs between jobs and the environment,” wrote Dr. Eban Goodstein, Director of the Center for Environmental Policy at Bard College, who is quoted in the CBF report.

The report concludes that new pollution limits for the Chesapeake Bay (the Chesapeake Bay Total Maximum Daily Load) would create nearly 250,000 jobs across the watershed. Moreover, the report notes that “[m]ore fish, crabs, and oysters will provide renewed work opportunities and hope for watermen, processors, packers, restaurant workers, people in tourism-dependent businesses, and many others.” The effects of coal tar-based sealants and the associated PAHs on fish, crabs, oysters, and other aquatic life could be putting these industries and jobs at stake. Baywide bans on coal tar-based sealants could similarly boost employment in the region both directly, through cleanup and removal efforts and, indirectly, from healthier fisheries and expanded aquatic recreation opportunities.

3. Retail Costs

Many major retailers have stopped selling coal tar-based sealants. According to the Minnesota Pollution Control Agency, as of 2014, Ace Hardware, Do It Best, Lowe’s, The Home Depot, and True Value have ceased nationwide distribution of coal tar-based sealants.⁴⁶ Moreover, the following regional distributors have stopped selling coal tar-based sealants: Agway, Menards, United Hardware (including Hardware Hank and Trustworthy). Furthermore, applicators and suppliers in Wisconsin, Michigan, North Dakota, Iowa, Illinois, New York, Ontario, and Pennsylvania have committed to phase-out coal tar-based sealants. Most state Departments of Transportation no longer use coal tar-based sealants, according to the Center for Environmental Excellence, a research group developed by the American Association of State Highway and Transportation Officials.⁴⁷

Historically, most coal tar has been imported into the United States.⁴⁸ According to Tom Ennis from Coal Tar Free America (an integral architect of the Austin, Texas

ban), approximately 2/3 of U.S. supplies were imported in 2003.⁴⁹ Ennis explains, “[t]his point was illustrated by the sealant industry’s coal tar shortage in 2006. The supply ran low here... because of factory problems outside our borders.”

There is limited information available on the price comparison of coal tar-based sealant and its main alternative, asphalt-based sealant. However, Tom Ennis compares the retail costs of coal tar-based sealant and asphalt-based sealant via Google on an annual basis.⁵⁰ Ennis’s research indicates that since 2001, asphalt-based sealants have been, on average, just slightly more expensive than coal tar-based sealants. In 2015, Ennis’ results included four coal tar-based products, costing an average of \$15 per five-gallon bucket. By comparison, Ennis found fourteen asphalt-based sealants, costing an average of \$21. However, Ennis found both types of sealant available for \$13, indicating price parity in some instances at a more affordable price. Ennis also notes, “Keep in mind that the cost of the two dominant products [coal tar-based and asphalt-based] are sensitive to the price of fuel and susceptible to interruptions in the supply chain.” Although coal tar-based sealants may have a lower sticker cost than asphalt-based sealants, the true cost of coal tar-based sealants, including environmental costs and PAH cleanup discussed in Part 4 below, can be exorbitant.

4. Cleanup Costs

The cost of cleaning up bodies of water contaminated with PAHs from coal tar-based sealants is expensive and extensive. In 2012, the Minnesota Pollution Control Agency estimated that cleanup costs for the stormwater ponds contaminated with PAH runoff could approach \$1 to \$5 billion in the Twin Cities area alone.⁵¹ The high cost of cleanup is one factor that ultimately drove Minnesota to a statewide ban of coal tar-based sealants. In 2013, The University of Wisconsin-Extension Solid and Hazardous Waste Education Center urged Wisconsin communities: “To avoid additional costs related to disposal of PAH contaminated sediment, municipalities should consider eliminating a major source of PAHs to their Municipal Separate Storm Sewer Systems - coal tar-based asphalt sealcoats.”⁵² Tom Kaldunski, the City Engineer for Inver Grove Heights, Minnesota, gave a presentation in a Fall 2013 webinar on coal tar-based sealants and discussed the costs of cleaning stormwater ponds and disposing of the PAH contaminated sediment.⁵³ He explained that there are an estimated potential 140 basins with PAH contaminated sediment, and the average basin cleaning cost is \$150,000. This could cost \$21 million for a city with 34,000 residents.

D. Availability of Alternatives

There are many alternatives to coal tar-based sealants readily available on the market – especially since many major retailers have stopped selling coal tar-based sealants as discussed in Part B above. The most popular and cheapest alternative to coal tar-based sealants is petroleum asphalt-based sealant.⁵⁴ While asphalt-based sealants do contain PAHs, they contain as little as 1/1000th the PAH level of coal tar-based sealants.⁵⁵ According to the Minnesota Pollution Control Agency, “Good asphalt sealcoat emulsions are very affordable, will provide a black appearance for 1-2 years, and can provide less-visible protection for 2-4 years if properly applied.”⁵⁶

Other alternatives contain fewer or no PAHs, such as gilsonite-based, acrylic-based, and agricultural oil-based sealants.⁵⁷ These products tend to be relatively more expensive, and they have less of an established performance track record than asphalt-

based sealants.⁵⁸ However, as major retailers move away from coal tar-based sealants, there may be a shift to some of these low and no PAH alternatives.

III. Coal Tar-Based Sealant Bans

This section examines current bans of coal tar-based sealants outside of Maryland, Virginia, and Pennsylvania, including location and scope. There are two states with statewide coal tar-based sealant bans, Minnesota and Washington. There are currently four countywide bans: Dane, Wisconsin; Montgomery County, MD; Prince George's County, MD and Suffolk, NY. In total, there are eight states/districts with a ban within the boundaries of the state (Texas, Wisconsin, New York, Washington, Illinois, Maryland, Minnesota and District of Columbia), and there are fifteen states/districts with known restrictions within the boundaries of the state (Texas, Wisconsin, New York, Massachusetts, District of Columbia, Michigan, North Carolina, South Carolina, Washington, California, Kansas, Illinois, Maryland, Minnesota and Missouri).

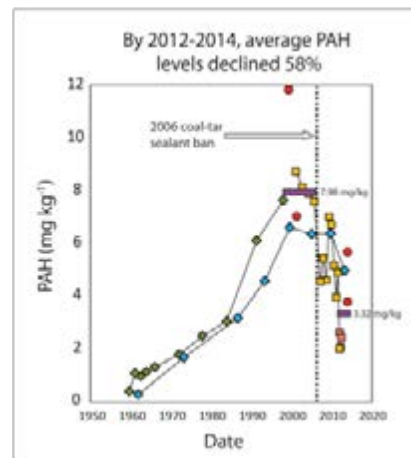
A. Locality Bans

1. Austin, Texas: The First Ban

In 2006, Austin, Texas, adopted the first ban of coal tar-based sealants in the United States. The City of Austin's City Council voted unanimously to ban the sale and use of coal tar-based sealants in the city and in its Extra Territorial Jurisdiction.⁵⁹ Regarding enforcement, Austin's Watershed Protection Department says:

Field staff (inspectors, investigators, biologists, etc.) for the Watershed Protection Department watch for sealant applications in progress and freshly sealed parking lots as they drive throughout the city on their other job duties. Whenever new sealant is found, it is screened for the presence of coal tar. Enforcement action is taken when coal tar-based pavement sealant is found applied after the ban was initiated. Enforcement actions proceed through municipal court and typically result in remediation of the applied sealant. The requirement for remediation is full removal of the coal tar sealant. Besides remediation, legal action can include fines and jail time.⁶⁰

The ban has proven to be very effective. In 2010, the City of Austin published the results of the coal tar-based sealant ban. According to Nancy McClintock, Assistant Director of the Watershed Protection Department, approximately one million pounds of PAHs have been prevented from entering Austin's environment since January 2006. Moreover, a United States Geological Survey study conducted in 2014 showed a 58% reduction in PAH's in lake sediment from Lady Bird Lake after the ban.⁶¹



2. Dane County, Wisconsin

Effective July 1, 2007, Dane County, Wisconsin banned the use, sale, and/or retail display of coal tar-based sealants.⁶² Moreover, “[i]t also requires retailers to prominently display information about the ordinance where customers make their driveway sealant purchases.” The notice must contain the following language:

The application of coal tar sealcoat products on driveways, parking lots and all other paved surfaces in Dane County is prohibited by section 80.08 of the Dane County Code of Ordinances. Coal tar is a significant source of polycyclic aromatic hydrocarbons (PAHs), a group of organic chemicals that can be carried by stormwater and other runoff into Dane County’s lakes and streams. PAHs are an environmental concern because they are toxic to aquatic life.⁶³

Any person who violates the ban is subject to subject to a forfeiture of \$25 per violation.

3. District of Columbia

Effective July 1, 2009, it is illegal to sell, use, or permit the use of coal tar-based sealants in the District of Columbia under the Comprehensive Stormwater Management Enhancement Amendment Act of 2008.⁶⁴ Any person who violates this law is subject to a daily fine of up to \$2,500.⁶⁵ According to the District Department of Environment, “the District of Columbia issued this ban to protect human health and our environment.”⁶⁶

Chris Kibler, Environmental Protection Specialist at the District Department of Environment, worked on the Washington, DC, ban and was able to provide additional information on the ban.⁶⁷ According to Kibler, there are no distributors of coal tar-based sealants in the District of Columbia. Distributors from outside the District of Columbia bring coal tar-based sealants into the District of Columbia, which makes coal tar-based sealants difficult to regulate. Because there are no manufacturers or distributors in the District of Columbia, the Comprehensive Stormwater Management Enhancement Amendment Act of 2008 only regulates contractors and end users in the District of Columbia. Kibler explained that the District of Columbia would benefit from having neighboring states (such as Maryland, Virginia, and Pennsylvania) regulate manufacturers and distributors of coal tar-based sealants to prevent these sealants from coming into the District of Columbia.

Kibler outlined how the District Department of Environment (DDE) enforces the ban on coal tar-based sealants in the District of Columbia. There are approximately 17,000 parking lots and driveways that potentially could be sealed with coal tar-based sealants in the District of Columbia. The DDE performs seventy-five inspections every year and has developed a field test to detect coal tar-based sealants during these inspections. First, an inspector removes a small piece of sealant with a razor blade and places it into a solvent. If the sealant does not dissolve after being placed in the solvent, that is an indication that the sealant could be coal tar-based. Second, a DDE official will talk to the owner of the parking lot or driveway and inspect contractor records. Finally, DDE sends a sample of the sealant to a lab in Texas for analysis that indicates with certainty whether the sealant is coal tar-based.

Kibler also described another innovative enforcement technique. The DDE uses aerial imagery (a GIS based model) that can help determine changes in parking lot color that could indicate the use of coal tar-based sealants. Pavements sealed with coal

tar-based sealants do not oxidize like their asphalt-based counterparts, therefore they remain very dark-colored. The DDE can use GIS technology to find dark parking lots and driveways. After identifying dark parking lots and driveways, the DDE then performs a field test on the pavement and sends a sample to Texas.

Once the DDE identifies parking lots and driveways with coal tar-based sealant, it requires the owner to remove the product. If the owner fails to remediate the property, the DDE can issue a civil penalty, and requires the owner to provide them with a plan for removal within thirty days of notification. The DDE will provide extensions in exigent circumstances (if, for example, if the weather does not allow removal). Kibler explained that fall and spring are the best times to remove coal tar-based sealant.

4. Suffolk County, New York

Suffolk County, New York, enacted a ban on coal tar-based sealants effective January 1, 2012.⁶⁸ “Violation of this law shall be subject to a civil fine of five hundred dollars (\$500.00) for an initial violation, with a penalty of seven hundred fifty dollars (\$750.00) for any subsequent violations.”

B. State Bans

1. Washington

Washington was the first state to ban the use of coal tar-based sealants on April 13, 2011. The statewide ban specifically prohibits the sale of coal tar in Washington after 2012 and prevents the application of coal tar after 2013.⁶⁹ Joan Crooks of the Washington Environmental Council remarked, “This bill is another big step forward to ensure we are protecting children’s health and the environment from harmful water pollutants.”⁷⁰ Rep. David Frockt, who sponsored the bill, said “I’m proud we passed the first statewide ban against this nasty toxic threat before it can further contaminate our waters and threaten the health of our people. We are the first, but we won’t be the last, because we are leading the nation in the right direction.”

Joshua Grice, Research Analyst for the Washington State Department of Ecology, was contacted about the Washington ban, and he explained, “The ban in Washington was aided by a general consensus that coal tar sealants were not in wide use here.”⁷¹ Moreover, the Department of Transportation had already moved away from using coal tar-based sealants. Holly Davies, who was involved in the legislative history of the ban at the Washington State Department of Ecology, added, “[I]t’s hard to defend smelly, black, carcinogens.”⁷² Prior to the ban, the United States Geological Service had tested two lakes in the state, Lake Washington and Lake Ballinger, and found coal tar contamination in both. Davies revealed, “An environmental advocate gave the paper to a legislator whose district includes Lake Ballinger and he wrote up a bill to ban coal tar sealants.”

2. Minnesota

Minnesota was the second state to ban the use of coal tar-based sealants. Effective January 1, 2014, the Minnesota Legislature banned the sale and use of coal tar-based sealants.⁷³ Prior to this statewide ban, Minnesota had twenty-nine local bans,⁷⁴ and in 2009, Minnesota restricted state agencies from purchasing coal tar-based sealant effective July 1, 2010.⁷⁵ In addition, the Minnesota Legislature provided small grants to local governments for voluntarily treating or disposing of contaminated sediment

in stormwater ponds, provided that the governments restrict the use of undiluted coal tar-based sealant. This law is codified under *Minnesota Statutes* section 116.202, accessible at <https://www.revisor.mn.gov>.

Al Innes, Safer Product Chemistry Coordinator at the Minnesota Pollution Control Agency, worked on the Minnesota ban and was able to provide additional information about the ban.⁷⁶ Innes explained that the success with the local bans and the voluntary grant-based program was integral to the adoption of the statewide ban. The popularity of local bans demonstrated that cities were concerned about the use of coal tar-based sealants; there was a lot of support for a statewide ban in policy committees and cities. The restriction on government agencies in 2009 also served as a stepping-stone to the statewide ban. Moreover, PAHs attach to suspended particles in the water and settle at the bottom, and settlement contamination issues were becoming more apparent and more concerning in Minnesota. In 2012, the Minnesota Pollution Control Agency estimated that cleanup costs for stormwater ponds contaminated with PAH runoff could approach \$1 to \$5 billion in the Twin Cities area alone.

IV. Bans in Maryland, Virginia, and Pennsylvania

Maryland, Virginia, and Pennsylvania are the three keystone states of the Chesapeake Bay watershed. Out of the three, only Maryland has attempted to present legislation banning coal tar-based sealants. However, the Maryland legislation was ultimately unsuccessful. Since then, two counties in Maryland have successfully enacted countywide bans prohibiting the use of coal tar-based sealants.

A. Maryland: Unsuccessful Legislation

On February 1, 2012, Delegate Dana Stein sponsored legislation (HB 369) to ban coal tar-based sealants in Maryland, but he ultimately withdrew the bill. In a report on February 2, 2012, Del. Dana Stein said this about HB 369:

This bill seeks to prohibit the use of a pavement sealant applied to asphalt surfaces known as coal tar. Coal tar pitch has been classified as a “known carcinogen” by the U.S. Department of Health and Human Services. Along with being washed into our streams and waterways, coal tar residue can enter the home on the soles of shoes that have come into contact with a sealed surface, which leaves children especially susceptible to contamination. The alternative to coal tar sealants is comparably priced. Passage of this bill will make our environment cleaner and our neighborhoods healthier places to live.⁷⁷

Some believe that this legislation failed to pass because of pressure from industry during a public hearing by the Environmental Subcommittee. According to Coal Tar Free America, industry representatives made “many exaggerations and false claims”⁷⁸ during the hearing. Some such claims include: “There is no link showing harm between coal tar and humans” and “3000 jobs would be lost if the ban were to take effect.”⁷⁹

B. Montgomery County, Maryland

As of December 18, 2012, Montgomery County, Maryland banned the use of coal tar-based sealant, the first ban of coal tar-based sealants in Maryland. According to Montgomery County, “The use of a coal-tar based sealant can subject the applicator

and the property owner to a fine of up to \$1,000.”⁸⁰ The penalty provision of the bill is:

Any violation of this Chapter is a Class A violation. However, notwithstanding Section 1-19, the maximum penalty for a civil violation of Article I is \$1,000 for an initial or repeat offense. Each day a violation continues is a separate offense.⁸¹

C. Prince George’s County, Maryland

Prince George’s County, Maryland, enacted the second ban of coal tar-based sealants in Maryland. “Effective July 1, 2015, it is illegal to sell, use or permit the use of coal tar pavement products on property in Prince George’s County. Contractors or property owners that use a coal tar pavement product are subject to a fine of up to \$1,000 per day for each violation.”

The bans in the District of Columbia, Montgomery County, and Prince George’s County have made the Anacostia Watershed the first multi-jurisdictional, coal tar-based sealant-free watershed in the United States.

V. Conclusion

The use of coal tar-based sealants is highly controversial. However, evidence suggests that the costs of use of coal tar-based sealants greatly outweigh the benefits of use. Although asphalt-based sealants are slightly more expensive, the environmental costs of coal tar-based sealants far outweigh the cheaper retail cost as the cleanup cost of coal tar-based sealants and PAHs is exorbitant. Moreover, the extent of the risk as well as cost of coal tar-based sealants and PAHs to human health is currently unknown.

One can conclude that the economic analysis actually favors banning coal tar-based sealants. It is arguable that a ban of coal tar-based sealants would not have a negative economic impact:

- The use of coal tar-based sealants hurts industries that rely on healthy populations of fish, crabs, and oyster.
- The continued use of coal tar-based sealants will increase the already high cost of cleanup.
- The cleanup and removal of coal tar-based sealants could create jobs in the region.
- Major retailers have already stopped selling the product, so consumers are already encouraged to purchase alternatives.

The Chesapeake Bay is a unique and precious resource. As the largest estuary in North America and the third largest in the world, one supporting more than 17 million people who live, work, and play within the watershed, 10 million of whom live along or near the Bay’s shores, the use of coal tar-based sealants in Maryland, Virginia, and Pennsylvania does pose a threat to the Bay watershed’s environment and the health of its residents. Statewide bans in Maryland, Virginia, and Pennsylvania would best serve the Chesapeake Bay and surrounding communities. Maryland, like Minnesota, has been very successful at enacting countywide bans, which could be indicative of a greater receptivity to a statewide ban in Maryland than in Virginia and Pennsylvania at this time. Without implementing statewide bans, the Chesapeake Bay remains unprotected from the pollution and risks associated with coal tar-based sealants.

VI. Attachments



DISTRICT OF COLUMBIA
BAN ON COAL TAR
PAVEMENT SEALANTS

Hiring a contractor? Do-it-yourself?
Don't use coal tar to seal your driveway
or parking lot. It's the law, and it's for the
protection of our waterways and health.



DISTRICT OF COLUMBIA
BAN ON COAL TAR
PAVEMENT SEALANTS

**DC LAW \$2,500 FINE PER DAY
ENFORCEMENT IS UNDERWAY**

Effective July 1, 2009, it is illegal to sell, use,
or permit the use of coal tar pavement products
on property in the District.

Coal tar pavement products are used to seal
driveways, parking lots, and playgrounds. They
contain high concentrations of polycyclic aromatic
hydrocarbons (PAHs), which are highly toxic
chemicals that are suspected to cause cancer and
are known to harm humans, animals, and aquatic
life. PAH-containing particles from sealants wear
off paved surfaces and can be washed into local
waterways by rainwater or tracked into homes.

Ask your contractor for
less toxic asphalt-based sealants.

GET MORE INFORMATION
ddoe.dc.gov/CoalTarBan

REPORT SUSPECTED VIOLATIONS
Tel: 202-407-1277



1200 First St., NE, 5th Floor
Washington, DC 20002

NOTICE

**Coal tar pavement sealants are now prohibited
in Montgomery County.**

Potential fines of up to \$1,000 for using coal tar.

**Before using a paving sealant, check to make sure it does not contain:
coal tar, coal tar pitch or RT-12.**

Why:

Coal tar, a byproduct of coal processing, contains high levels of chemicals called polycyclic aromatic hydrocarbons (PAHs).

FOR HUMAN HEALTH: Some PAHs are known carcinogens.

TO PROTECT WILDLIFE: Studies have shown that when coal tar-based sealants are applied on parking lots and driveways, PAHs can be released into nearby surface water. The chemicals can then accumulate in sediments to levels potentially harmful to aquatic wildlife.

TO SAVE MONEY: The presence of PAHs in sediments can potentially increase costs to the County government, businesses, and homeowner's associations charged with maintaining stormwater management facilities.



Alternatives:

Approved alternatives for coal tar sealants include:

- Asphalt-based Sealant
- Latex Sealant

Any material containing coal tar, refined coal tar, coal tar pitch, or RT-12 is prohibited.

For those hiring a contractor to perform the job, make sure you specify a product without coal tar. Ask to see the ingredient list of the product they are using. For do-it-yourselfers, local home improvement stores carry asphalt-based or latex sealants.

Use of a coal tar-based sealant can subject the applicator and the property owner to a **fine of up to \$1,000**, effective December 18, 2012.

For a list of more alternative sealants and information on the County's ban on coal tar pavement sealants, visit www.montgomerycountymd.gov/coaltarban.



Montgomery County
Department of Environmental Protection
255 Rockville Pike, Suite 120
Rockville, MD 20850

Photo by Justin Mcinnis/ U.S. Geological Survey

AVISO

Ahora los selladores de alquitrán de carbón (Coal Tar) para pavimentos están prohibidos en el Condado de Montgomery.

Se pueden imponer multas de hasta \$1,000 por usar alquitrán de carbón.

Antes de usar un sellador para pavimento, verifique el producto para asegurar que no contenga: alquitrán de carbón, alquitrán de hulla o RT-12.

Por qué:

El alquitrán de carbón, un producto derivado del procesamiento de carbón, contiene altos niveles de productos químicos denominados hidrocarburos aromáticos policíclicos (HAP).

PARA LA SALUD HUMANA: Algunos HAP son carcinógenos conocidos.

PARA PROTEGER LA FLORA Y LA FAUNA: Estudios han demostrado que cuando se aplican selladores que contienen alquitrán de carbón en los estacionamientos y entradas para automóviles, los HAP se pueden liberar en el agua superficial cercana. Los productos químicos se pueden acumular en los sedimentos a niveles potencialmente dañinos para la flora y la fauna.

PARA AHORRAR DINERO: Es posible que la presencia de los HAP en los sedimentos incremente potencialmente los costos para el gobierno del Condado, negocios y asociaciones de propietarios de viviendas a los que se les cobra por el mantenimiento de instalaciones de escurrimiento de agua pluvial.

Alternativas:

Las alternativas aprobadas para los selladores de alquitrán de carbón incluyen:

- Selladores a base de asfalto
- Selladores de látex

Está prohibido cualquier material que contenga alquitrán de carbón, alquitrán de carbón refinado, alquitrán de hulla o RT-12.

Para aquellas personas que utilizan un contratista para ejecutar el trabajo, no deje de especificar que se use un producto sin contenido de alquitrán de carbón. Solicite ver la lista de ingredientes del producto que se va a utilizar. Para las personas que se ocupan ellas mismas de hacer estos trabajos, las tiendas locales de mejoras para el hogar cuentan con selladores a base de asfalto o de látex.

El uso de un sellador a base de alquitrán de carbón puede causar que se imponga una multa a la persona que aplica el material y al dueño de la propiedad de hasta \$1,000, con vigencia el 18 de diciembre de 2012.

Para obtener una lista de selladores alternativos e información sobre la prohibición del Condado en cuanto a selladores de alquitrán de carbón, visite www.montgomerycountymd.gov/coalartan.



Condado de Montgomery
Departamento de Protección del Medio Ambiente
255 Rockville Pike, Suite 120
Rockville, MD 20850

Fotografía de: Justin Morris/ U.S. Geological Survey





PRINCE GEORGE'S COUNTY

BAN ON COAL TAR PAVEMENT SEALANTS

Effective July 1, 2015, it is illegal to sell, use or permit the use of coal tar pavement products on property in Prince George's County.

COUNTY BAN

Prince George's County has banned the use of coal tar pavement products used on parking lots, driveways, playgrounds, airport runways and other surfaces. These products contain extremely high levels of PAHs (polycyclic aromatic hydrocarbons) that find their way into our local stream sediments during rain events and pose a significant threat to our waterways. Sediment PAHs are known to harm aquatic life and contain cancer causing carcinogens.

WHAT TO DO

- Use asphalt-based or latex sealants that are less toxic. Some products that do not contain coal tar include:

RETAIL

- Henry PM2000 Premium Driveway Sealer/Filler
- Henry Elastomeric Emulsion Crack Filler

COMMERCIAL/WHOLESALE

- Paveshield
- Jennite Asphalt Emulsion Pavement Sealer
- Gilonite Asphalt Driveway Sealant

*There are other sealant products available that do not contain coal tar, so please read labels carefully. Listing of specific product trade name does not constitute an endorsement of its use.

- Construct parking lots with pervious pavement or concrete to avoid the need for sealants
- If purchasing a pavement product/sealant from a retailer or hiring a contractor/sealant applicator, ask for a Materials Safety Data Sheet (MSDS) that can help you identify coal tar-containing products before you purchase them.

Use of a coal tar pavement product can subject the applicator and the property owner to a fine of up to **\$1,000**.

Disposal of any unwanted product can be made at the **Prince George's County Household Hazardous Waste Acceptance Site** located at the Brown Station Road Sanitary Landfill, 11611 White House Road in Upper Marlboro. For information, contact 3-1-1.

To report a potential violation of the ban, contact George Nicol at **(301) 883-5976**.



References

- 1 B.J. Mahler & Van Metre, P.C., *Coal-Tar-Based Pavement Sealcoat, Polycyclic Aromatic Hydrocarbons (PAHs), and Environmental Health*, U.S. Geological Survey (2011), <http://pubs.usgs.gov/fs/2011/3010/pdf/fs2011-3010.pdf>.
- 2 *Id.*
- 3 Mateo Scoggins, Tom Ennis, Nathan Parker, & Chris Herrington, *A Photographic Method for Estimating Wear of Coal Tar Sealcoat from Parking Lots*, 43 ENV. SCI. & TECH. 4909 (2009), <http://pubs.acs.org/doi/abs/10.1021/es9003119>.
- 4 Mahler, *supra*, note 1, at 6.
- 5 Kim Gehle, *Polycyclic Aromatic Hydrocarbons (PAHs): How Do PAHs Induce Pathogenic Changes?*, U.S Dept. of Health and Human Services, Agency for Toxic Substances and Disease Registry (2012), <http://www.atsdr.cdc.gov/csem/csem.asp?csem=13&po=10#tocbookmark2>.
- 6 Fraunhofer Institute of Toxicology and Aerosol Research, *Environmental Health Criteria 202: Selected non-heterocyclic polycyclic aromatic hydrocarbons*, World Health Organization, International Programme on Chemical Safety (1998), <http://www.inchem.org/documents/ehc/ehc/ehc202.htm>; Mahler, *supra*, note 1, at 5.
- 7 Mahler, *supra*, note 1, at 2.
- 8 *Id.*
- 9 Texas Water Science Center, *USGS Research: PAHs and Coal-Tar-Based Pavement Sealcoat*, <http://tx.usgs.gov/sealcoat.html>.
- 10 Mahler, *supra*, note 1, at 3.
- 11 Texas Water Science Center, *supra*, note 9.
- 12 Amy Witter, Mihn Nguyen, Sunil Baidar, & Peter Sak, *Coal-tar-based sealcoated pavement: A major PAH source to urban stream sediments*, ENVIRONMENTAL POLLUTION, 59 (2014), <http://www.sciencedirect.com/science/article/pii/S0269749113005435>.
- 13 Texas Water Science Center, *supra*, note 9.
- 14 Peter Van Metre, Barbara Mahler, & Jennifer Wilson, *PAHs Underfoot: Contaminated Dust from Coal-Tar Sealcoated Pavement is Widespread in the United States*, 43 ENV. SCI. & TECH. 20 (2009), <http://pubs.acs.org/doi/abs/10.1021/es802119h>.
- 15 Barbara Mahler, Peter Van Metre, Judy Crane, Alison Watts, Mateo Scoggins, & E. Spencer Williams, *Coal-Tar-Based Pavement Sealcoat and PAHs: Implications for the Environment, Human Health, and Stormwater Management*, 46 ENV. SCI. & TECH. 3039 (2012), <http://pubs.acs.org/doi/abs/10.1021/es203699X>.
- 16 R.T. Pavlowsky, *Coal-tar pavement sealant use and polycyclic aromatic hydrocarbon contamination in urban stream sediments*, 34 PHYSICAL GEOGRAPHY 392 (2013), http://www.tandfonline.com/doi/full/10.1080/02723646.2013.848393#VS_ytVy_vD2.
- 17 Peter Van Metre, Barbara Mahler, *Contribution of PAHs from coal-tar pavement sealcoat and other sources to 40 U.S. lakes*, 409 SCI. OF THE TOTAL ENV. 334 (2010), <http://tx.usgs.gov/coring/pubs/Van%20Metre%20PAH%20sources%20TOTEN2010.pdf>.
- 18 Barbara Mahler, Peter Metre, Jennifer Wilson, MaryLynn Musgrove, Teresa Burbank, Thomas Ennis, Thomas Bashara, *Coal-tar-based parking lot sealcoat: An unrecognized source of PAH to settled house dust*. 44(3) Env. Sci. & Tech. 894 (2010), <http://pubs.acs.org/doi/abs/10.1021/es902533r>.
- 19 Peter Van Metre & Barbara Mahler, *PAH Concentrations in Lake Sediment Decline Following Ban on Coal-Tar-Based Pavement Sealants in Austin, Texas*, 38 Env. Sci. & Tech. 7222 (2014), <http://tx.usgs.gov/coring/pubs/PAHConcentrationsArticle.pdf>.
- 20 Van Metre, et. al, *Contribution of PAHs to 40 lakes*, *supra*, note 17.
- 21 Coal Tar, CAMPAIGN FOR SAFE COSMETICS, <http://www.safecosmetics.org/get-the-facts/chemicals-of-concern/coal-tar/>.
- 22 Polycyclic Aromatic Hydrocarbons (PAHs), WISCONSIN DEPT. OF PUBLIC HEALTH, <https://www.dhs.wisconsin.gov/chemical/pah.htm>.

- 23 Coal Tar: Frequently Asked Questions, "Other sources of PAH in the environment besides coal tar pavement sealants", AUSTIN WATERSHED PROTECTION DEPT., <https://www.austintexas.gov/content/1616/FAQ/2511>.
- 24 Mahler, et. al, *supra*, note 18.
- 25 International Agency for Research on Cancer, 1980, Agency for Toxic Substances and Disease Registry. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA, U.S. Department of Health and Human Services, Public Health Service, 1995.
- 26 E. Spencer Williams, Barbara Mahler, & Peter Van Metre, *Cancer risk from incidental ingestion exposures to PAHs associated with coal-tar-sealed pavement*, 47(2) ENV. SCI. & TECH. 1101 (2012), <http://pubs.acs.org/doi/abs/10.1021/es303371t>.
- 27 *Id.*
- 28 *Id.*
- 29 National Toxicology Program, Dept. of Health and Human Services, *Coal Tars and Coal-Tar Pitches*, 13 REPORT OF CARCINOGENS (2014), <http://ntp.niehs.nih.gov/ntp/roc/content/profiles/coal tars.pdf>.
- 30 Coal Tar and Coal-Tar Pitch, NATIONAL CANCER INSTITUTE, <http://www.cancer.gov/cancertopics/causes-prevention/risk/substances/coal-tar>.
- 31 Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs), AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, <http://www.atsdr.cdc.gov/PHS/PHS.asp?id=120&tid=25>.
- 32 Thomas Bommarito, Donald Spalding, & Richard Halbrook, *Toxicity of coal-tar pavement sealants and ultraviolet radiation to Ambystoma Maculatum*, 19(6) ECOTOXICOLOGY 1147 (2010), <http://link.springer.com/article/10.1007%2Fs10646-010-0498-8>.
- 33 P. J. Breyer, J. N. Elliott, & E. J. Willingham, *The effects of coal tar based pavement sealer on amphibian development and metamorphosis*, 15(3) ECOTOXICOLOGY 241 (2006), <http://www.ncbi.nlm.nih.gov/pubmed/16557355>.
- 34 Thomas Bommarito, Donald Sparling, & Richard Halbrook, *Toxicity of coal-tar and asphalt sealants to eastern newts, Notophthalmus viridescens*, 81(2) CHEMOSPHERE 187 (2010), <http://www.sciencedirect.com/science/article/pii/S0045653510007320>
- 35 Mark Myersa, Lyndal Johnson & Tracy Collier, *Establishing the Causal Relationship between Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Hepatic Neoplasms and Neoplasia-Related Liver Lesions in English Sole (Pleuronectes vetulus)*, 9(1) HUMAN & ECOLOGICAL RISK ASSESSMENT 67 (2003), http://www.tandfonline.com/doi/abs/10.1080/713609853#.VS_X9Fy_vD0; M. S. Shailaja, C. D'Silva, Evaluation of impact of PAH on a tropical fish, *Oreochromis mossambicus* using multiple biomarkers. <http://www.ncbi.nlm.nih.gov/pubmed/14505704>.
- 36 Pamela Bryer, Mateo Scoggins, Nancy McClintock, *Coal-tar based pavement sealant toxicity to freshwater macroinvertebrates*, 156(5) ENV. POLLUTION 1932 (2010), <http://www.sciencedirect.com/science/article/pii/S0269749109005375>; M. Scoggins, N. L. McClintock, L. Gosselink, & P. Bryer, Occurrence of polycyclic aromatic hydrocarbons below coal-tar-sealed parking lots and effects on stream benthic macroinvertebrate communities, 26(4) J. N. AMERICAN BENTHOLOGICAL SOCIETY 694 (2007), <http://www.bioone.org/doi/abs/10.1899/06-109.1>.
- 37 Biomagnification, USGS, <http://toxics.usgs.gov/definitions/biomagnification.html>.
- 38 See R. Dadamo, S. Pelosi, P. Trotta, G. Sansone, *Bioaccumulation and biomagnification of polycyclic aromatic hydrocarbons in aquatic organisms*, 56 MARINE CHEMISTRY 45 (1997), <http://www.ncbi.nlm.nih.gov/pubmed/20422285>; I. Takeuchi, et. al., *Biomagnification profiles of polycyclic aromatic hydrocarbons, alkylphenols and polychlorinated biphenyls in Tokyo Bay elucidated by delta13C and delta15N isotope ratios as guides to trophic web structure*, 58(5) MAR POLLUTION BULLETIN 663, <http://www.ncbi.nlm.nih.gov/pubmed/19261300>, <http://joyerresearchgroup.uga.edu/content/bioaccumulation-and-biomagnification-polycyclic-aromatic-hydrocarbons-aquatic-organisms>.
- 39 U.S. Dept. of Interior, *Environmental Justice Strategic Plan, 2012-2017*, <http://www.doi>.

gov/pmb/oepc/upload/Final-DOI-EJ-SP-March-27-2012.pdf.

- 40 Goal 3 reads: “The Department will, on its own or in collaboration with partners, identify and address environmental impacts that may result in disproportionately high and adverse human health or environmental effects on minority, low-income, or tribal populations.” *Id.*, at 18.
- 41 See *Id.*, at 20 (“In the District of Columbia the ban was issued to protect human health and the environment. The ban includes the entire District of Columbia, but the [environmental justice] relevance is in the Anacostia River watershed.”).
- 42 Pennsylvania Asphalt Pavement Association Website, <http://www.pa-asphalt.org>. Conversation with Gary Hoffman, March 18, 2015.
- 43 Associated Builders and Contractors, VA Chapter Website, <http://www.abcva.org/en-us/abcva/aboutus.aspx>. Conversation with Patrick Dean, March 18, 2015.
- 44 VA Asphalt Association Website, <http://www.vaasphalt.org/about-vaa/about-us/>. Conversation with Caroline Fahed, March 18, 2015.
- 45 Chesapeake Bay Found., *Debunking the “Job Killer” Myth, How Pollution Limits Encourage Jobs* (2011), <http://www.cbf.org/document.doc?id=1023>.
- 46 MN Pollution Control Agency, *Actions to restrict or discontinue the use of Coal Tar-Based Sealants in the United States* (Current as of Dec. 2, 2014), <http://www.pca.state.mn.us/index.php/view-document.html?gid=16180>.
- 47 Center for Environmental Excellence by AASHTO Stormwater Management Community of Practice, *STATE-OF-THE-PRACTICE REPORT: EPA Post-Construction Stormwater Control Rulemaking* (2011), http://environment.transportation.org/pdf/communities_of_practice/stormwatercopjan2011.pdf.
- 48 Carbon products and organic chemicals from coal, COAL ONLINE, <http://www.coalonline.info/site/coalonline/content/browser/81369/Carbon-products-and-organic-chemicals-from-coal#>.
- 49 FAQ, COAL TAR FREE AMERICA, <http://coaltarfreeamerica.blogspot.com/p/references.html#where%20does%20coal%20tar%20for%20sealant%20come%20from>.
- 50 CTS v. Asphalt-Based Sealant: How do the Costs Compare?, COAL TAR FREE AMERICA (2011), <http://coaltarfreeamerica.blogspot.com/2011/03/cts-vs-asphalt-based-sealant-how-do.html>; Annual Sealant Price Comparison: Asphalt Drops Twice as Much vs. Coal Tar, *Id.*, <http://coaltarfreeamerica.blogspot.com/2012/03/annual-sealant-price-comparison-asphalt.html>; 2013 Coal Tar vs. Asphalt Sealer Price Comparison, *Id.*, <http://coaltarfreeamerica.blogspot.com/2013/03/2013-coal-tar-vs-asphalt-sealer-price.html>; 2014 Asphalt vs. Coal Tar Sealer Prices: Coasts Outpace Inflation, *Id.*, <http://coaltarfreeamerica.blogspot.com/2014/07/driveway-sealer-costs-outpace-inflation.html>.
- 51 National Park Service, *State of the River Report: Water Quality and River Health in the Metro Mississippi River*, <http://www.nps.gov/miss/learn/nature/upload/SOTR-2nd-Edition-v2-022213.pdf>.
- 52 Solid & Hazardous Waste Education Center, *Avoiding High Costs from Stormwater Sediment Contaminated by Coal Tar-Based Asphalt Sealcoats*, <http://www4.uwm.edu/shwec/publications/cabinet/p2/Stormwater%20Utilities%206-7-13.pdf>.
- 53 City of Inver Grove Heights, MN, *City Project No. 2012-15 – Sediment Removal from Storm Water Basin (Polycyclic Aromatic Hydrocarbons)*, <https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWVfbnXncmVhdGxha2VzcGFocmVkdWN0aW9ufGd4OmU5NjFjYjMwYjYxYmU2Yg>.
- 54 MN Pollution Control Agency, *Choosing alternatives to coal tar-based pavement sealcoats: Guidance for property owners, associations and managers*, <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/great-lakes-coal-tar-sealcoat-pah-reduction-project/choosing-alternatives-to-coal-tar-based-pavement-sealcoats.html#more-on-why-to-move-away-from-coal-tar-click-on-bar-to-expand>.
- 55 Texas Water Science Center, *supra*, note 9.
- 56 MN Pollution control Agency, *supra*, note 54.

- 57 *Id.*
- 58 *Id.*
- 59 Austin City Code § 6-6, et. seq., available at https://www.austintexas.gov/sites/default/files/files/Watershed/coal_tar_ordinance.pdf.
- 60 Austin Watershed Protection Dept., *supra*, note 23, “Coal Tar Ban Enforcement”.
- 61 USGS, Austin Coal Tar Sealant Ban Leads to Decline in PAHs, https://www.austintexas.gov/sites/default/files/files/Watershed/coal_tar/PAH-News-Release-2014.pdf.
- 62 Dane County Code, Ch. 80, available at <https://pdf.countyofdane.com/ordinances/ORD080.pdf>; Van Metre, et. al., *PAH Concentrations in Lake Sediment Decline Following Ban in Austin*, *supra*, note 19.
- 63 *Id.*, at 80.04(5).
- 64 D.C. Code § 8-153.01, available at <http://green.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Coal%20Tar%20Law.pdf>.
- 65 *Id.*
- 66 Coal Tar Ban in the District of Columbia, DC.gov, <http://dc.gov/service/coal-tar-ban-district-columbia>.
- 67 Conversation with Chris Kibler, April 3, 2015.
- 68 Resolution No. 440 (2011), Adopting Local Law No. 27, <http://legis.suffolkcountyny.gov/Resos2011/i1162-11.pdf>.
- 69 First in nation ban on toxic coal tar sealants passes WA state legislature, WASHINGTON ENV. COUNCIL, <http://wecprotects.org/press-room/press-releases/first-in-nation-ban-on-toxic-coal-tar-sealants-passes-wa-state-legislature>.
- 70 *Id.*
- 71 Conversation with Joshua Grice, February 17, 2015.
- 72 Conversation with Holly Davies, February 18, 2015.
- 73 MN Pollution Control Agency, *Restriction on Coal Tar-Based Sealants*, <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/municipal-stormwater/restriction-on-coal-tar-based-sealants.html>.
- 74 Coal Tar Sealant Bans, COAL TAR FREE AMERICA, <http://coaltarfreeamerica.blogspot.com/p/bans.html>.
- 75 U.S. EPA, *Stormwater Best Management Practice: Coal-Tar Sealcoat, Polycyclic Aromatic Hydrocarbons, and Stormwater Pollution*, http://www.epa.gov/npdes/pubs/coal_tar.pdf; Dale Thompson, *Coal tar based seal coat for driveways and parking lots*, MN POLLUTION CONTROL AGENCY, <http://www.metrocitiesmn.org/vertical/sites/%7B63D48B3B-FE99-433B-BCDD-78BBF3D7629D%7D/uploads/%7B72B795DA-432C-4019-A28F-622D3DEB5AD5%7D.PDF>.
- 76 Conversation with Al Innes, February 23, 2015.
- 77 Dana Stein, House of Delegates, http://danastein.com/wp-content/uploads/2012/11/2012_02_3-Annapolis-Report.pdf.
- 78 MD Drops Sealant Ban After Industry Bluster, COAL TAR FREE AMERICA, <http://coaltarfreeamerica.blogspot.com/2012/03/md-drops-sealant-ban-after-industry.html>.
- 79 *Id.*
- 80 Coal tar Pavement Sealants are Prohibited in Montgomery County, DEPT. OF ENVIRONMENTAL PROTECTION, <http://www.montgomerycountymd.gov/DEP/water/coal-tar-ban.html>.
- 81 Montgomery County Code § 19-70, available at http://montgomeryco-md.elaws.us/code/coor_ptii_ch19_artvi_sec19-70.