

Sources for Maryland Coal Tar Ban
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Abdel-Shafy, Hussein I., and Mona S. M. Mansour. "A review on polycyclic aromatic hydrocarbons: Source, environmental impact, effect on human health and remediation." *Egyptian Journal of Petroleum*, vol. 25, no. 1, Mar. 2016, pp. 107-23. *Science Direct*, doi:10.1016/j.ejpe.2015.03.011. Accessed 28 July 2019. This review on polycyclic aromatic hydrocarbons is about their impact on the environment and the health risks posed to humans. This source also explains the anthropogenic sources of PAHs and the main mechanisms of their losses, especially using bacteria, fungi, and algae. This source is helpful in explaining the causes and effects of PAHs, and how to get rid of them.

Actions to restrict or discontinue the use of Coal Tar Based Sealants in the United States.

Minnesota Pollution Control Agency, 12 July 2016. Tdr-g1-12. Table. This chart lists all states/jurisdictions, universities, and companies that have actions to restrict or discontinue the use of coal tar based sealants. This source helps us know what places have coal tar sealant bans.

Arfsten, Darryl P. "The Effects of near Ultraviolet Radiation on the Toxic Effects of Polycyclic Aromatic Hydrocarbons in Animals and Plants: A Review" ["The Effects of Near Ultraviolet Radiation on the Toxic Effects of Polycyclic Aromatic Hydrocarbons in Animals and Plants: A Review"]. *ScienceDirect*, www.sciencedirect.com/science/article/pii/S0147651396900019?via%3Dihub. Accessed 28 July 2019. This article is about the effects of ultraviolet (UV) Radiation and the toxic

effects of PAHs in animals and plants, especially in aquatic life. This source is helpful in reporting on UV-induced carcinogenesis in PAHs.

Bommarito, T., et al. "Toxicity of coal-tar pavement sealants and ultraviolet radiation to *Ambystoma Maculatum*." *Pub Med. PubMed*, 4 May 2010, www.ncbi.nlm.nih.gov/pubmed/20440554. Accessed 11 Nov. 2019. This is an abstract to an article that explains ultraviolet radiation and *Ambystoma Maculatum*. It gives facts about PAHs and explains the effects of coal tar sealant exposure in aquatic animals. This source is helpful in explaining how coal tar sealants affect aquatic life.

Bowman, David T., et al. "Characterization of Polycyclic Aromatic Compounds in Commercial Pavement Sealcoat Products for Enhanced Source Apportionment." *Environmental Science and Technology*, digital ed., vol. 53, no. 6, 12 Feb. 2019.

Butler, Mary Ann, et al. "Hazard Review: Health Effects of Occupational Exposure to Asphalt." PDF file, Dec. 2000. This source gives an overview of the vocational uses of coal tar sealants. It explains what coal tar sealants are used on. It references to a number of primary resources, which all prove negative health effects on the human body, especially cancer. This source is helpful in showing the negative health effects of coal tar sealants on the human body. This is to disprove opponents that say coal tar does not affect the human body.

"Coal Tar and Coal-Tar Pitch." *National Cancer Institute*, National Institutes of Health, 28 Dec. 2018, www.cancer.gov/about-cancer/causes-prevention/risk/substances/coal-tar. Accessed 14 July 2019. This source mainly focuses on Coal Tar and Coal Tar Pitch. This article explains what coal tar and coal-tar pitch is, how people are exposed to coal tar and

coal-tar pitch, which cancers are associated with exposure to coal tar and coal-tar pitch, and how exposure can be reduced. This source is helpful in giving an overview of the dangers of coal-tar products on humans.

"Coal Tar and High-PAH Pavement Sealant Ban in the District." *Department of Energy and Environment*, DC.gov, doee.dc.gov/coaltar. Accessed 14 July 2019. This source describes the 2009 ban of coal-tar and high-PAH sealants in Washington, DC. It describes the purpose of the law, regulations of the law, and what would happen if somebody were to break the law. This article is helpful in providing a baseline for the Howard County and Maryland bans, as well as introducing other high-PAH sealants that are not coal tar.

"Coal Tar Ban." *Department of Environmental Protection Montgomery County, Maryland*, Montgomery County Government, 2019, www.montgomerycountymd.gov/DEP/contact/coal-tar.html. Accessed 14 July 2019. This source describes the 2012 coal-tar ban implemented in Montgomery County, Maryland. It describes products that are in the ban and safer alternatives to coal tar. This source is helpful in showing how to write out the ban, as well as showing that other counties have coal-tar bans, too.

"Coal Tar Cream." *webmd.com*, www.webmd.com/drugs/2/drug-4183-1056/coal-tar-topical/coal-tar-topical/details. Accessed 18 Sept. 2019. This source describes the coal tar topical, a medication used to treat conditions such as psoriasis. It describes the uses, side effects, precautions, interactions of coal tar topical, and what happens if one overdoses. This source is helpful in over-viewing the product, and for comparing with coal tar sealant.

"Coal Tar in Pavement Sealants." *Weitz & Luxenberg, P.C.*, 10 Jan. 2019,

www.weitzlux.com/environmental-pollution/coal-tar-pavement-sealants/. Accessed 14 July 2019. This source describes how sediment worn away by coal-tar sealants gets into streams, lakes, and other water bodies. It also describes different lawsuits filed by people in the area on how the PAHs in the sediment affected them. This source is helpful in showing one way in which PAHs are bad for the environment.

"Coal Tar Pavement Products Ban." *Anne Arundel County, Maryland*, 2018,

www.aacounty.org/departments/inspections-and-permits/site-inspections/coal-tar-pavement-ban/. Accessed 14 July 2019. This source is made for the ban on coal tar sealants in Anne Arundel County, Maryland. It describes what coal tar sealants are, how it gets into the ecosystem, and what happens if someone doesn't comply with the ban. A list of alternatives is also given. This source is helpful in showing that other counties have banned coal tar sealants as well. A graphic used in this website is also in our presentation.

"Coal Tars." *Canada.ca*, Government of Canada, 23 Aug. 2019,

www.canada.ca/en/health-canada/services/chemicals-product-safety/coal-tars.html. Accessed 17 Dec. 2019. This web page from the government of Canada describes coal tars in general, but focusing on coal tar sealants and shampoos. It describes that coal tar soaps and shampoos are prepared differently than coal tar sealants. This source is helpful in counter-arguing the opponents' claim that coal tar shampoos are the same thing as coal tar sealants, but they

"Coal Tars." *Health Canada*,

www.canada.ca/en/health-canada/services/chemicals-product-safety/coal-tars.html.

Accessed 23 Jan. 2020. This source talks about coal tar and how it is used. It also explains the safety of coal tar and how it can affect the environment.

"Coal-Tar Sealant and PAH Contamination." *Tip of the Mitt Watershed Council*, 2019, [www.watershedcouncil.org/coal-tar-sealants-and-pah-contamination.html#/. Accessed 14 July 2019](http://www.watershedcouncil.org/coal-tar-sealants-and-pah-contamination.html#/). This source is the basics of coal tar. The article explains PAH's and coal tar and the problems it has caused. This source focuses on the problems that coal tar sealants has done to the Michigan River Watershed, which is similar to the Chesapeake Watershed. This source is helpful in giving an overview of the dangers of coal tar sealants on watersheds. An image of somebody applying coal tar sealants is also used in our presentation.

"Coal Tar Sealant Ban." *Prince George's County Maryland*, www.princegeorgescountymd.gov/678/Coal-Tar-Sealant-Ban. Accessed 14 July 2019. This source describes the ban of coal tar in Prince George's County, Maryland. The text tells people when the ban was put into affect and how much contractors will be fined. The source includes the purpose of the ban, alternatives, and retail stores. This article is good if someone wants to know more about the ban of coal tar in Prince George's County.

"Coal Tar Sealer Vs. Asphalt Emulsion Sealer. What's the Difference Anyways?" *American Pavement Sealcoating*, 14 Mar. 2018, americanpavementsealcoating.com/2018/03/24/coal-tar-vs-asphalt-emulsion-whats-the-difference-anyway/. Accessed 28 July 2019. This source compares the formulation, longevity, performance, and health and environmental risks of asphalt-emulsion and coal

tar-based sealants. It also explains why many companies still use coal tar sealants. This source is helpful in countering opponents who say that coal tar sealants are objectively better than its alternatives.

"Contamination of Stormwater Pond Sediments by Polycyclic Aromatic Hydrocarbons (PAHs) in Minnesota." *Minnesota Pollution Control Agency*, www.pca.state.mn.us/sites/default/files/tdr-g1-07.pdf. This source from the Minnesota Pollution Control Agency goes well in depth about PAH's. What they really are, different types of PAH's, where they can be found, and other crucial facts about Polycyclic Aromatic Hydrocarbons. The information is thoroughly backed up with research, as well as diagrams and pictures for better understanding. We used a significant amount of science and research from this source.

Crane, Judy L. *Carcinogenic PAHs and Management Decisions About Urban Stormwater Pond Sediment in Minnesota*. PDF file, 2017. Chart. This chart describes a study conducted in Minnesota stormwater ponds. The goal of the study is to determine whether benzo[a]pyrene is the most important factor in making decisions related to upland management. This source is helpful in showing how coal tar sealants affect what is in stormwater ponds and other water bodies.

Craven, Jim. "Coal tar sealant ban a bad idea." *MySA*, Hearst Newspapers, LLC, 16 June 2016, www.mysanantonio.com/opinion/commentary/article/Coal-tar-sealant-ban-a-bad-idea-8258529.php. Accessed 14 July 2019. This article was written in San Antonio when a coal tar sealant ban was being passed there. It counters the idea of a ban on coal tar sealants, saying that the entire ban was based off of one source by the USGS, which amassed

much criticism over the years. This source is helpful in understanding our opponents' reasons against a coal tar sealant ban so we can counter them.

Dombrowski, Diana. "Sheboygan among Wisconsin cities to ban pavement sealant containing dangerous chemicals." *Sheboygan Press*, 6 Feb. 2019, www.sheboyganpress.com/story/news/2019/02/06/sheboygan-bans-coat-tar-sealant-contains-dangerous-chemicals/2768981002/. Accessed 15 Nov. 2019. This source explained the banning of coal tar in Sheboygan, Wisconsin and the testing of PAHs in Wisconsin. This source was helpful in understanding the effects of coal tar in Wisconsin.

Esselman, Rebecca. "It's Pavement Sealing Season Again." *Huron River Watershed Council*, 26 June 2019, www.hrwc.org/its-pavement-sealing-season-again/. Accessed 28 July 2019. This source talks about coal tar and PAHs and states alternatives to coal tar sealants. It also contains a list of watershed communities that have prohibited the use and application of coal tar and other high PAH sealcoats.

Fretwell, Sammy. "Toxic coal tar a costly mess for SC power customers, environment." *The State*, 27 Nov. 2017, www.thestate.com/news/local/article186481653.html. Accessed 14 July 2019. This article is about the mess that coal tar sealants have caused and how costly it is. It explains the pollution coal tar created.

Gillan, Patrick T. "PTG Enterprises." *My Pavement Guy*, 2019, www.mypavementguy.com/. Accessed 14 July 2019. This information page on the PTG Enterprises website talks about what they do. It states the history of the company and also emphasizes that they use only asphalt based sealants.

Hawthorne, Michael. "Study Points to Dangers of Children's Exposure to Coal Tar Sealants."

Edited by Tribune Reporter. *Chicago Tribune*, 15 Feb. 2012,

www.chicagotribune.com/lifestyles/health/ct-met-coal-tar-kids-20120215-story.html.

Accessed 22 Oct. 2019. This article talks about how children living near driveways and parking lots are exposed to much higher levels of cancer causing chemicals than children living next to driveways with untreated asphalt. A survey also found how the children near coal tar paved parking lots ingest twice as much as PAHs than children living in place with untreated asphalt. This helped us understand how dangerous coal tar sealants can really be to children.

"Home." *Coal Tar Free America*, 2017, coaltarfreeusa.com/. Accessed 14 July 2019. This

homepage to the Coal Tar Free America website contains many articles about coal tar sealants, why they are harmful, where they are banned, and articles about pavement sealers in general. This source helped direct us to many articles with important information about coal tar, and it showed us that there is a national campaign to ban coal tar sealants.

"Home." *Pavement Coatings Technology Council*, www.coaltarban.com/. Accessed 14 July

2019. This site talks about all the dangers of coal tar and the science behind it. The main mission of this site is to promote the view of not using coal tar. It also talks about the research that they did to make the site.

Innes, Alister. "Moving to Safer Alternatives to Coal Tar Sealcoats." Minnesota Pollution

Control Agency, 1 Jan. 2014,

www.red-wing.org/DocumentCenter/View/907/January-29-2015---Moving-to-Safer-Alt

rnatives-to-Coal-Tar-Sealcoats-PDF. Accessed 11 Nov. 2019. This is a press release of the Minnesota law on the ban of coal tar sealants. This source includes companies and contractors that don't use coal tar, links to interactive maps, and anti-coal tar projects.

Kelso, Nick. "Minnesota's Largest Sealcoater Switches to Safer Formula." Interview by Ralph Pribble. *Minnesota Pollution Control Agency*, 2 Mar. 2012, content.govdelivery.com/accounts/MNPCA/bulletins/318d9c. Accessed 11 Nov. 2019. This source is an interview with Nick Kelso, head of Jet-Black International, a company that makes sealant products. It describes why and how Jet-Black International phased out of using coal tar sealants. This source is helpful in describing a sealant maker's journey in phasing out of using coal tar sealants to counter the argument that banning coal tar would be a detriment to local sealant companies.

"Known and Probable Human Carcinogens." *American Cancer Society*, 17 May 2019, www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html. Accessed 10 Dec. 2019. This web page is a compilation of some of the many confirmed carcinogens by many national and international health organizations. It lists the names of each carcinogen and its group, along with some explanation of the groupings. This source further proves the point that coal tar is carcinogenic, and disproves the opponents' point that many common foods are more carcinogenic than PAHs.

Mahler, Barbara J., et al. "Coal-Tar-Based Pavement Sealcoat and PAHs: Implications for the Environment, Human Health, and Stormwater Management." *Environmental Science and Technology*, PDF ed., vol. 46, 24 Jan. 2012, pp. 3039-45. This article explains PAHs

along with health concerns of coal tar and how it spreads. This source explains the dangers of coal tar really well while using numbers and tests to prove their points.

Maryland State, General Assembly, House of Delegates. Environment - Sale and Application of Coal Tar and Coal Tar Pavement Products - Prohibition. 2019 General Assembly, House of Delegates Bill 1211, section 9-2201 through 9-2203, failed passage 29 Jan. 2019.

N. H. Sea Grant. *Thinking about Sealcoating Your Driveway? Get the Facts!* PDF file.

Infographic. This quick, easy read was very helpful. Featuring a few visuals and detailed descriptions, this article was crucial to getting our facts perfectly in check. NOT FINISHED.

Nwaichi, E. O., and S. A. Ntorgbo. "Assessment of PAHs Levels in Some Fish and Seafood from Different Coastal Waters in the Niger Delta." *Toxicology Reports*, vol. 3, 2016, pp. 167-72. *Science Direct*, doi:10.1016/j.toxrep.2016.01.005. Accessed 14 July 2019. This source told us how varying levels of PAHs were found in 30 types of frequently consumed fish in the Niger Delta. This shows how PAHs can easily travel into our waterways and into our bodies through the affected fish.

Perera, Frederica, et al. "Children's Environmental Health Research—Highlights from the Columbia Center for Children's Environmental Health." *Annals of the New York Academy of Sciences*, PDF ed., vol. 1076, 2006, pp. 15-28. This article summarizes the data from recent projects by The Columbia Center for Children's Environmental Health reflecting children's health. This source was helpful in seeing the effects on children's health.

"Polycyclic Aromatic Hydrocarbons (PAHs) in Food." *Toxicology Factsheet Series*, PDF ed., no. 2, June 2015, pp. 1-10. This article talks about the PAHs found in food. It explains different ways that PAHs can be formed in your food and ways that PAHs can harm your body. It also contains a list of the many foods that contain carcinogens.

"Rebuttal of Testimony of Mariani CB60-2018." PDF file, 2018. This source is a rebuttal to the testimony of Chris Mariani of GemSeal Pavement products. It gives a rebuttal to some of the most common counterarguments to banning coal tar sealants. This source is helpful in finding the arguments against banning coal tar sealants, and how to counter those counterarguments.

Straif, Kurt, et al. "Carcinogenicity of Polycyclic Aromatic Hydrocarbons." *Policy Watch*, PDF ed., vol. 6, Dec. 2005, pp. 931-32. This source included information about how PAHs are carcinogenic, and the effects of benzo(a)pyrene on different animals. It helped us conclude that PAHs do have very harmful effects on humans and animals. It also said that benzo(a)pyrene is classified as a group 1 carcinogen by the IARC, which also helped us conclude that PAHs are harmful.

Titaley, Ivan A., et al. "Identification and Toxicological Evaluation of Unsubstituted PAHs and Novel PAH Derivatives in Pavement Sealcoat Products." *Environmental Science & Technology Letters*, vol. 3, no. 6, 2016, pp. 234-42, doi:10.1021/acs.estlett.6b00116. Accessed 14 July 2019. This letter describes the concentrations of polycyclic aromatic hydrocarbons, or PAHs, in coal tar emulsion sealants. It describes the percentages of PAHs in coal tar sealants, as well as the concentrations of said PAHs in the environment neighboring the coal tar sources. It also describes how sunlight affects PAH

concentration and carcinogenicity in coal tar sealants. This source is helpful in describing how the concentrations of PAHs changes with the concentration of coal tar.

"Toxic Substances Portal - Polycyclic Aromatic Hydrocarbons (PAHs)." *Toxic Substances Portal*, Agency for Toxic Substances and Disease Registry, Aug. 2015, www.atsdr.cdc.gov/phs/phs.asp?id=120&tid=25. Accessed 28 July 2019. This source gives an overview of coal tar substances, which is considered a "toxic substance" by the CDC. It gives an overview of what coal tar sealants are, the components of it, what happens to PAHs when coal tar enters the environment, how one might be exposed to PAHs, the hazards of PAHs on human health, and the recommendations the federal government has implemented to protect human health. This source is helpful in describing the health risks of coal tar sealants on the human body, and this article's old publication date shows that coal tar is not a new issue.

"U.S. EPA Proposes First-Time Measures to Restrict the use of Coal Tar Sealants." *Waterkeeper Alliance*, 23 Aug. 2016, waterkeeper.org/u-s-epa-proposes-first-time-measures-to-restrict-the-use-of-coal-tar-sealants/. Accessed 14 July 2019. This source is about how the Waterkeeper Alliance, along with other environmental foundations, helped the U.S. EPA start restricting the use of coal tar sealants in the United States. It explained what coal tar sealants are, how it gets into our environment, the effects of exposure to those sealants, and the cost of cleaning the carcinogenic coal tar sediment in stormwater ponds. Information from this article gives a general overview of the dangers of coal tar sealants, and also sees the environmental damage from an economic perspective.

Van Metre, Peter, and Jennifer LaVista. "Austin Coal-Tar Sealant Ban Leads to Decline in PAHs." *USGS Newsroom*, US Geological Survey, 16 June 2014, archive.usgs.gov/archive/sites/www.usgs.gov/newsroom/article.asp-ID=3914.html. Accessed 14 July 2019. An overview of the 2006 Austin, Texas ban on coal tar sealants is given in this USGS press release. This source also references a series of studies conducted in Lady Bird Lake that concludes the link between coal tar usage and PAH prevalence in stormwater runoff.

Watts, Alison W., et al. "Polycyclic Aromatic Hydrocarbons in Stormwater Runoff from Sealcoated Pavements." *Environmental Science and Technology*, PDF ed., vol. 44, no. 23, 3 Nov. 2010, pp. 8849-54. This source is a study on polycyclic aromatic hydrocarbons from sealcoated pavements that get into stormwater runoff. This primary source is helpful in explaining the correlation between coal tar exposure and PAH concentrations in stormwater runoff.

Williams, Spencer, and William G. Wilber. "Human Health Concerns Associated with Exposure to PAHs & Coal-Tar-Sealed Pavement." *NALMS*, PDF ed., Spring 2017. This article explains the carcinogenicity of polycyclic aromatic hydrocarbons, and how it can get into the environment. This source references to many research studies that link exposure to PAHs and cancer. This source is helpful in explaining how PAHs gets into our bodies and the environment.