SHWEC SOLID & HAZARDOUS WASTE EDUCATION CENTER

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Keeping Coal Tar Out of School Yards
A Guide for Wisconsin's School Districts

Did you know that there are asphalt sealcoats that do not contain coal tar? Coal tar-based sealcoats have been used for years to revitalize the surface of asphalt playgrounds and parking lots, providing a deep black finish to weathered asphalt. But we have learned that coal tar-based sealcoats contain polyaromatic hydrocarbons (PAHs) that are carcinogenic. School districts can minimize children's exposure to these chemicals by specifying non-coal tar asphalt sealcoats for their facilities.

Coal Tar-Based Asphalt Sealcoats - A Health and Environmental Hazard (below) describes the health and environmental risks associated with PAHs found in coal tar-based sealcoats. Studies focused on PAH exposure from dust from sealcoated asphalt are raising concerns about the health risk to children. For example, see: http://www.usgs.gov/newsroom/article.asp?ID=3101.

In a recent paper in the journal *Environmental Pollution*[1] the authors describe the problem:

> "Although PAH sources are ubiquitous in the environment, one recently identified PAH source stands out: Coal-tar-based pavement sealant - a product applied to many parking lots, driveways, and even **playgrounds** primarily in the central, southern, and eastern U.S. - has PAH concentrations 100-1000 times greater than most other PAH sources. It was reported recently that PAH concentrations in house dust in residences adjacent to parking lots with coal-tar-based sealant were 25 times higher than in residences adjacent to unsealed asphalt parking lots."

If your school(s) has been contracting to have playgrounds, driveways and parking lots sealcoated, now is the time to specify a non-coal tar-based product. Fortunately, alternative products are available at comparable cost and effectiveness. There are several types of coal tar-free asphalt sealcoat products available to professional applicators: asphalt emulsion-based, Gilsonite (bitumen)-based, or acrylic-based. *Avoiding Coal Tar-Based Asphalt Sealcoats and Finding a Coal Tar-free Sealcoat Applicator* (below) describes how to identify coal tar products, and provides a list of Wisconsin sealcoat applicators that have certified that they do not use coal tar.

For more information on efforts to limit the use of coal tar-based asphalt sealants, visit: Moving to Safer Alternatives to Coal Tar Sealcoats.

1. Williams, E. Spencer, B. Mahler , P. Van Metre , *Coal-tar Pavement Sealants Might Substantially Increase Children's PAH Exposures*, Environmental Pollution, 164 (2012), pg 40-41

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Coal Tar-Based Asphalt Sealcoats - A Health and Environmental Hazard

Asphalt sealcoats are used to improve the appearance and prolong the life of driveways and parking lots. Most of us are familiar with the heady odor and deep black appearance of freshly sealcoated asphalt. However, some sealcoat products contain coal tar, a byproduct of coke manufacturing. This fact sheet discusses the toxicity, health and environmental hazards of coal tar, and suggests ways to reduce risk.


- Van Metre

Coal Tar Toxicity

Coal tar is a complex chemical mixture that includes polycyclic aromatic hydrocarbons (PAHs), a class of chemical known to cause cancer. Preferred by many sealcoat applicators because of its superior pavement bonding properties, coal tar (RT-12) has been blended into asphalt sealcoats for many years. RT-12 coal tar typically contains more than a dozen toxic PAH's that have been determined to be: confirmed human carcinogens (ACGIH); potential occupational carcinogens (NIOSH); known human carcinogens (NTP); and/or carcinogenic to humans (IARC)[1]. Types of cancer that may be caused by coal tar used in sealcoats (cited by the manufacturer) include: blood, kidney, liver, lung, scrotal, skin and stomach cancers.

The Health Hazard

The risk from cancer causing chemicals depends on human exposure. Exposure to PAHs in asphalt sealcoats can come in several ways. For example, sealcoat applicators can suffer from occupational exposure when handling or applying coal-tar-based sealcoat products. This exposure is regulated by the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA).

There is also a need to protect the general public from exposure to PAHs resulting from coal tar-based asphalt sealant dust and vapor. Research[2] by the United States Geological Survey, Baylor University, Minnesota Pollution Control Agency, City of Austin Texas and University of New Hampshire shows that PAHs in coal tar-based asphalt sealants applied to driveways, parking lots or playgrounds can find their way into schools and homes, potentially exposing children and adults to toxic carcinogens via skin contact, ingestion or inhalation.

The Environmental Hazard

Coal tar-based sealant residue can also find its way into stormwater runoff from deteriorating sealcoat on asphalt parking lots and driveways. PAH contaminated runoff into lakes and streams contaminates aquatic life and can enter the food chain[3]. PAH contaminated sediment that accumulates in stormwater detention ponds can require removal and disposal as a hazardous material, increasing costs for municipalities and private land owners.

Managing Risk from Coal Tar-Based Sealcoats

Eliminating the use of coal tar-based asphalt sealcoats can (over time) reduce the health and environmental risk from these products, thus communities around the country are banning their use. In Wisconsin, Dane County has prohibited the sale or application of coal tar-based asphalt sealants. Asphalt sealcoat applicators in these communities are able to use alternative sealcoat products that provide similar performance and cost, without coal tar's carcinogenic properties.

Consumers (homeowners, businesses, schools, churches and municipalities) can insist that only non-coal tar-based sealants be used on their asphalt surfaces. Many home improvement stores now offer coal tar-free asphalt sealants. Before you apply asphalt sealant, or contract with a sealcoat applicator, be sure that the sealcoat used is free of coal tar compounds.

For more information on preventing the use of coal tar-based sealants

Dane County, WI Ordinance 80.08 – *Regulation of the Application and Sale of Sealcoat Products Containing Coal Tar*
http://pdf.countyofdane.com/ordinances/ord080.pdf

USEPA's coal tar-based asphalt sealant and stormwater webpage
http://cfpub2.epa.gov/npdes/courseinfo.cfm?program_id=0&outreach_id=645&schedule_id=1169

Thinking about Sealcoating your Driveway? Get the Facts!
http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/UNHSC%20Seagrant%20sealcoat%20fact%20sheet.pdf

Coal Tar-Based Pavement Sealcoat, Polycyclic Aromatic Hydrocarbons (PAHs), and Environmental Health
http://pubs.usgs.gov/fs/2011/3010/pdf/fs2011-3010.pdf

References

1. Koppers Inc.- Material Safety Data sheet #00228325, Pavement Sealer Base (PSB; K-364; RT-12): American Conference of Industrial Hygienists, The National Institute for Occupational Safety and Health, National Toxicology Program, International Agency For Research On Cancer

2. Williams et al, Coal Tar Pavement Sealants Might Substantially Increase Children's PAH Exposure, Environmental Pollution, 164 (2012) pg. 40-41

LaVista and Mahler, Coal Tar Sealcoats a Major Source of PAHs to Air and to Children Living Nearby, United States Geological Survey, February 13, 2012

Mahler et al, Coal Tar-Based Pavement Sealcoat and PAHs: Implications for the Environment, Human Health, and Stormwater Management, Environmental Science and Technology (2012), Vol. 46, 3039-3045

Mahler et al, Coal Tar-Based Parking Lot Sealcoat: an Unrecognized Source of PAH to Settled House Dust, Environmental Science and Technology (2010), Vol. 44 No. 3, pg. 894-900

Van Metre et al, PAHs Underfoot: Contaminated Dust from Coal Tar Sealcoated Pavement is Widespread in the United States, Environmental Science and Technology (2009), V.43 No.1, pg. 20-25

3. Yaning et al, Influence of Coal Tar Sealcoat and Other Carbonaceous Materials on Polycyclic Aromatic Hydrocarbon Loading in an Urban Watershed, Environmental Science and Technology (2010), Vol. 44, pg. 1217–1223

Bryer et al, Coal Tar-Based Pavement Sealant Toxicity to Freshwater Macroinvertebrates, Environmental Pollution (2010) Vol. 158, pg. 1932-1937

Van Metre et al, Contributions of PAHs from Coal Tar Pavement Sealcoat and Other Sources to 40 U.S. Lakes, Science of the Total Environment (2010) Vol. 409, pg.334-344

Murakami et al, Modeling of Runoff Behavior of Particle-Bound Polycyclic Aromatic Hydrocarbons (PAHs) from Roads and Roofs, Water Research (2004), Vol.38 pg. 4475-4483

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Avoiding Coal Tar-Based Asphalt Sealcoats and Finding a Coal Tar-free Sealcoat Applicator

There are several types of asphalt sealcoat products available to professional applicators. The most commonly used are: coal tar-based, asphalt emulsion-based , Gilsonite (bitumen)-based , or acrylic-based. Of these, coal tar-based products or blends contain the greatest amounts of Polycyclic Aromatic Hydrocarbons (PAHs), which have been found to cause cancer.

The table below[1] shows the amount of PAHs typically found in one brand of coal-tar (RT-12) used for blending asphalt sealcoats. The PAHs that have been highlighted are "reasonably anticipated to be human carcinogens" according to the *12th Report on Carcinogens* by the National Toxicology Program[2].

CAS	Component	Percent (weight)
65996-93-2	HIGH TEMPERATURE COAL TAR PITCH	100
-	The above listed complex substance contains the consitutents listed below	-
85-01-8	PHENANTHRENE	1.85-2.7
206-44-0	FLUORANTHENE	1.50-2.35
129-00-0	PYRENE	1.02-1.59
91-20-3	NAPHTHALENE	0.87-1.32
120-12-7	ANTHRACENE	0.75-0.99
56-55-3	BENZ(A)ANTHRACENE	0.65-0.84
193-39-5	INDENO(1,2,3-CD)PYRENE	0.48-0.81
83-32-9	ACENAPHTHENE	0.47-0.74
218-01-9	CHRYSENE	0.56-0.73
205-99-2	BENZO(B)FLUORANTHENE	0.30-0.70
86-73-7	FLUORENE	0.50-0.70
192-97-2	BENZO(E)PYRENE	0.40-0.70
50-32-8	BENZO(A)PYRENE	0.47-0.69
132-64-9	DIBENZOFURAN	0.49-0.68
191-24-2	BENZO(G,H,I)PERYLENE	0.37-0.68
86-74-8	CARBAZOLE	0.40-0.60
90-12-0	1-METHYLNAPHTHALENE	0.00-0.60
189-64-0	DIBENZO(A,H)PYRENE	0.27-0.58
205-82-3	BENZO(J)FLUORANTHENE	0.22-0.56
207-08-9	BENZO(K)FLUORANTHENE	0.21-0.52
243-17-4	BENZO(B)FLUORENE	0.20-0.50
238-84-6	BENZO(A)FLUORENE	0.30-0.40
192-65-4	DIBENZO(A,E)PYRENE	0.00-0.30
217-59-4	TRIPHENYLENE	0.10-0.20
92-52-4	DIPHENYL	0.00-0.20
224-42-0	DIBENZ(A,J)ACRIDINE	0.07-0.19
91-22-5	QUINOLINE	0.00-0.16
53-70-3	DIBENZO(A,H)ANTHRACENE	0.07-0.11
226-36-8	DIBENZ(A,H)ACRIDINE	0.00-0.06
208-96-8	ACENAPHTHYLENE	0.01-0.04
194-59-2	7H-DIBENZO(C,G)CARBAZOLE	0.00-0.01

Products with PAH containing coal tar normally have Material Safety Data Sheets (MSDS), container labels or technical bulletins that reference Chemical Abstracts Service (CAS) numbers 65996–93–2, 65996-89-6 or 8007-45-2, and/or use the words: coal tar; refined coal tar; refined tar; refined coal tar pitch; coal tar pitch volatiles; and/or RT-12 .

Coal tar-free sealcoat applicators

Sealcoat applicators have a wide variety of sealcoat products to choose from, depending on customer requirements. Applicators that apply coal tar-based sealcoats should also be capable of apply asphalt emulsion, Gilsonite or latex based sealcoats if requested. When specifying or contracting for asphalt sealcoating, specify that the coating product be free from coal tar; refined coal tar; refined tar; refined coal tar pitch; coal tar pitch volatiles; and/or RT-12.

The following Wisconsin asphalt sealcoat applicators have certified that they do not use coal tar-based sealcoats:

A1 Seal Coating - Irma, Osceola,
ABBS Paving - Baraboo
Asphalt Maintenance & Paving - Eau Claire, Spring Valley
Asphalt Services - Rochester
Badger Asphalt - Madison
Beaver Companies - Beaver Dam
Blackline Asphalt - Wausau
Brew City Asphalt Maintenance - New Berlin
Directional Striping Company - Sun Prairie
Fahrner Asphalt Sealers - Plover, Eau Claire, Kaukauna, Waunakee, Frederic
Fond Du Lac Asphalt Paving - Fond du Lac
Grade-Tech Pavers - Ixonia
Hallman Asphalt & Sealing - Sun Prairie
Jet Black Sealcoating - Somerset
Klein Asphalt Maintenance - Manitowoc
Midwest Sealcoat - Dodgeville
Purpose Contracting - Franksville
Rochester Asphalt - Byron, MN
Roy's Sealcoating - Minong
Sailer Sealcoating - Hudson
SealKing - Somerset
Wisconseal Pavement Maintenance - Chippewa Falls

For more information on non-coal tar asphalt sealcoating see:
Moving to safer alternatives to coal tar sealcoats http://www.pca.state.mn.us/ahx9qrk

Notes:

1. Source: Koppers Inc.- Material Safety Data sheet #00228325, *Pavement Sealer Base* PSB; K-364; RT-12
2. 12th Report on Carcinogens, National Toxicology Program, http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf

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