Questionnaire regarding Refined Tar Based Pavement Sealer Brochure from Government of The District of Columbia

Background:

Effective July 1, 2009, The District of Columbia banned the sale and use of refined tar-based pavement sealer. This decision was made without any input from industry or the Pavement Coatings Technology Council (PCTC). Prior to the ban, the District of Columbia commissioned a study to look at PAH sediment contamination in the Anacostia River (see link below). In this study, refined tar-based pavement sealer was not even mentioned as a source of PAHs. The District of Columbia decided to ignore the study and ban sealer anyway without any proof that refined tar based pavement sealer was the source of the problem.

Link: **Characterization of polycyclic aromatic hydrocarbons in urban stormwater runoff flowing into the tidal Anacostia River, Washington, DC, USA**. Hwang and Foster-2006.

doi:10.1016/j.envpol.2005.08.003

1) **Question: Refined Tar Based Pavement Sealer contains PAHs. PAHs are highly toxic chemicals that have known harmful impacts on humans and animals and are suspected to cause cancer**:

Answer:
Refined Tar Based Pavement Sealers does contain PAHs as does Asphalt Based Pavement Sealers but to a lesser extent. Refined Tar and Asphalt are both complex mixtures which are made of many different compounds.

Background information on PAHs:
Polycyclic aromatic hydrocarbons are also known as polycyclic aromatic compounds, polyaromatic hydrocarbons or as polynuclear aromatics. PAHs are a group of over 100 different chemicals consisting of carbon and hydrogen in fused-ring structures. PAHs are very common in the environment (ATSDR-Barton Springs Health Consultation 2003). *Polycyclic aromatic hydrocarbons are found in coal and petroleum, but they are also products of incomplete combustion, of either natural or anthropogenic (man-made) origin. Anthropogenic (man-made) sources to the environment are more abundant than natural sources and include burning of wood, coal, oil*

and gas, garbage, or other organic substances like tobacco or charbroiled meat. The most important natural sources are forest fires and volcanoes (National Research Council, 1983). PAHs are generally found as complex mixtures, not as single compounds. Because PAHs are so common in the environment, people are exposed to them daily (ATSDR 2003).
For U.S. residents, the greatest PAH exposure is through the ingestion of food, but this can vary depending on lifestyle (Agency for Toxic Substance and Disease Registry, 1995). The most common sources of exposure to PAHs are tobacco smoke, food, wood smoke and ambient air (ATSDR 2003). Exposure to PAHs via inhalation is estimated to range from .02 to 3 micrograms per day. Smoking one pack of unfiltered cigarette per day increases this estimate by an additional 2 to 5 micrograms per day. People that smoke three packs of cigarette per day increase their exposure by an estimated 6 to 15 micrograms per day. The intake of carcinogenic PAHs from the average American diet has been estimated to range from 1 to 5 micrograms per day, mostly from the ingestion of unprocessed grains and cooked meats. The dietary estimate increases to 6 to 9 micrograms per day for those individuals who eat large amounts of meat (ATSDR 2003). The WHO (1998) notes that while PAHs may be found on fruits and vegetables due to atmospheric disposition and/or due to food processing such as frying and roasting, the highest levels of PAHs have been found in smoked meat (over 100 parts per billion) and fish (up to 86 parts per billion).

Of the over 100 PAHs that exist in the environment, only seven are classified by EPA (2010) as probable human carcinogens (Group 2B). Refined Tar Based Sealers are not the only source of these seven PAHs, as the other possible sources of PAHs in the environment also contain these seven PAHs. Although studies in humans do not adequately demonstrate that the seven PAHs mention are responsible for inducing carcinogenicity, there is sufficient animal data demonstrating carcinogenicity.

One of the most frequently asked questions asked is have refined tar-based pavement sealants been declared a carcinogen by EPA or OSHA? The answer is no.

With regards to the USGS study that examines refined tar based sealer and settled household dust there were several flaws with regards health risk evaluation in this study:

◦USGS assumed that all PAHs that are part of the Group 2B are the same potency as benzo(a)pyrene (the other six PAHs do not have the same potency) which is not correct and should not be used when compared to health or risk based values.

◦USGS incorrectly states that Germany has a regulatory standard of 10 ppb of Benzo(a)pyrene for indoor air quality. This value was not established due to health-based criterion. Germany established this limit in an attempt to minimize exposure of residents.

◦The house dust exposure model used by USGS is not as sophisticated as the model that was developed for the World Trade Center criterion. When PCTC utilized the WTC criterion for house dust exposure, they found that the seven Group 2B PAHs were below an acceptable risk management level and also is consistent with other background exposures via food and air. In other word, USGS findings of an increased cancer risk from those lots that were coated with refined tar based sealer were incorrect.

2) **Question: Concentrations of toxic PAHs in Refined Tar Based Pavement sealer are about 1,000 times higher than alternative asphalt based pavement sealers.**

Answer:
This statement is false. This statement originated from The City of Austin study regarding PAH sediments and refined tar based pavement sealer.

One way to put things into perspective in terms of source of PAH contributions equivalent to a rain event from a freshly sealed one acre commercial parking lot, see graph 2.

3) **Question: The Government of The District of Columbia issued the ban on Refined Tar Based Pavement Sealer to protect human health and the environment?**

Answer:
If you refer to the background section, based upon the study that was commissioned by The District of Columbia, there was **no mention** that the source of PAHs in any of the area watersheds was a result of Refined Tar Based Pavement Sealer. The authors of the study attributed the major source of PAHs in the watersheds to be combustion related.

In communications between Pavement Coating Technology Council and The District of Columbia, the District listed the scientific literature utilized to make their decision. 70% of the literature listed was authored by The City of Austin or the same authors of the USGS Refined Tar Based Sealer studies.

◦One of the other studies listed was from The New York Academy of Science. In this study, refined tar based pavement sealer was not listed as the major source of PAHs in the NJ/NY watershed, transportation-related activity was shown to contribute the majority of PAHs into the watershed. In a recent NYAS study in which a mass balance of PAHs in the NY/NJ Harbor were examined (NYAS 2010). In this analysis, refined tar based pavement sealer was not examined as a source of PAHs to the harbor.

◦The final study listed by the district looks at tumor prevalence in Brown Bullheads from the Tidal Potomac River Watershed. In this study, about half Brown Bullheads from the Anacostia River had some sort of liver tumor which claims to be due to contaminate exposure. The study attributes these tumors to average PAH content in Anacostia river sediment to be over nine fold increase over West Coast NOAA study PAH limits. The study further explains that PAHs in the Anacostia River are derived from both petroleum and combustion of petroleum products.

At this time, The District of Columbia has not produced any evidence that they performed any studies on their own (other than funding the Hwang study) to determine for themselves if they indeed have a problem with excessive PAHs in watershed sediment and if the origin of PAHs is from refined tar based pavement sealer.

One could make the argument that perhaps that The District of Columbia is utilizing a precautionary stance with regards to refined tar pavement sealers. By taking a precautionary principle approach to control PAHs, The District banned the refined tar based sealer on the belief that it could harm the environment. The Pavement Coating Technology Council was never afforded an opportunity to offer opposing studies that show that the City of Austin (COA) and USGS studies are flawed and that PCTC studies show that Refined Tar Based Sealer is not a major contributor of PAHs in a watershed.

In fact in a recent presentation made by an official from The City of Austin TX Watershed Protection Department admitted that Austin ban was enacted as a precautionary measure.

The precautionary principle states that:

"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action." - **Wingspread Statement** on the Precautionary Principle, Jan. 1998
Source: http://www.sehn.org/precaution.html

The short version of the above statement is if there is a belief that an activity or product is harmful to the environment or human health, that activity or product should be banned until it can be proved that that product or activity is "deemed safe".

There are state and local governments that are adopting precautionary statements as part of health or environmental legislation or these government bodies using precautionary statements as an informal policy.

4) **Question: Dust from refined tar based pavement sealed parking lots contains about three times more toxic PAHs than undiluted used motor oil.**

Answer:
This statement is false. One teaspoon of used motor oil contains 267 parts per million of PAHs while the median total PAHs in dust collected from refined tar based parking lots was 4,760 parts per billion or 4.760 parts per million.

5) **Question: Dust from refined tar based sealed parking lots contain about 80 times more PAHs than dust of unsealed lots.**

Answer:
This statement is false since it would fail to include the fact that the USGS study points out that there was a 48% variance between total PAHs on dust from refined tar based pavement sealed lots and those lots that were not sealed or sealed with asphalt based sealers. When evaluating the PAH analytical data available from the Supplementary Information in the USGS study, the information provided was insufficient to identify unique patterns in the dataset.

The data appears to most closely resemble what would be considered an "urban background" profile.

In the USGS dust study, assuming exposure to the seven group 2B PAHs in dust at the highest detected concentration for a refined tar based pavement sealer location, the total daily intake would be 0.28 parts per billion.

6) **Question: PAHs are toxic to mammals (including humans) birds, fish, amphibians and invertebrates.**

Answer:
Refer to question #1 with regards to background information on PAHs. As mentioned in question #1, every person is exposed to PAHs daily. Every person ingests carcinogenic PAHs daily. There are certain PAHs which are more toxic than others. One thing to stress is that PAHs rarely occur as individual compound in the environment, they typically are part of complex mixtures (vehicle exhaust for example). The City of Austin and USGS (same authors) continually state that refined tar based pavement sealers are a major contributor of PAHs into watersheds. There are literally hundreds of studies which state that combustion sources are the primary contributor of PAHs into watershed. PCTC research has shown that COA and USGS are flawed in many areas and that COA and USGS studies hypothesis is incorrect.

The reason for mentioning that flaws of the studies by COA and USGS is because it does draw attention from the real problem of being able to control man made PAHs into the environment. PCTC is working towards tightening controls over application of refined tar based sealer to do as much as possible to help the environment.

7) **Question: Rainwater washes toxic, PAH containing sealant particles and dust down storm drains and into our local streams and rivers, threatening aquatic life in the Anacostia and Potomac Rivers and the Chesapeake Bay**.

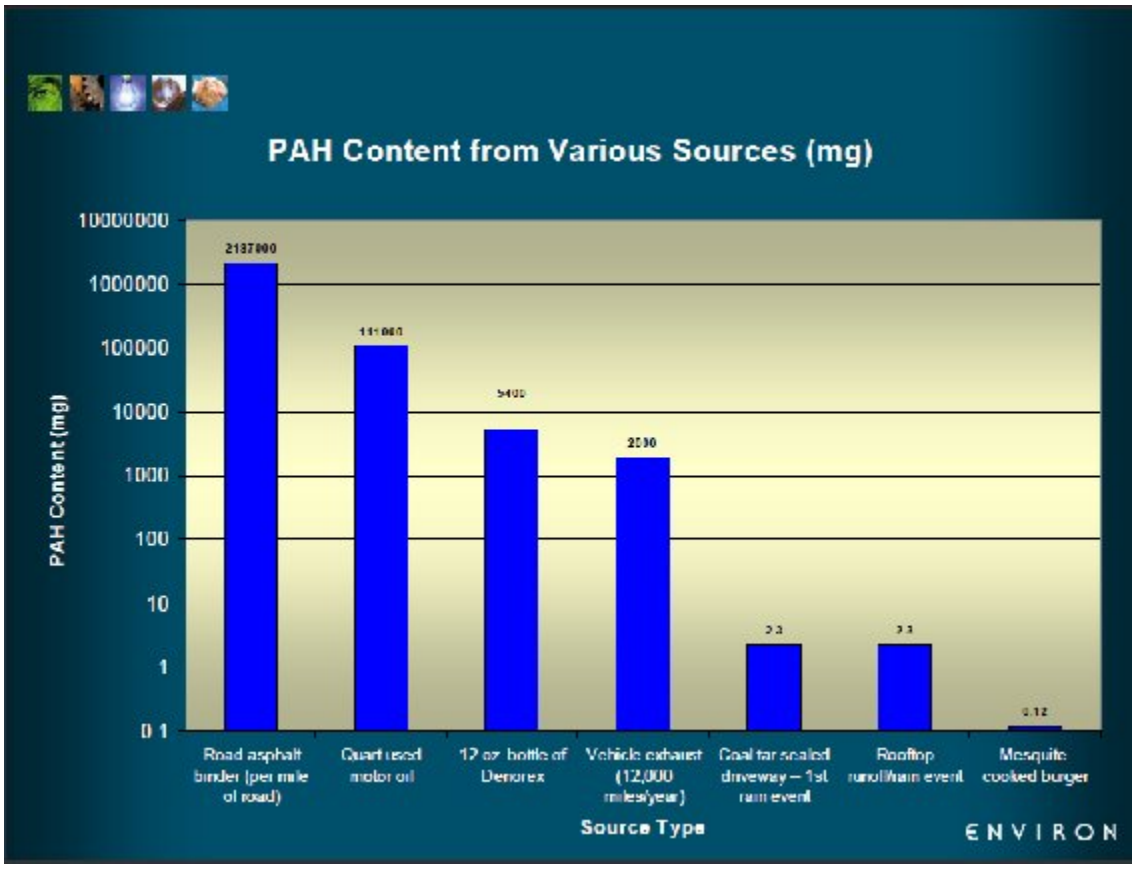
Answer:
Refer to questions #1 and 6 regarding PAHs and flaws in COA and USGS studies. The District of Columbia would like you to believe that there is a single "magic bullet" that will solve the problem of PAHs contamination in watershed sediments. That is simple not the case here. USGS, The City of Austin and The District of Columbia want you to believe that by banning refined tar based sealer will resolve PAH

contamination problem. In a PCTC study, watershed samples were taken in Austin, TX in 2005 (pre-ban) and in 2008 (post-ban). There were two conclusions to this study. First, in the three year period following the product ban, there was no discernable different in PAH levels post ban. Second, chemical fingerprint analysis was performed to determine the source of PAH in the watershed. This analysis concluded that combustion sources were the primary source of the PAHs in the watershed.

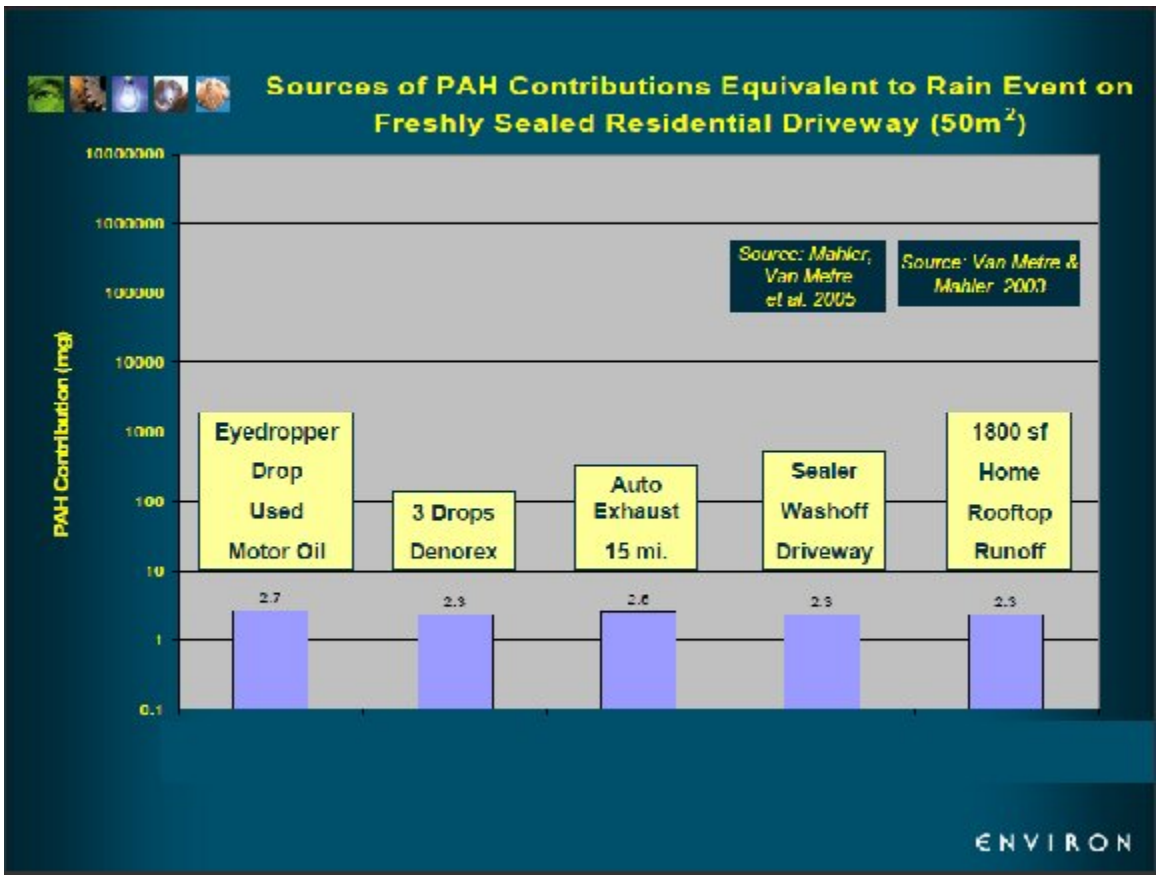
8) In the DC brochure, there are two photos of what appears to be water running off pavement sealer? Is this true representation of what it looks like when water runs over sealer?

No. Those two pictures are not a fair representation of water running over properly applied pavement sealer. In fact even if the sealer was not applied correctly, one would not see the oil sheen as presented in the photos. When PCTC confronted DDOE (District Department of Environment) about the photos being "staged", Mr. Hamid Karimi, Deputy Director-Natural Resource Administration stated "DDOE included the photo to illustrate how rain washes pollution from parking lots into storm drains. Though there is an oily sheen in the photo, other pollutants are also present. The materials do not state that an oily sheen is indicative of refined tar-based pavement sealant" (correspondence from Dr. Karimi to PCTC-March 19, 2010). The title of the brochure is "**Coal Tar Pavement Products BANNED**" and topic was refined tar-based pavement sealer. There would be no way anyone reading the brochure to know that other pollutants were present.

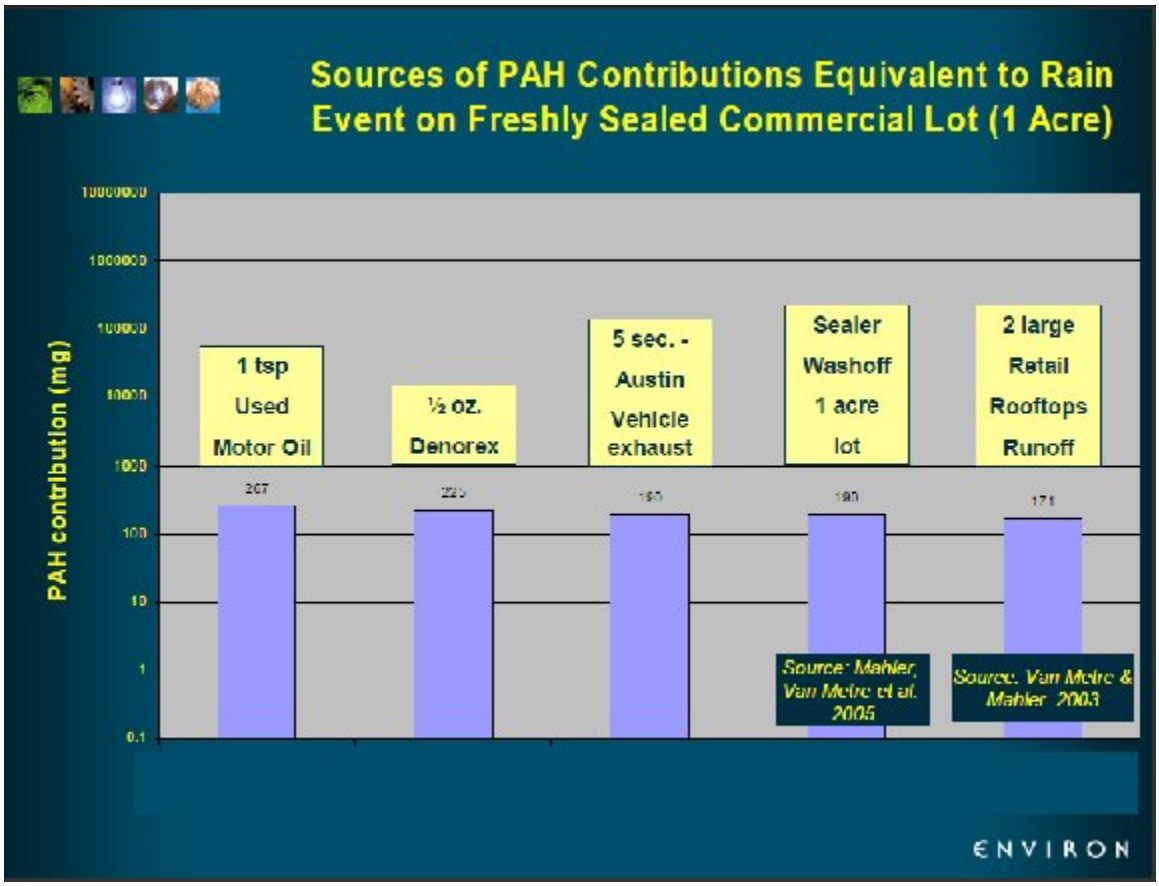
To put things into perspective, attached are three graphs which show:
-PAH content from various sources
-Sources of PAH Contributions equivalent to rain events on freshly sealed residential driveway
- Sources of PAH contributions equivalent to rain event on freshly sealed commercial lot (one acre):


PAH Content from Various Sources (mg)
PAH Content (mg)
10000000
1000000
100000
10000
1000
100
10
1
0.1
2137000
111000
5400
2000
3.3
3.3
0.12
Road asphalt binder (per mile of road)
Quart used motor oil
12 oz. bottle of Demorex
Vehicle exhaust (12,000 miles/year)
Coal tar sealed driveway – 1st rain event
Rooftop runoff/rain event
Mesquite cooked burger
Source Type
ENVIRON

Graph 1


Sources of PAH Contributions Equivalent to Rain Event on Freshly Sealed Residential Driveway (50m²)
PAH Contribution (mg)
10000000
1000000
100000
10000
1000
100
10
1
0.1
Source: Mahler, Van Metre et al. 2005
Source: Van Metre & Mahler 2003
Eyedropper Drop Used Motor Oil
3 Drops Denorex
Auto Exhaust 15 mi.
Sealer Washoff Driveway
1800 sf Home Rooftop Runoff
2.7
2.3
2.6
2.3
2.3
ENVIRON

Graph 2


Sources of PAH Contributions Equivalent to Rain Event on Freshly Sealed Commercial Lot (1 Acre)
PAH contribution (mg)
1000000
100000
10000
1000
100
10
1
0.1
1 tsp Used Motor Oil
½ oz. Denorex
5 sec. - Austin Vehicle exhaust
Sealer Washoff 1 acre lot
2 large Retail Rooftops Runoff
207
171
Source: Mahler, Van Metre et al. 2005
Source: Van Metre & Mahler 2003
ENVIRON
Graph 3