

USGS Science on Coal-Tar-Based Sealcoat and Environmental and Human Health



Presented by
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2. COMPOSITION/ INFORMATION ON INGREDIENTS

Component	CAS NO.	% by Weight
Refined Coal Tar Pitch	65996-93-2	35 ± 5
Water	7732-18-5	50 ± 5
Hydrous Aluminum Silicate	1332-58-7	30 ± 5
Additives	Proprietary	1 ± 0.5

Note: The above components and their percentages are provided for health and safety purposes, ONLY. This document should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Appearance and odor: Dark brown to black, thick consistency liquid with an aromatic odor.

WARNING STATEMENTS:

Skin and eye irritant. Harmful or fatal if swallowed. **Carcinogen.**

POTENTIAL HEALTH EFFECTS:

Likely Routes of Exposure:

EYE CONTACT:

Coal tar - volatiles and mist may cause irritation to the eyes. Eye contact with product will result in irritation, which in the absence of recommended first aid, can result in minor burns to eyes.

SKIN CONTACT:

Coal tar - exposure causes skin irritation characterized by skin itching, burning, swelling, and redness. Photosensitization of the skin may occur. This irritation has a burning sensation somewhat like sunburn and is accentuated by sunlight. Repeated or prolonged contact may contribute to conditions such as dermatitis, tar warts, and rough skin.

INHALATION:

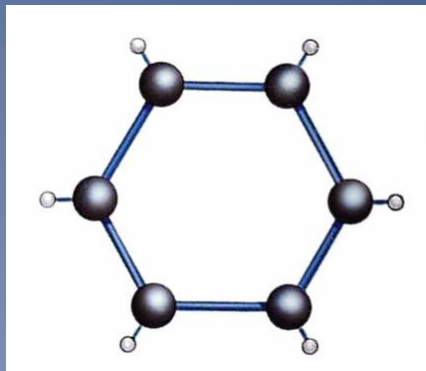
Coal tar volatiles - acute effects caused from overexposure may include coughing, sneezing, and swollen or irritated nasal mucus and sinuses. Repeated and/or prolonged contact to high concentrations may result in toxic effects, such as respiratory difficulties, convulsions, and possible cardiovascular collapse may occur.

INGESTION:

Coal tar - may cause gastrointestinal tract irritation followed by nausea and vomiting, abdominal discomfort, rapid pulse, etc. In extreme cases, cardiovascular collapse may occur.

Refer to Section 11 for toxicological information.

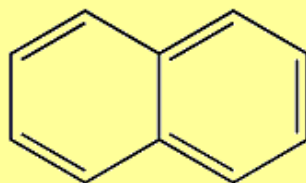
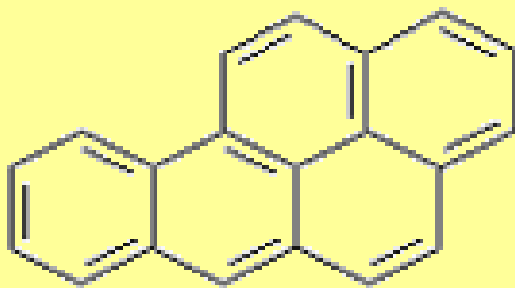
Polycyclic Aromatic Hydrocarbons (PAHs)



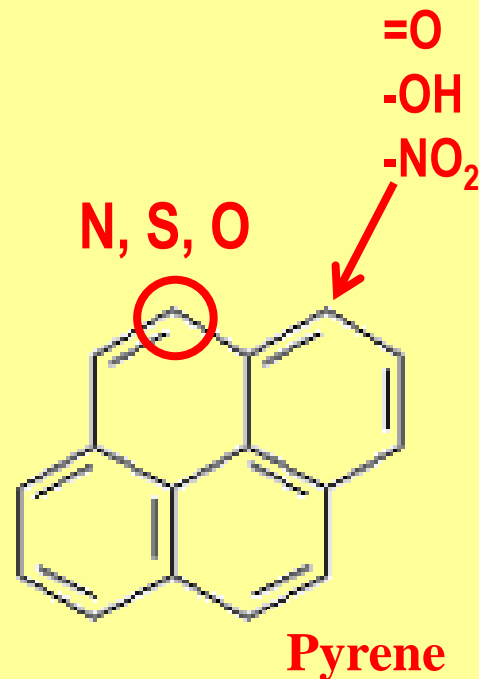
Benzene ring, building block of PAHs

Examples of PAHs

Benzo(a)pyrene



Naphthalene



Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous in the urban environment



PAHs in urban sources

All concentrations in mg/kg (means of as many as 6 studies)

• Fresh asphalt	1.5
• Weathered asphalt	3
• Fresh motor oil	4
• Brake particles	16
• Road dust	24
• Tire particles	86
• Diesel emissions	102
• Gasoline emissions	370
• Used motor oil	440

Pavement Sealcoat

Asphalt-based

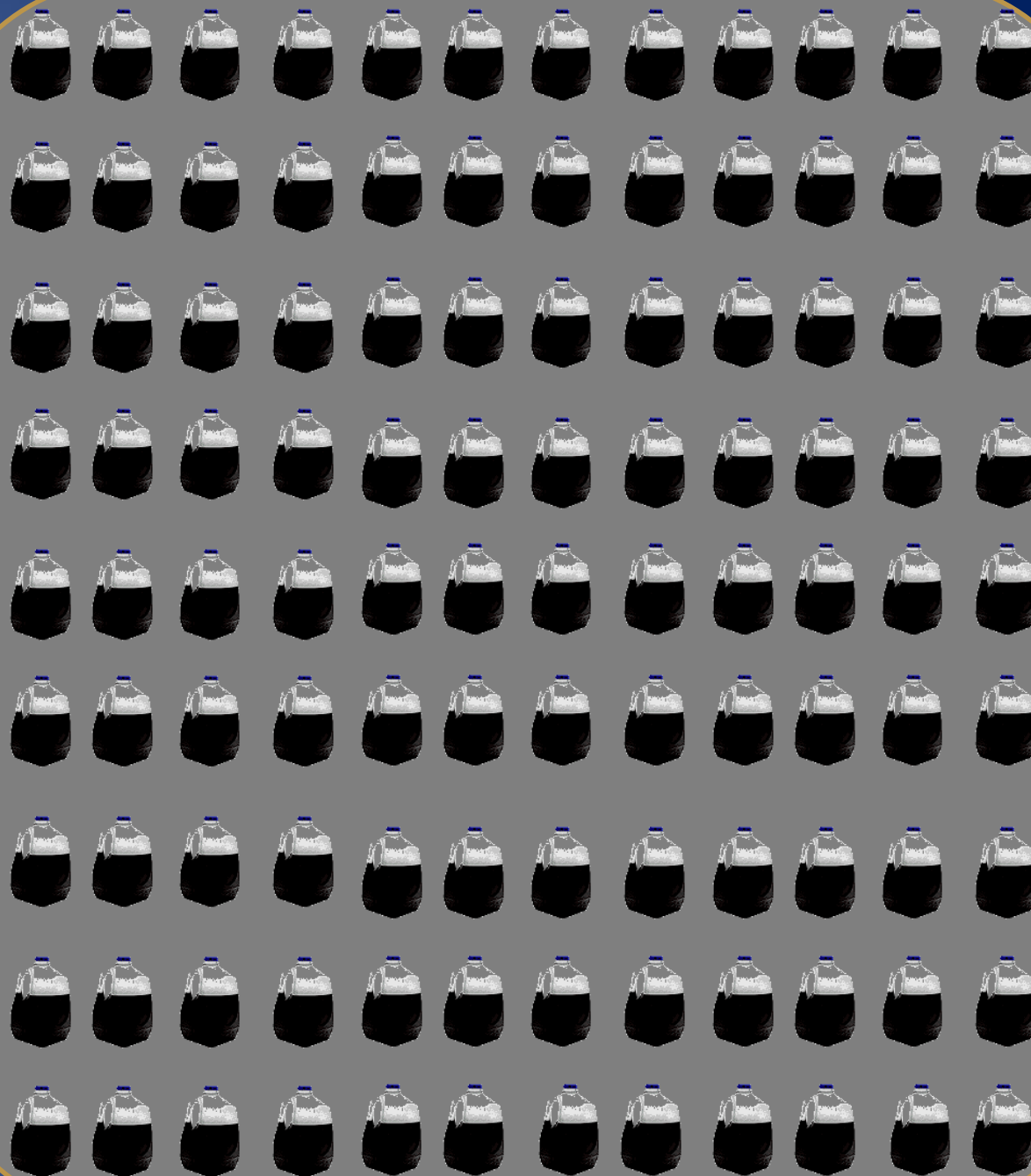
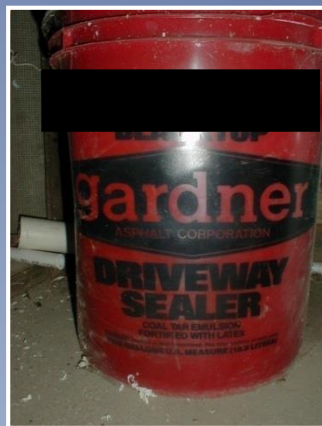
~50

Coal-tar-based

~70,000

Used
motor oil

Coal-tar-
based
sealcoat



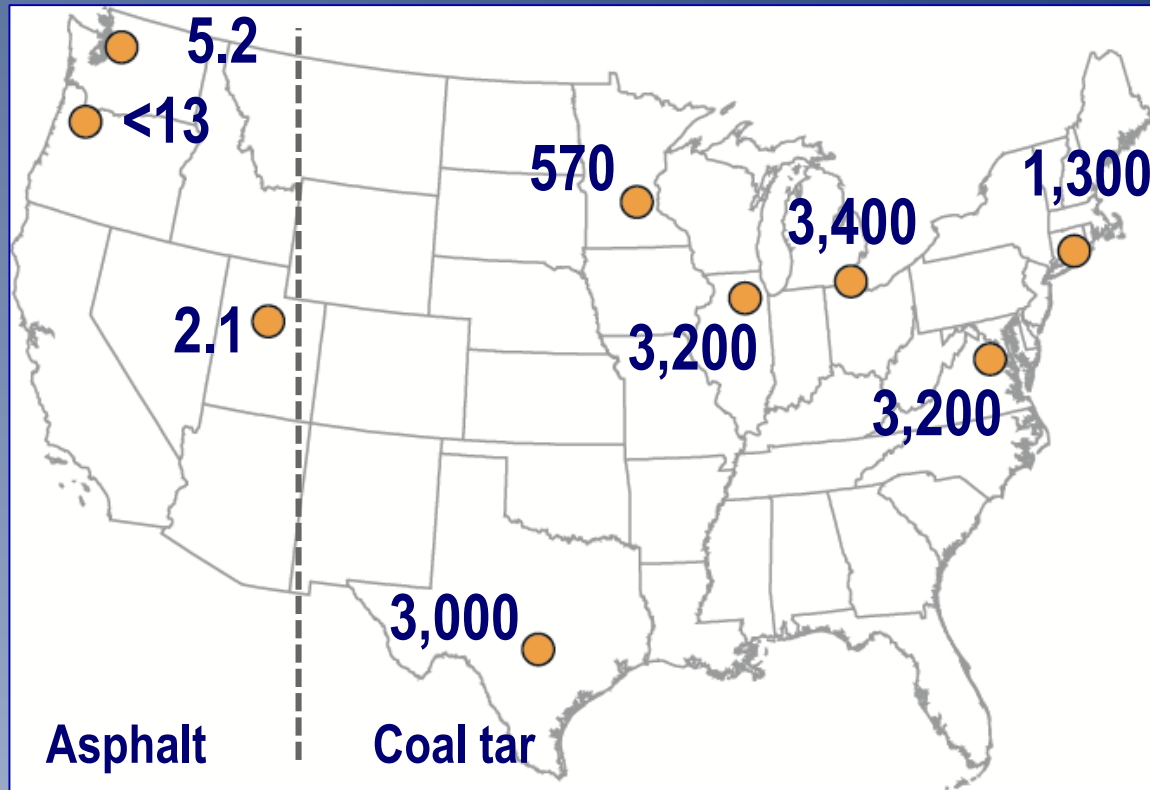
Coal-tar-based sealcoat use

- 322 million liters (85 million gallons) per year in US (per industry)
- 440 km² (170 mi²) covered in US per year





Sealed pavement dust Total PAH (mg/kg)



Fish kill, 17 July 2010

Hodge's Creek, North Carolina

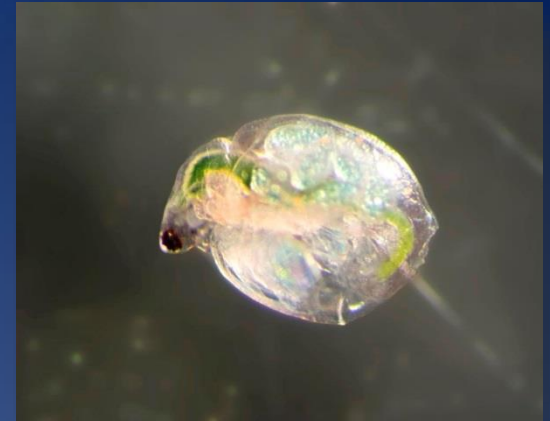


Sealcoat application and runoff sampling



Exposure protocol: Columbia Environmental Research Center

- Tested undiluted and 1:10 dilution of runoff
- 48-h exposure
- Remove surviving organisms to control water for 48-h “recovery”
- Expose half of remaining individuals to 4-h UVR to mimic sunlight



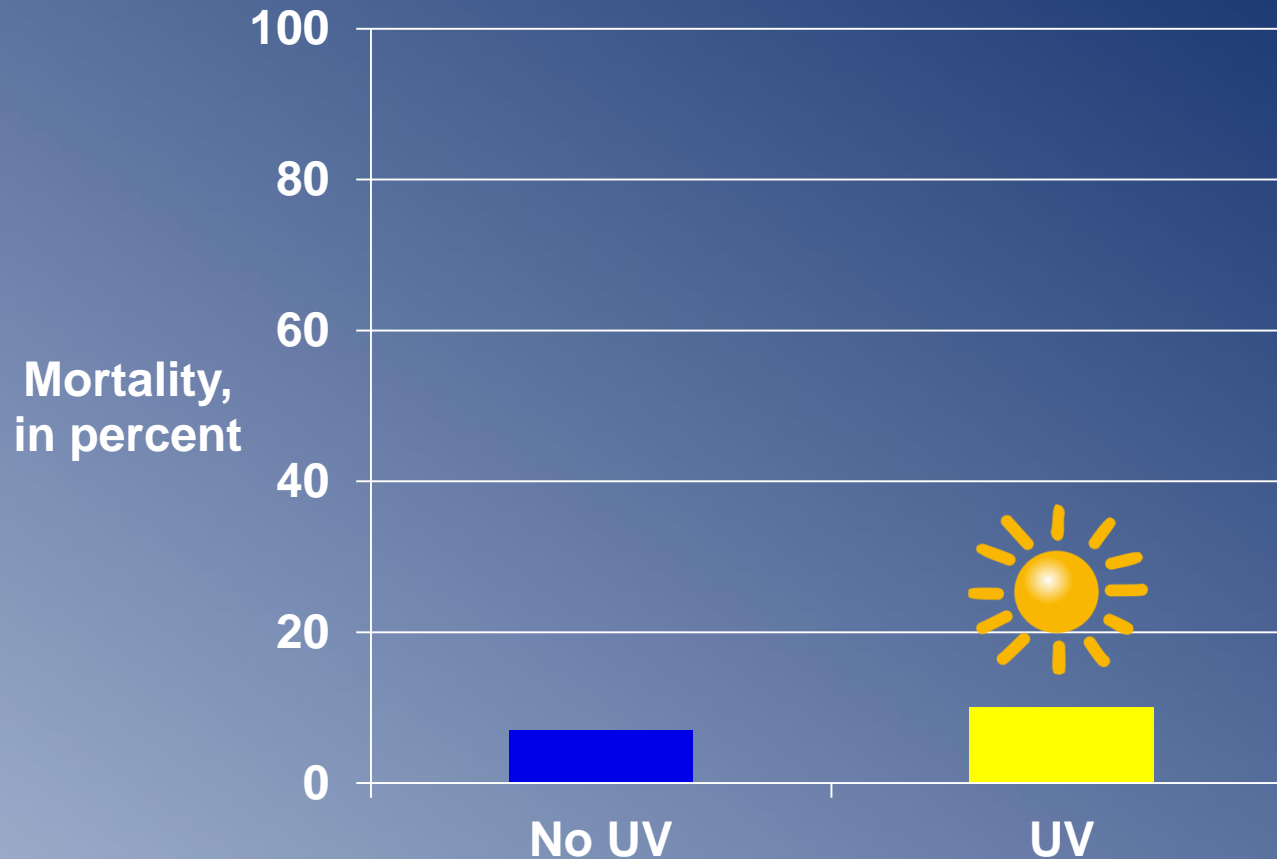
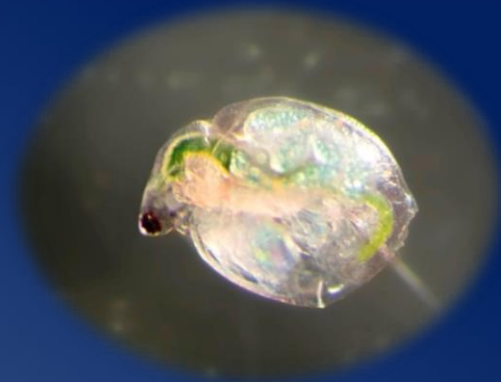
Ceriodaphnia dubia



Pimephales promelas

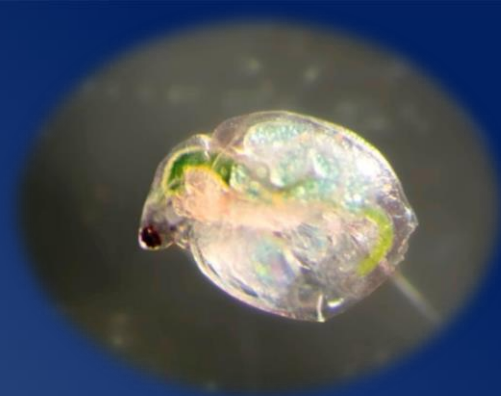
Mortality, *Ceriodaphnia*

Runoff from unsealed asphalt pavement

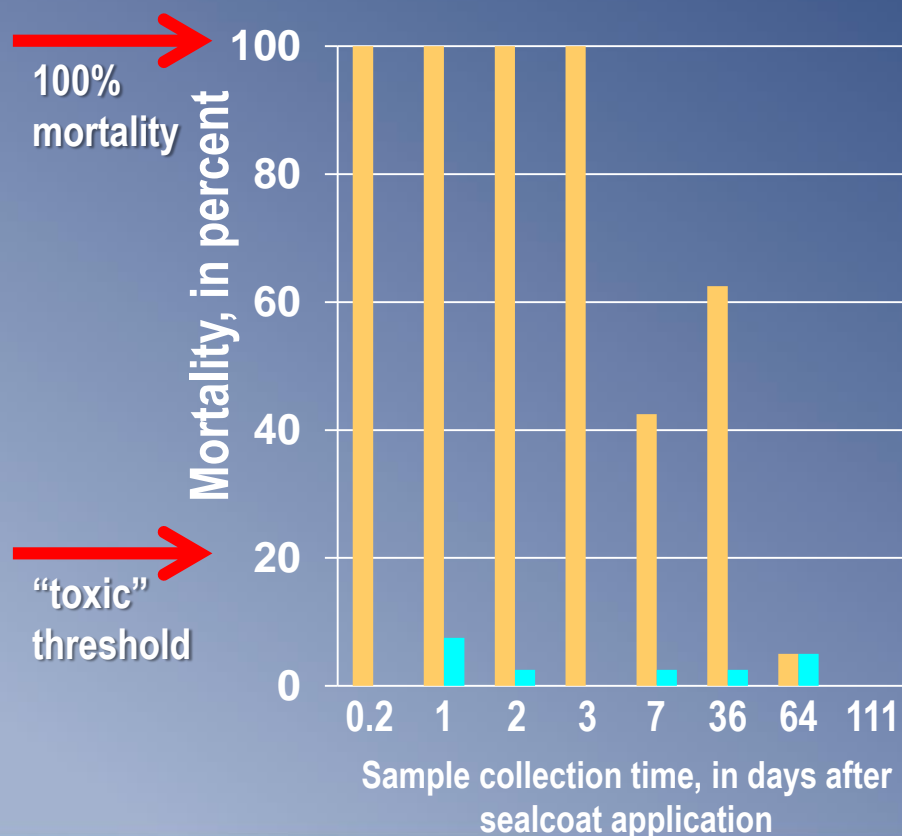


Mortality, *Ceriodaphnia*

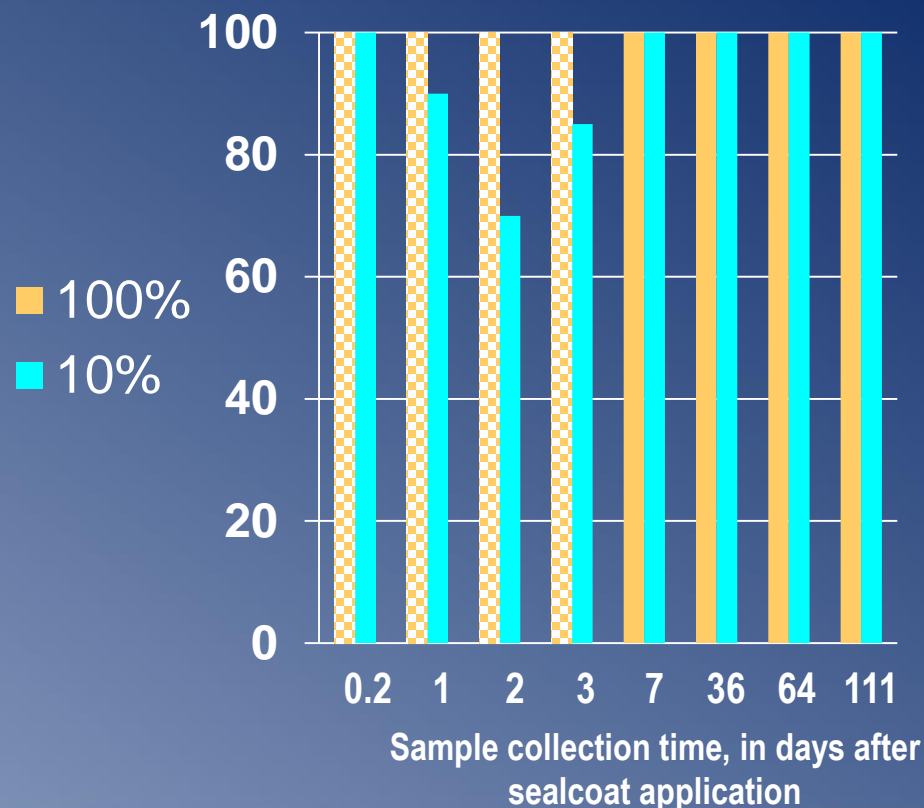
Runoff from coal-tar-based sealcoated pavement



48-hour exposure to runoff



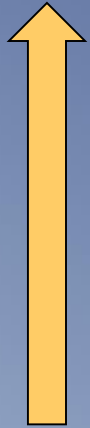
48-hr recovery, 4-hr UV exposure



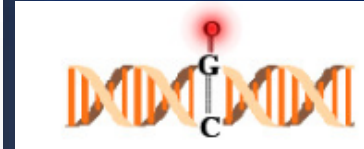
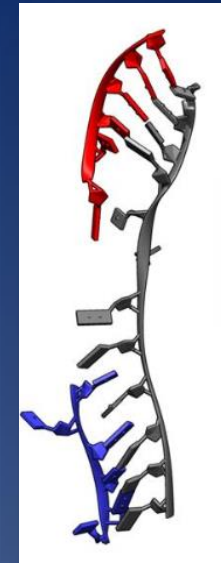
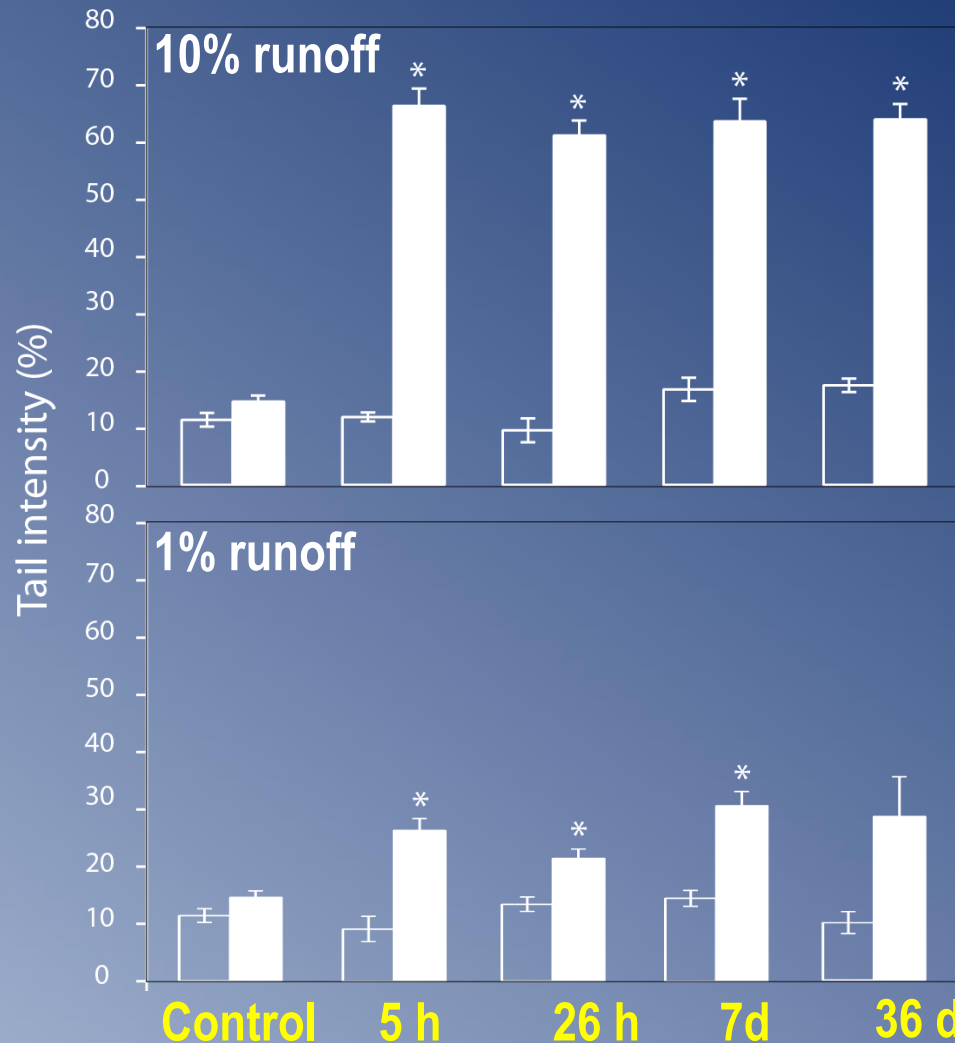


DNA damage

More
damage



Less
damage



EXPLANATION

 No UVA exposure

 With UVA exposure

***** = significantly different from control



Photos from Jupiter Images and Corbis Images, Inc.

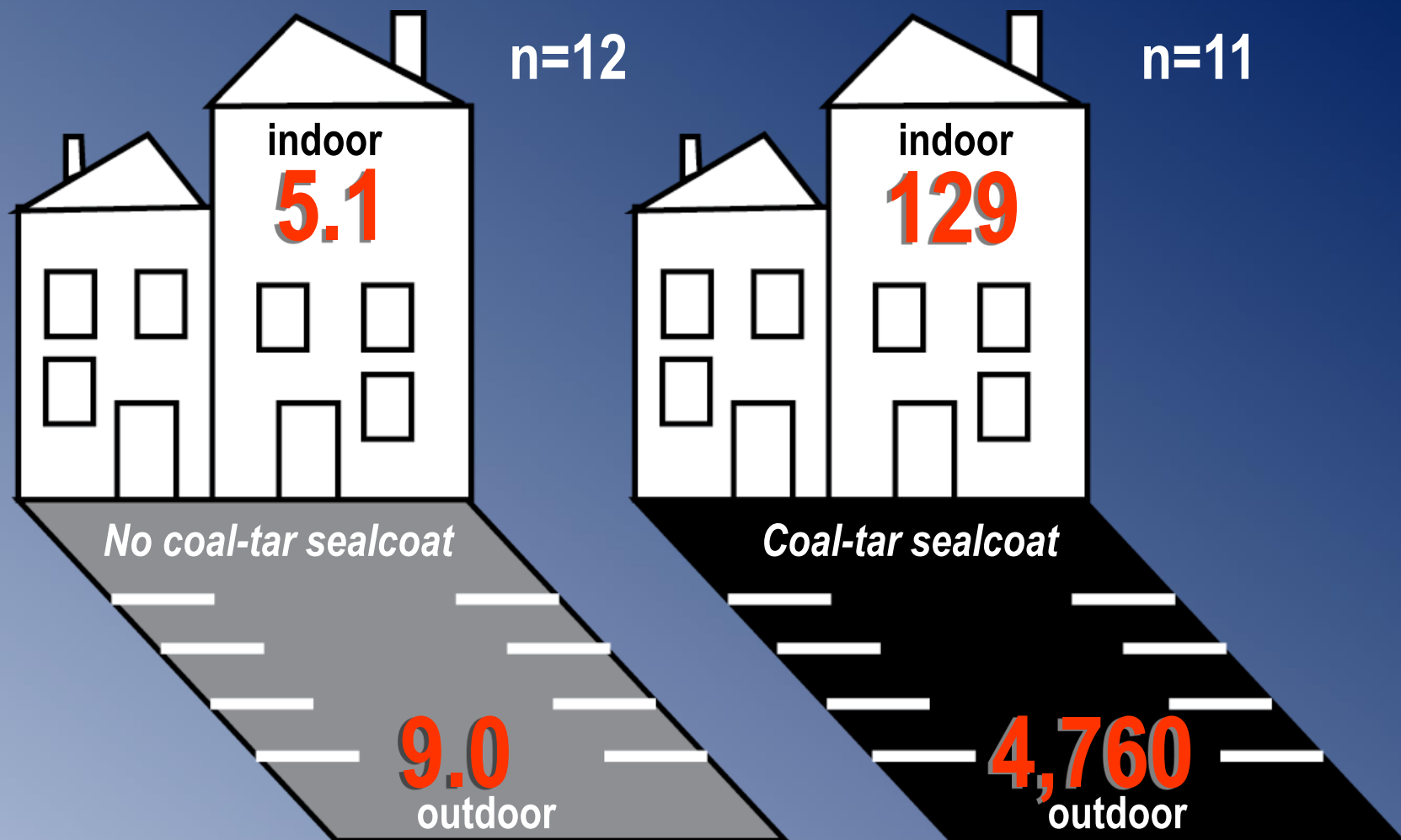


Photo courtesy of CLEARCorps Durham, NC

Austin, Tex.: 23 ground-floor apartments sampled



Median ΣPAH_{16} [$\mu\text{g/g}$] in indoor and parking lot dust

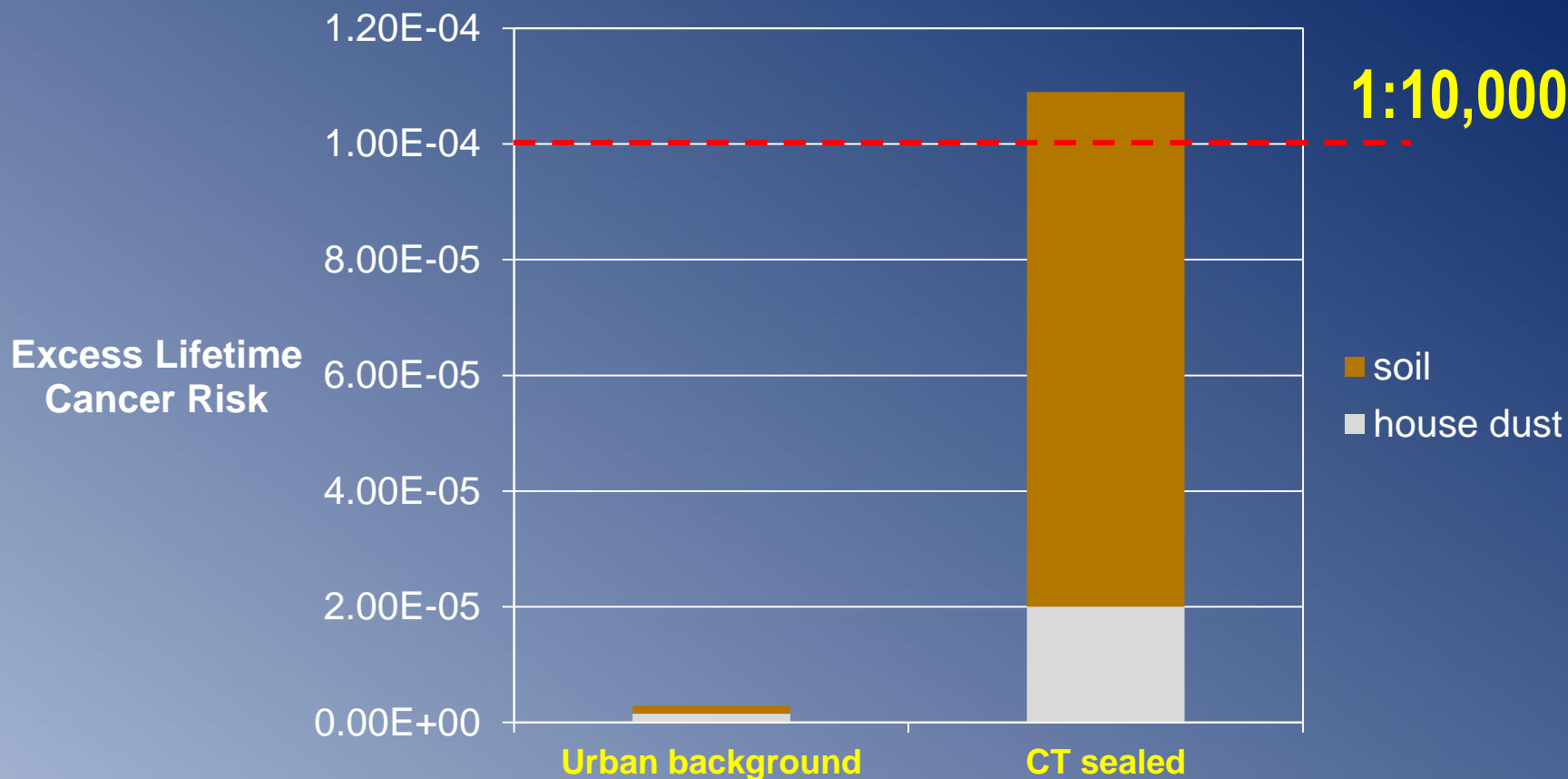


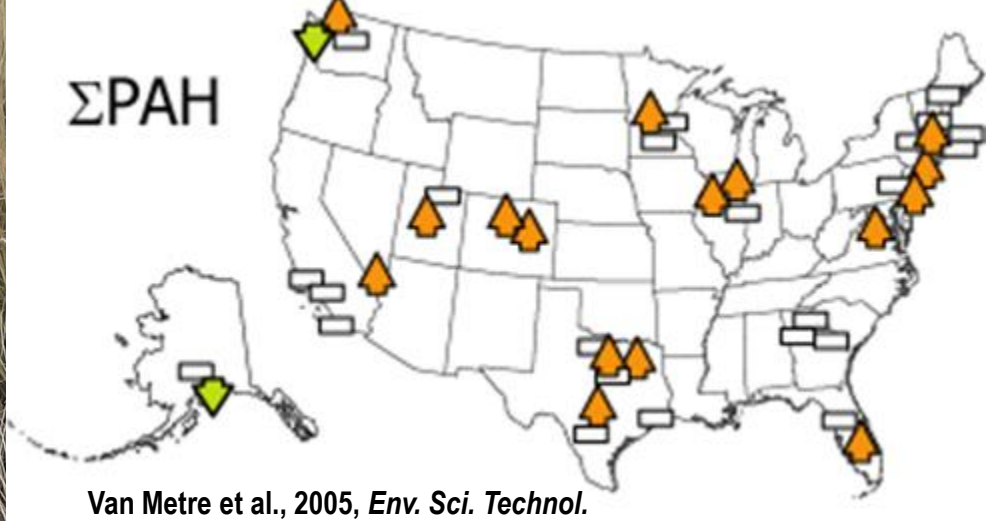
“Coal tars and coal tar pitches are known to be human carcinogens...”



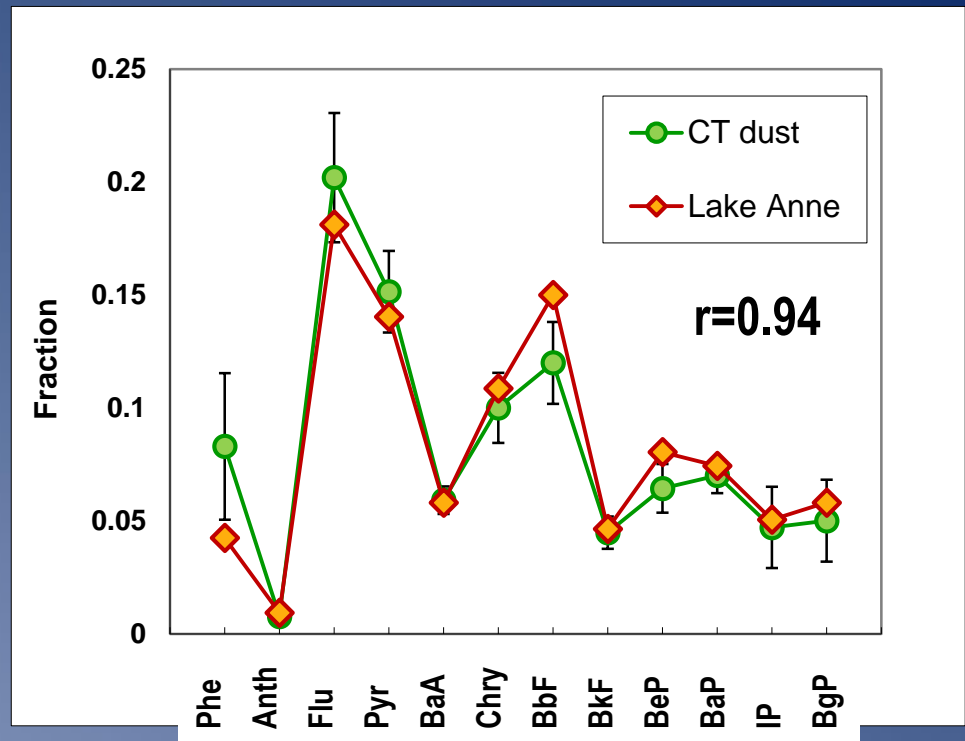
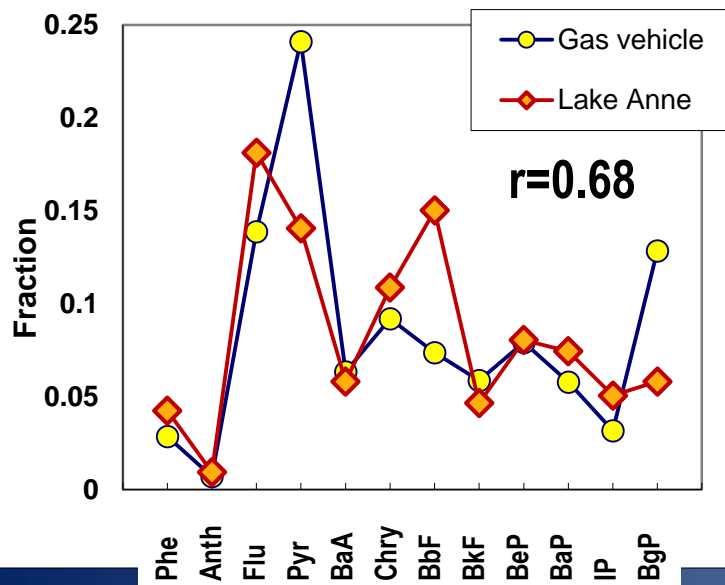
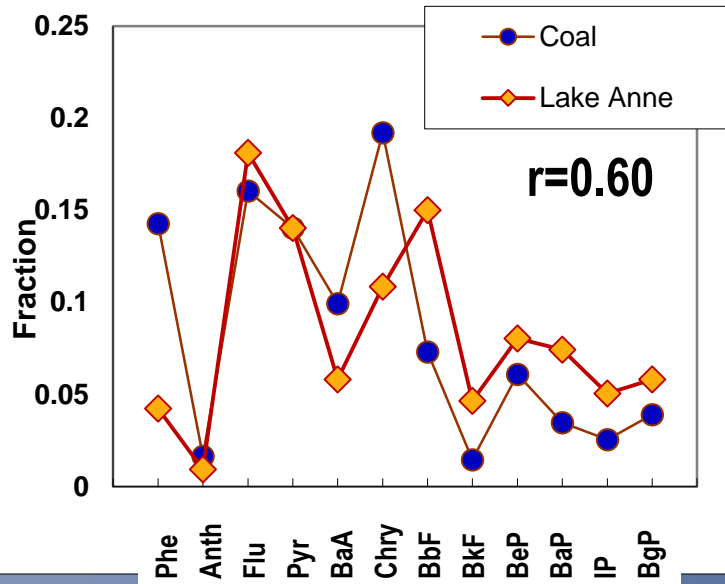
National Institute of Environmental
Health Sciences, USA

Coal-tar sealcoat contributes to a 38-fold increase in excess lifetime cancer risk (central tendency)

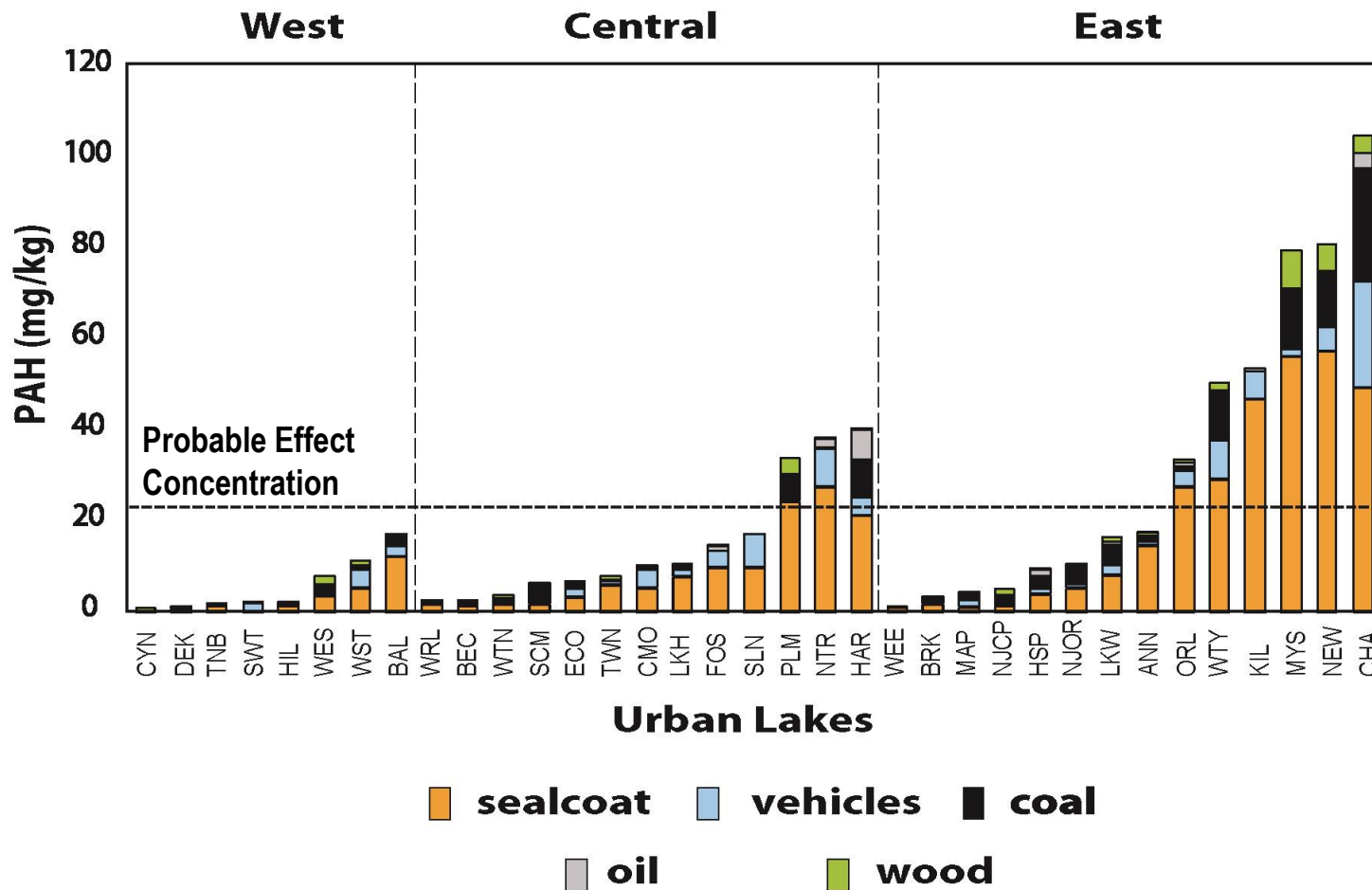




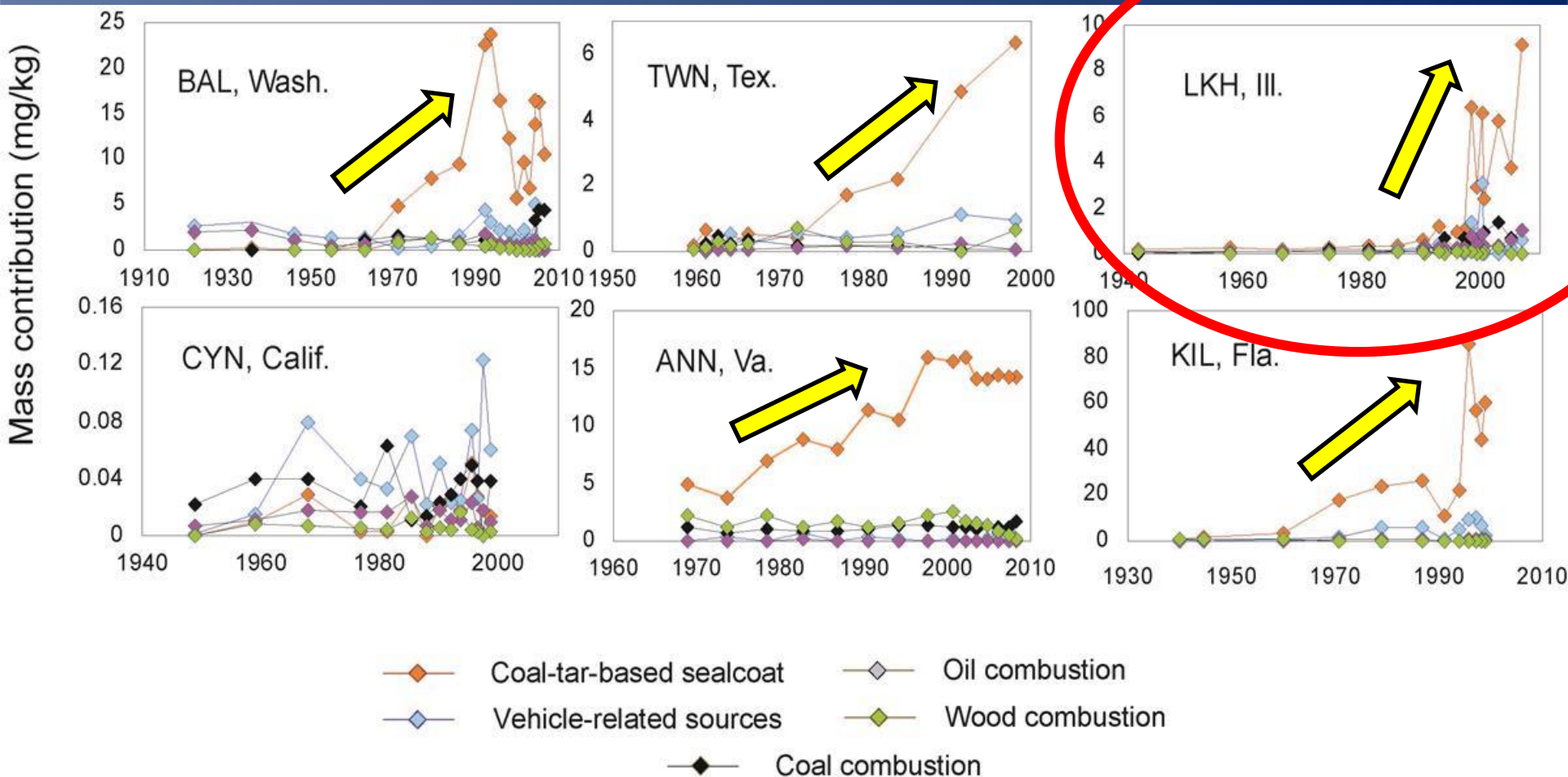
Environmental Forensics: PAH fingerprints



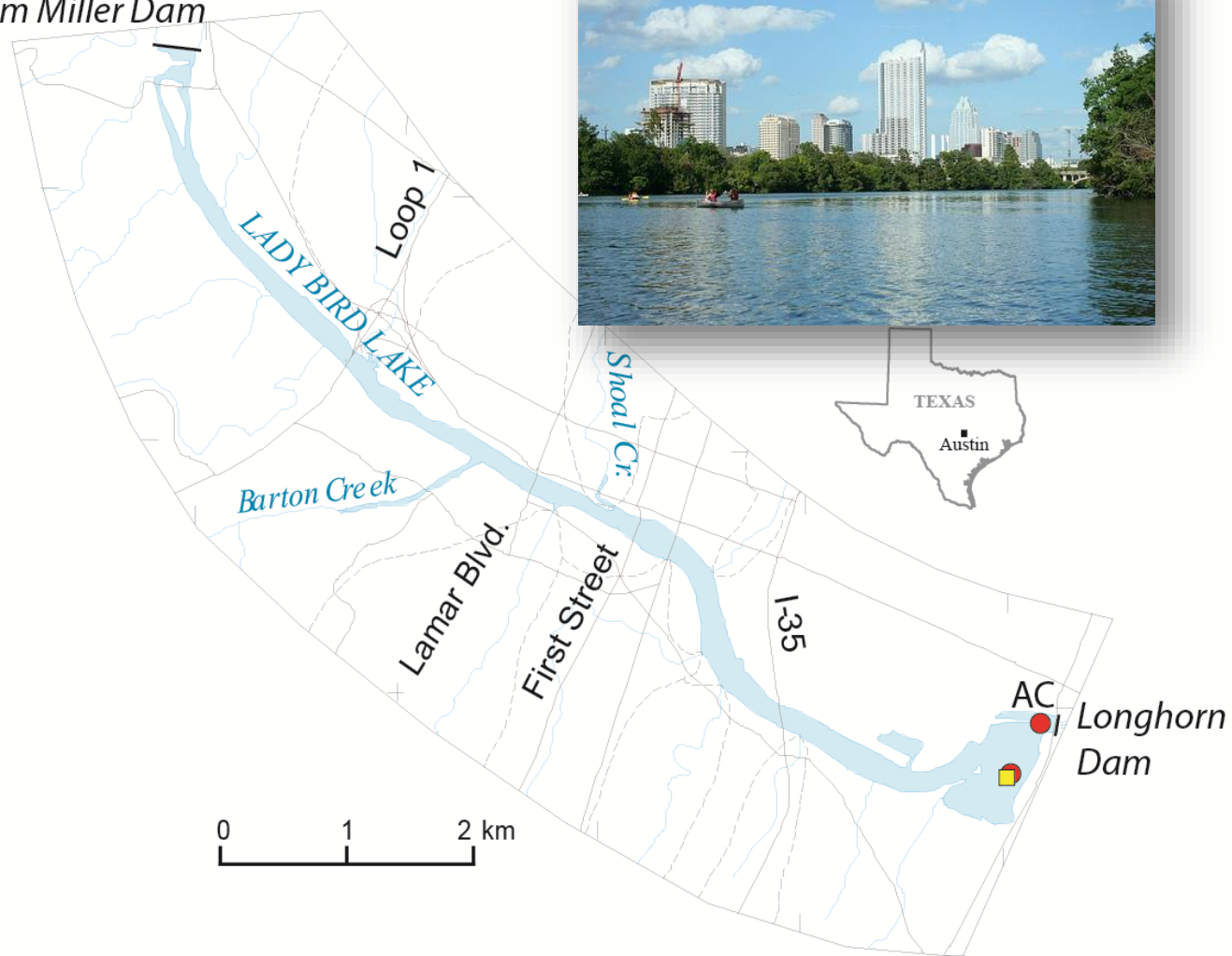
PAH sources to U.S. urban lakes



PAH trends in new urban lakes

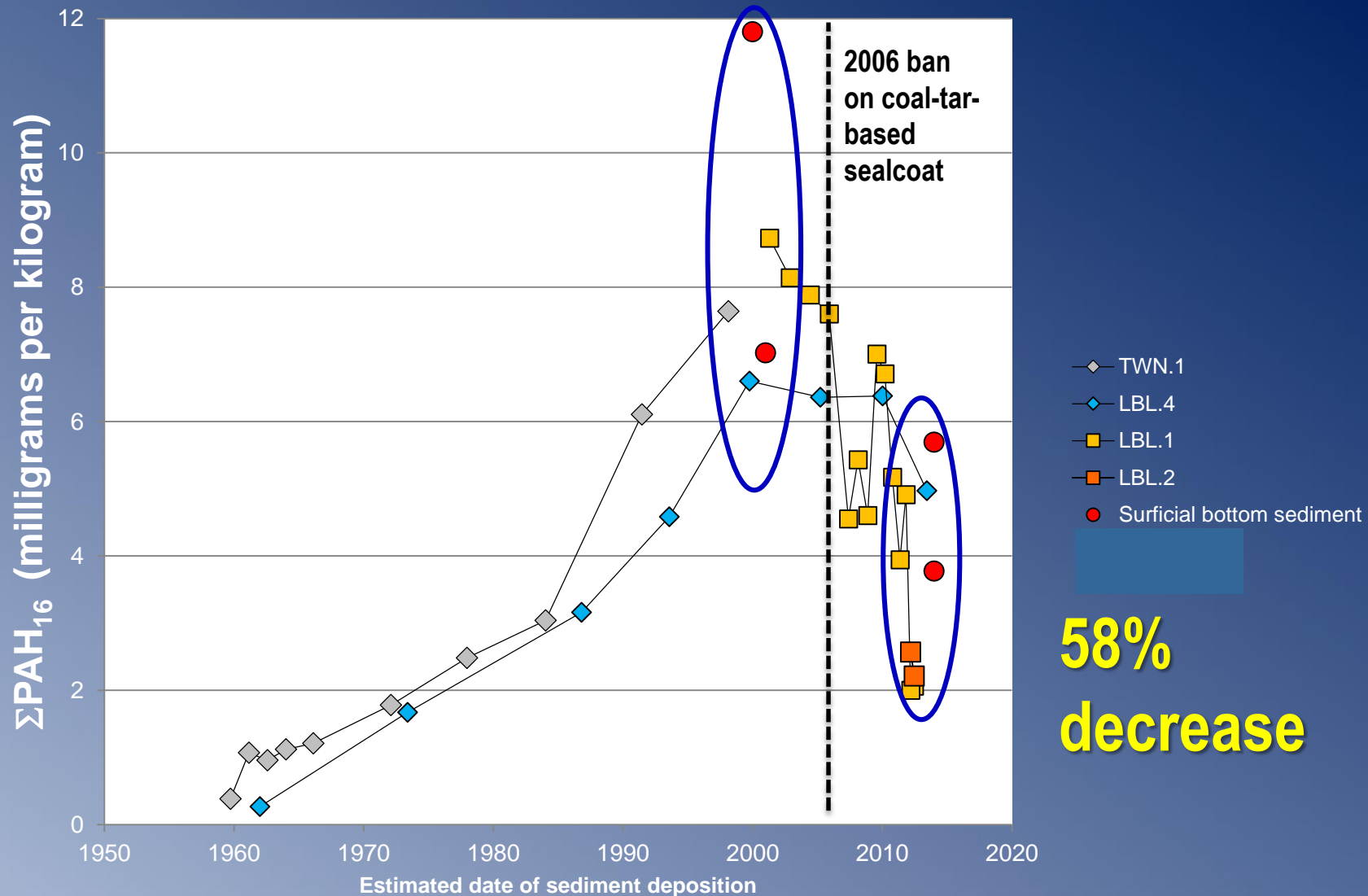


Tom Miller Dam



- Sediment-core collection site
- Surficial bottom sediment collection site

PAH concentrations in Lady Bird Lake: Before and after the ban



**58%
decrease**

PAHs and Coal-Tar-Based Pavement Sealcoat

<http://tx.usgs.gov/sealcoat.html>

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