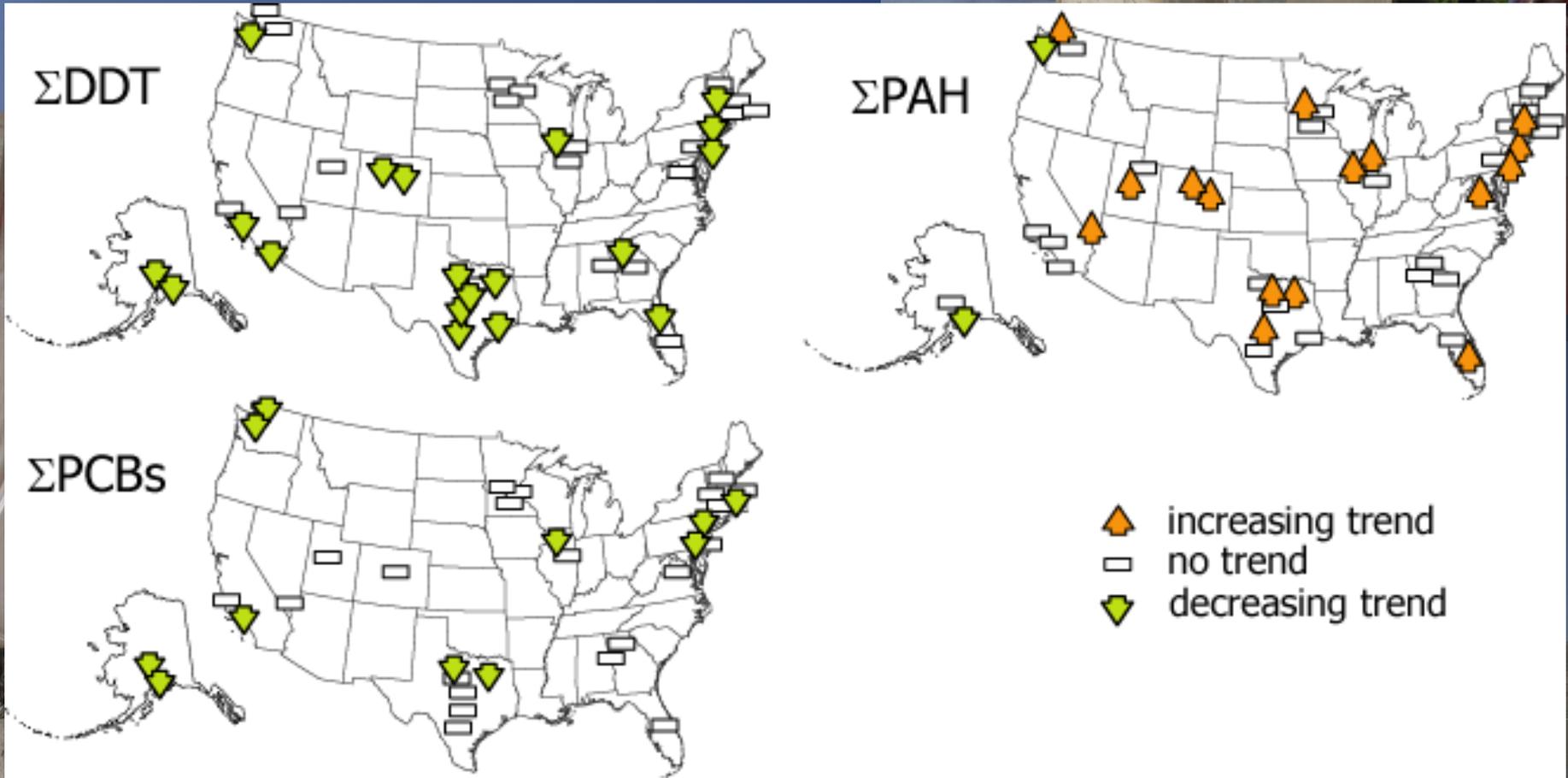


# Coal-Tar-Based Pavement Sealcoat: Health and Environmental Overview



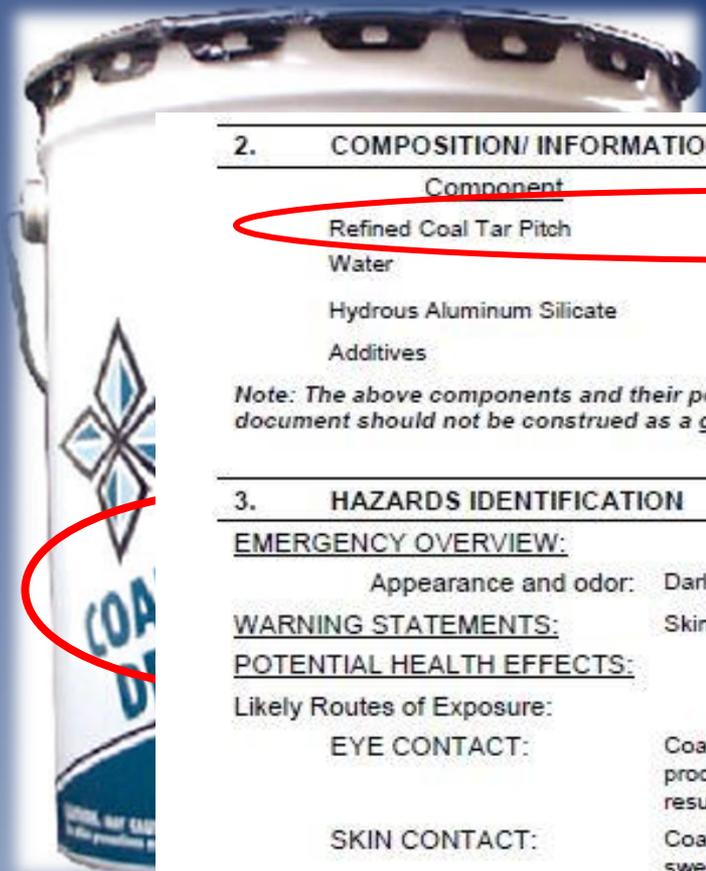
# NAWQA: Contaminant Trends in Lake Sediment



# The first clue: City of Austin measures high PAH in stream sediment



- ❑ PAHs  $>1,500$  mg/kg in some small drainages in residential areas
- ❑ Compare to Probable Effect Concentration (PEC) of 23 mg/kg



## 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:

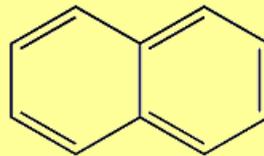
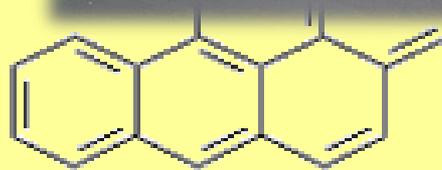
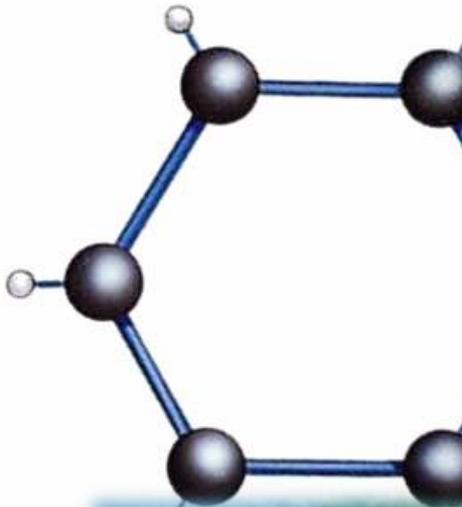
Coal tar volatiles - acute effects caused from overexposure may include coughing, sneezing, and swollen or irritated nasal mucus and sinuses. Repeated and/or prolonged contact to high concentrations may result in toxic effects, such as respiratory difficulties, convulsions, and possible cardiovascular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

##### INGESTION:

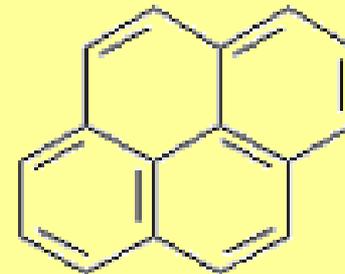
Coal tar - may cause gastrointestinal tract irritation followed by nausea and vomiting, abdominal discomfort, rapid pulse, etc. In extreme cases, cardiovascular collapse may occur.

Refer to Section 11 for toxicological information.

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



**Naphthalene**



**Pyrene**

# 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 engine 102
- Gasoline engine 370
- Used motor oil 440

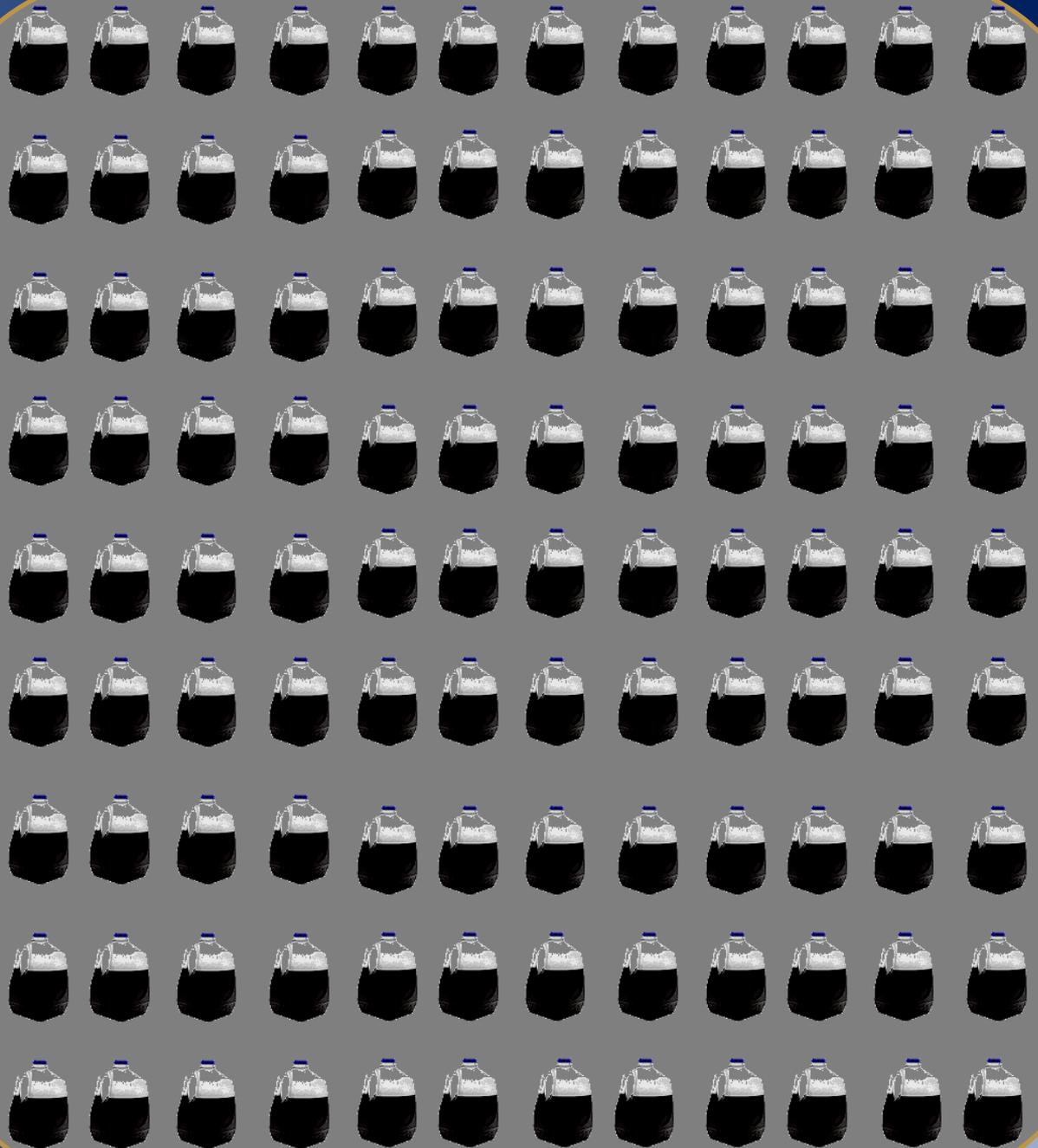
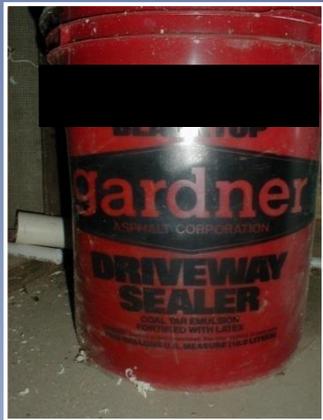
## Pavement Sealcoat

- Asphalt Based  
~ 50

- Coal-tar-based  
~70,000

Used  
motor oil

Coal-tar  
sealcoat



# Coal-tar-based sealcoat use

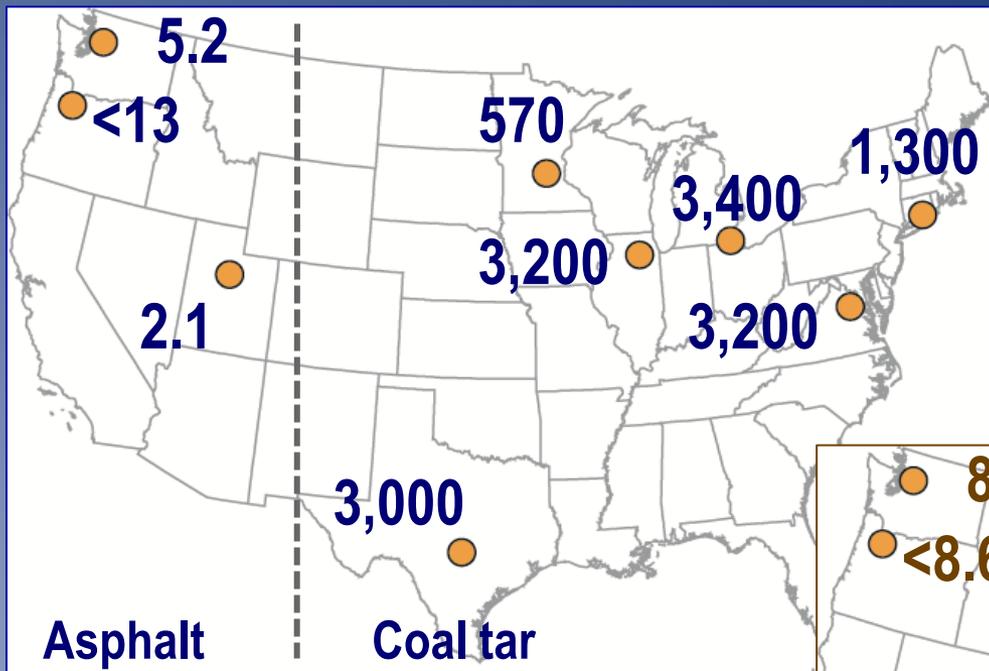
- 85 million gallons per year (per industry)
- 170 mi<sup>2</sup>, or 110,000 ac covered



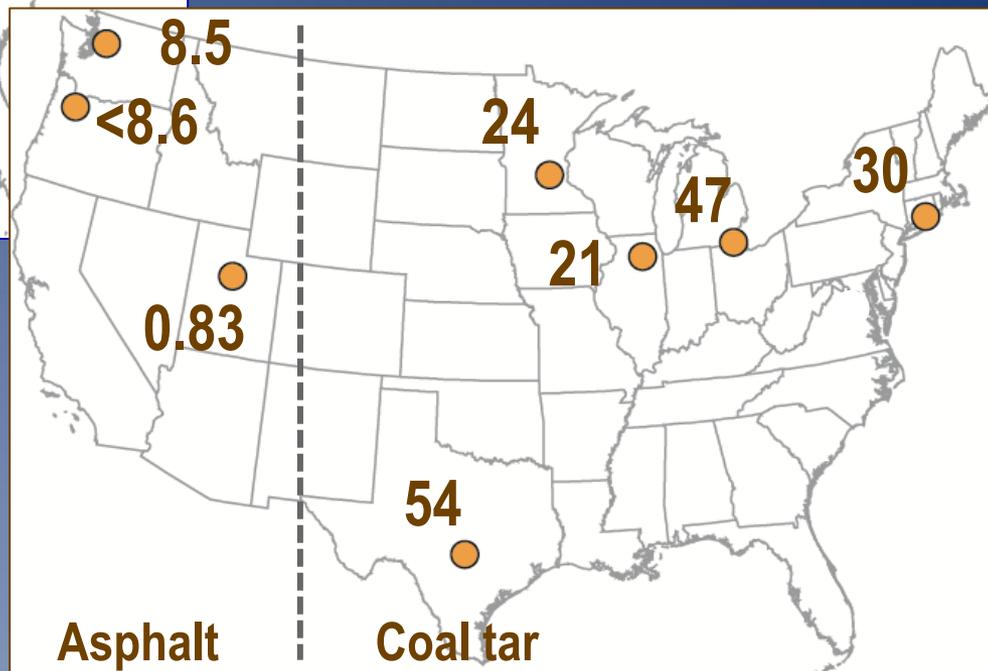


# Sealed pavement dust

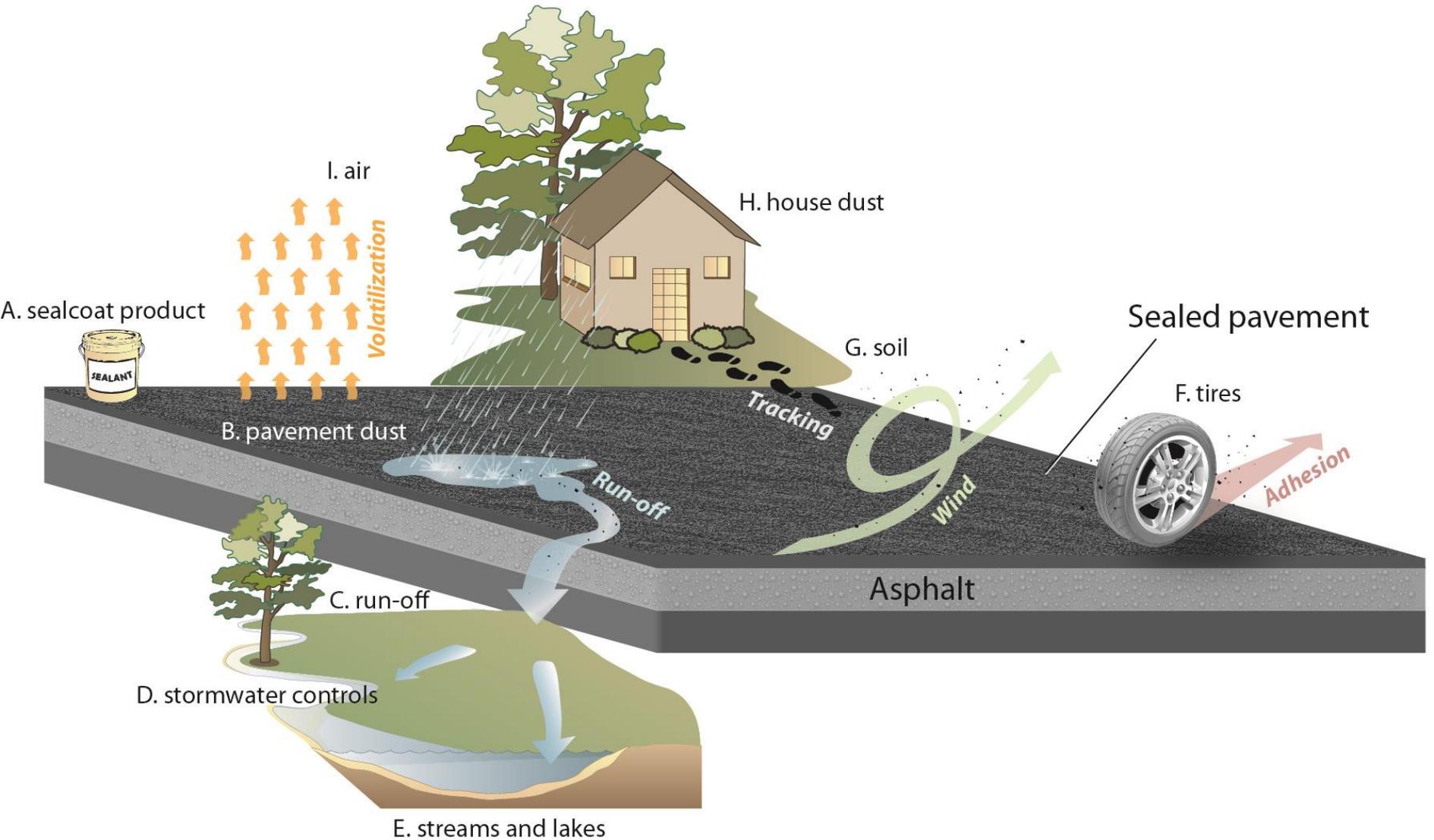
## Total PAH (mg/kg)



Unsealed pavement dust

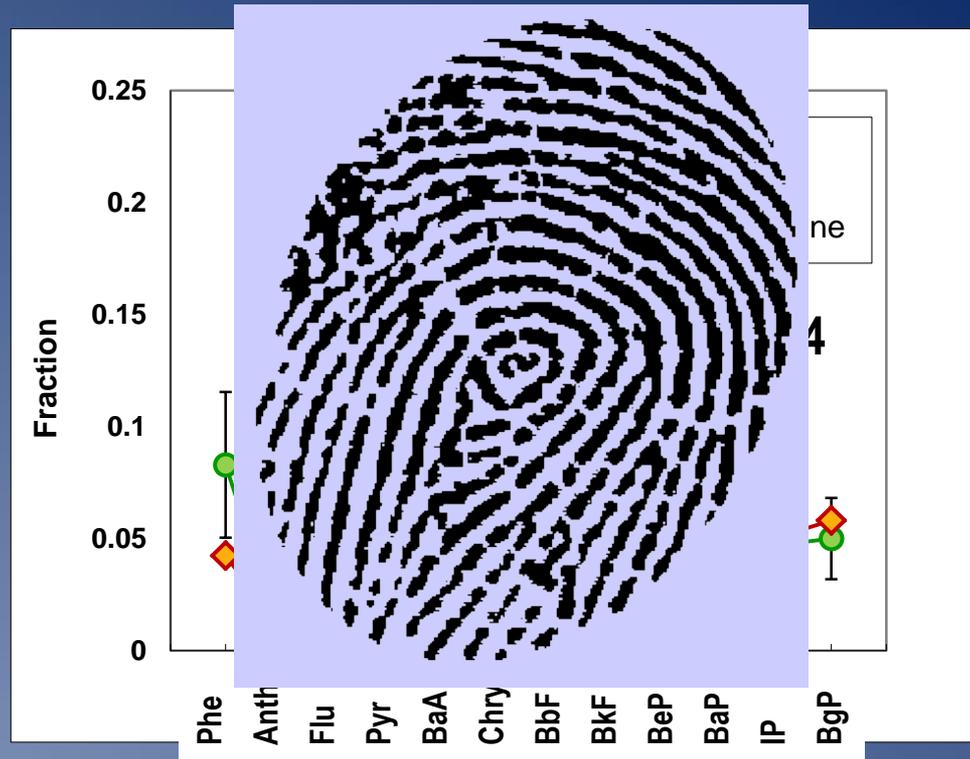
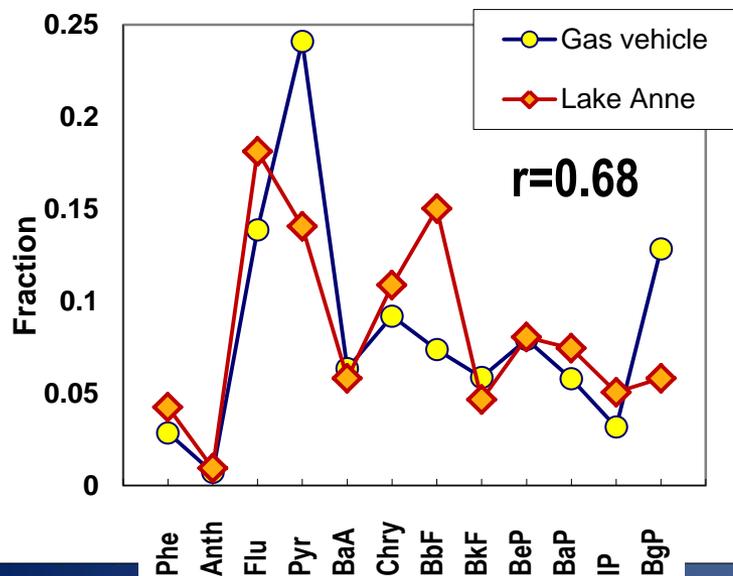
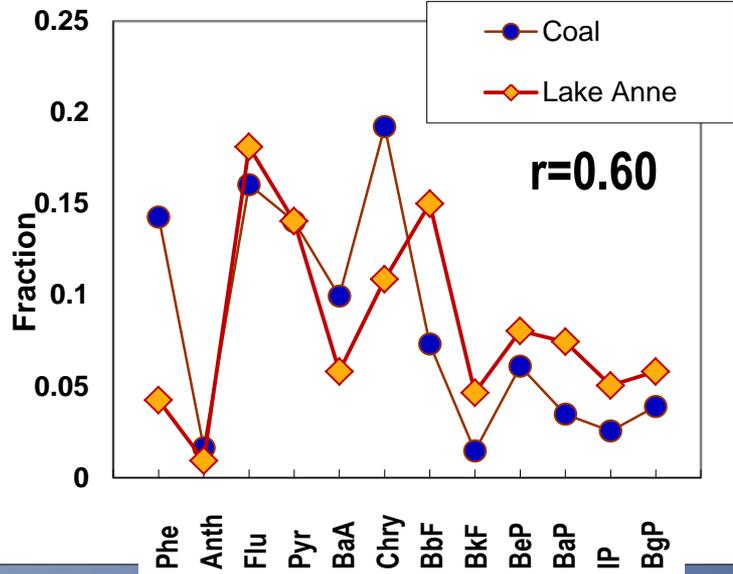


# Sealcoat PAH transport pathways

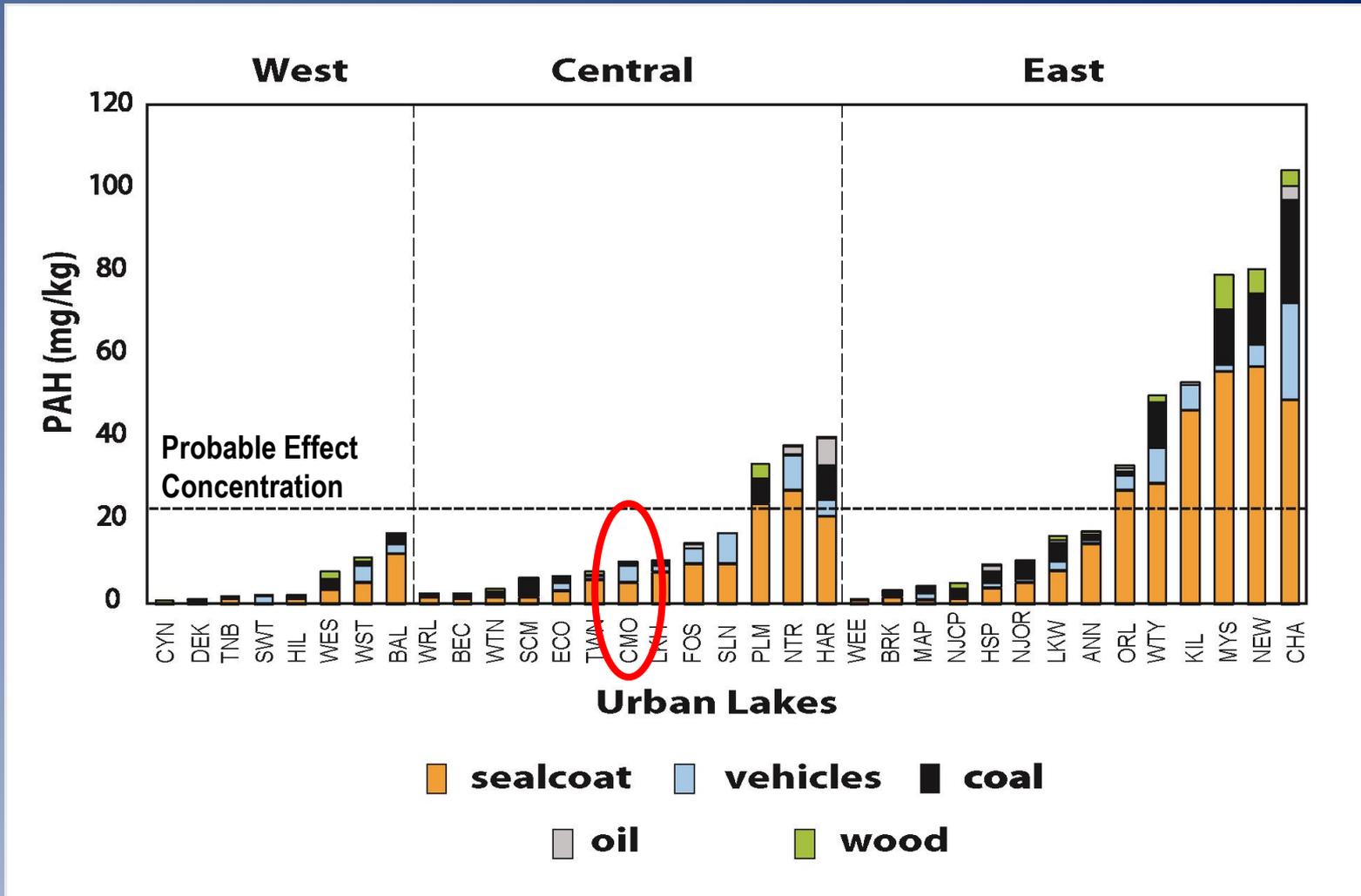




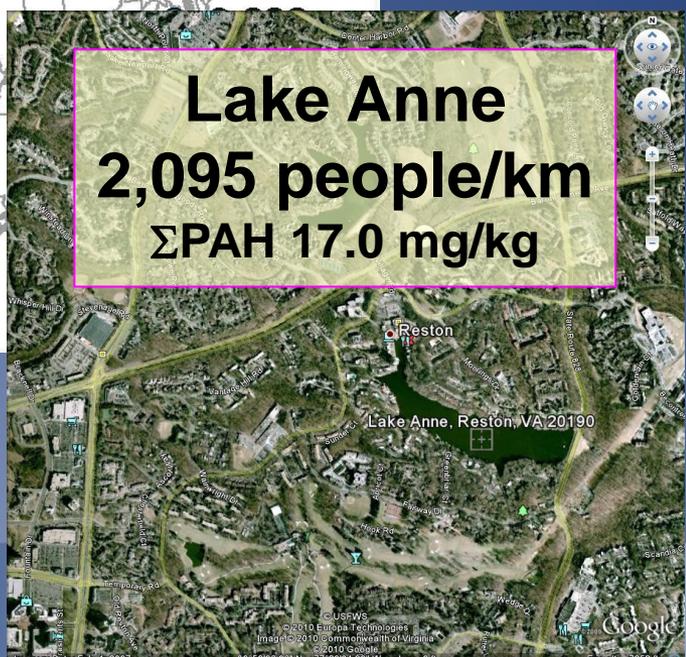
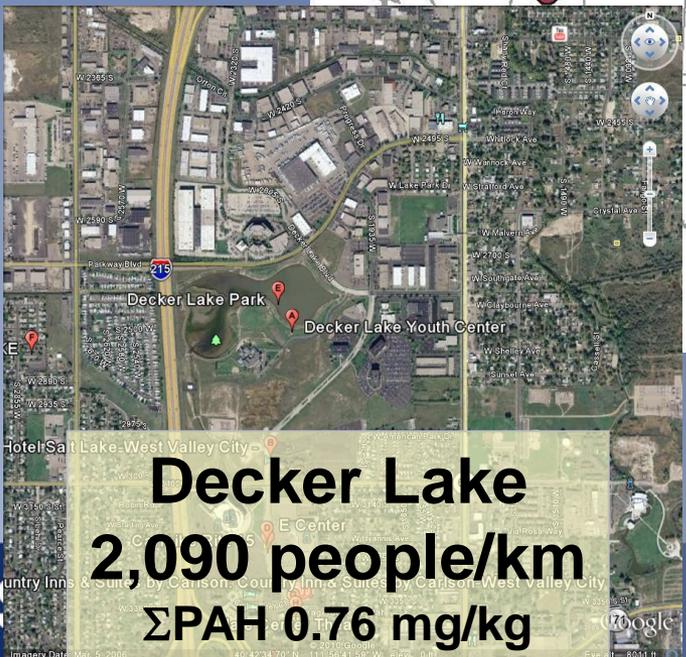
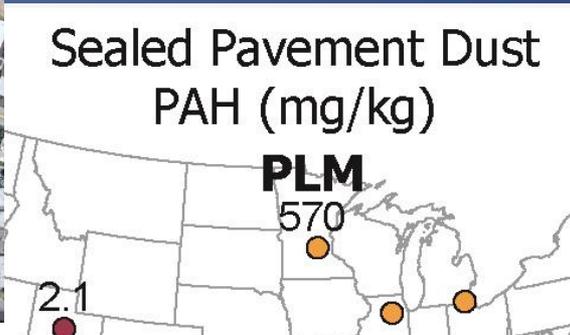
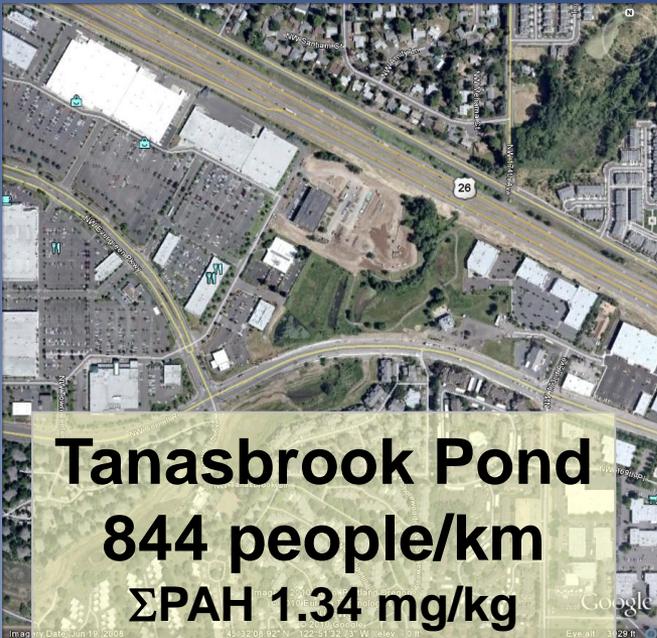
# Environmental Forensics: PAH fingerprints



# PAH sources to U.S. urban lakes



# "Background" PAH concentration



Country Inns & Suites by Carlson, County Inns & Suites by Carlson, West Valley City

# Effects on aquatic biota



Bommarito et al., 2010, *Ecotoxicology*  
Bommarito et al., 2010, *Chemosphere*  
Bryer et al., 2010, *Environ. Poll.*  
Bryer et al., 2006, *Ecotoxicology*  
Scoggins et al., 2007, *J. NABS*



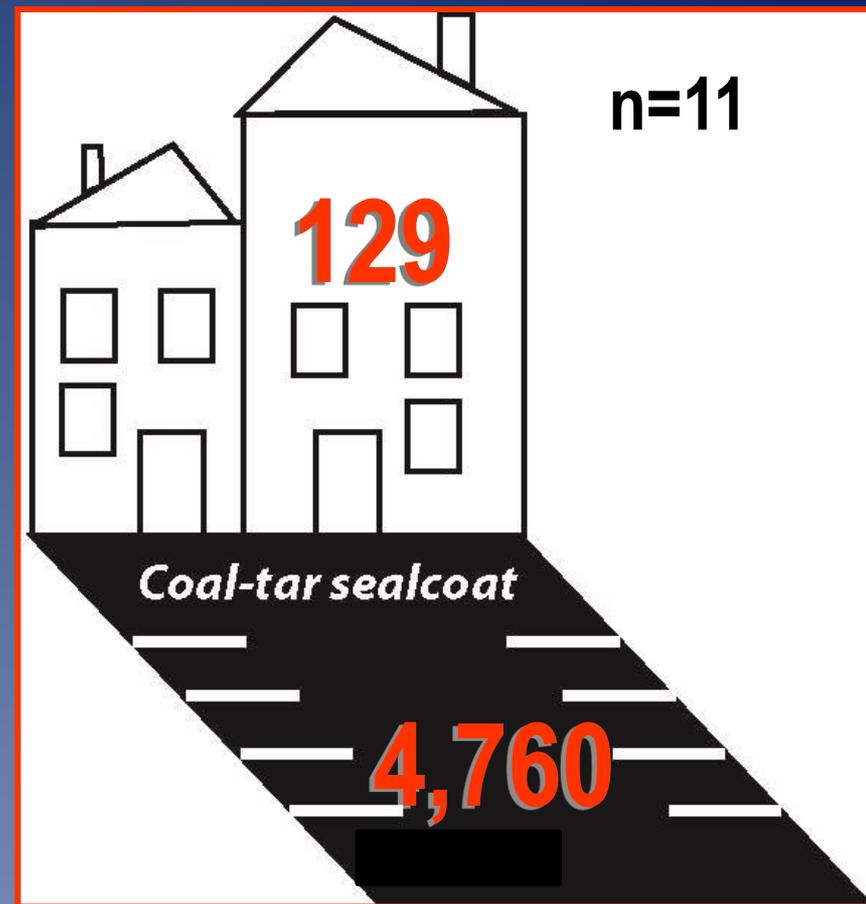
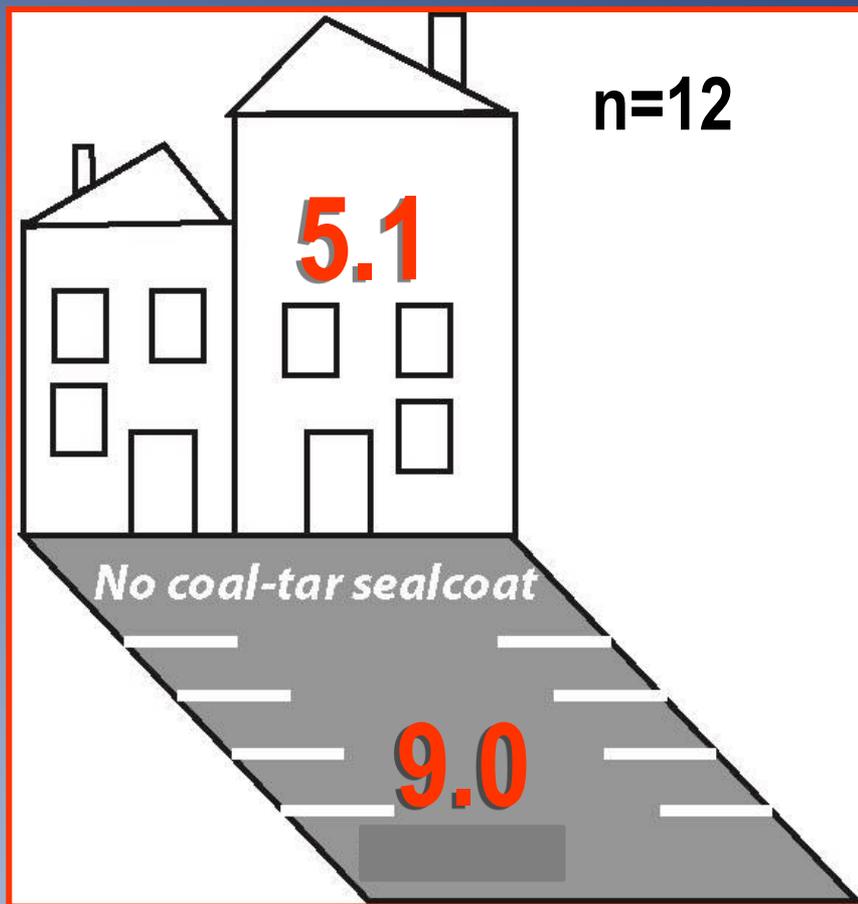


Photos from Jupiter Images and Corbis Images, Inc.





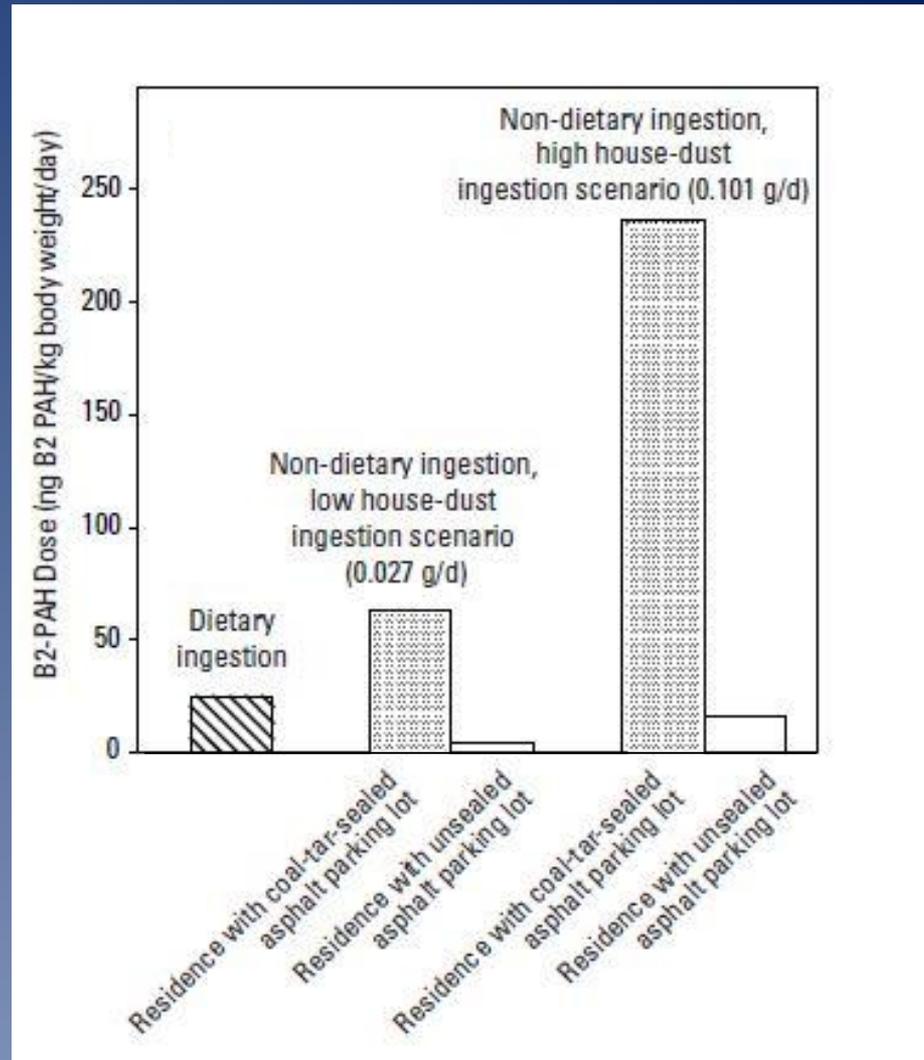
# Median total PAH [mg/kg]



# Coal-tar based sealcoat and pre-school ingestion of PAHs



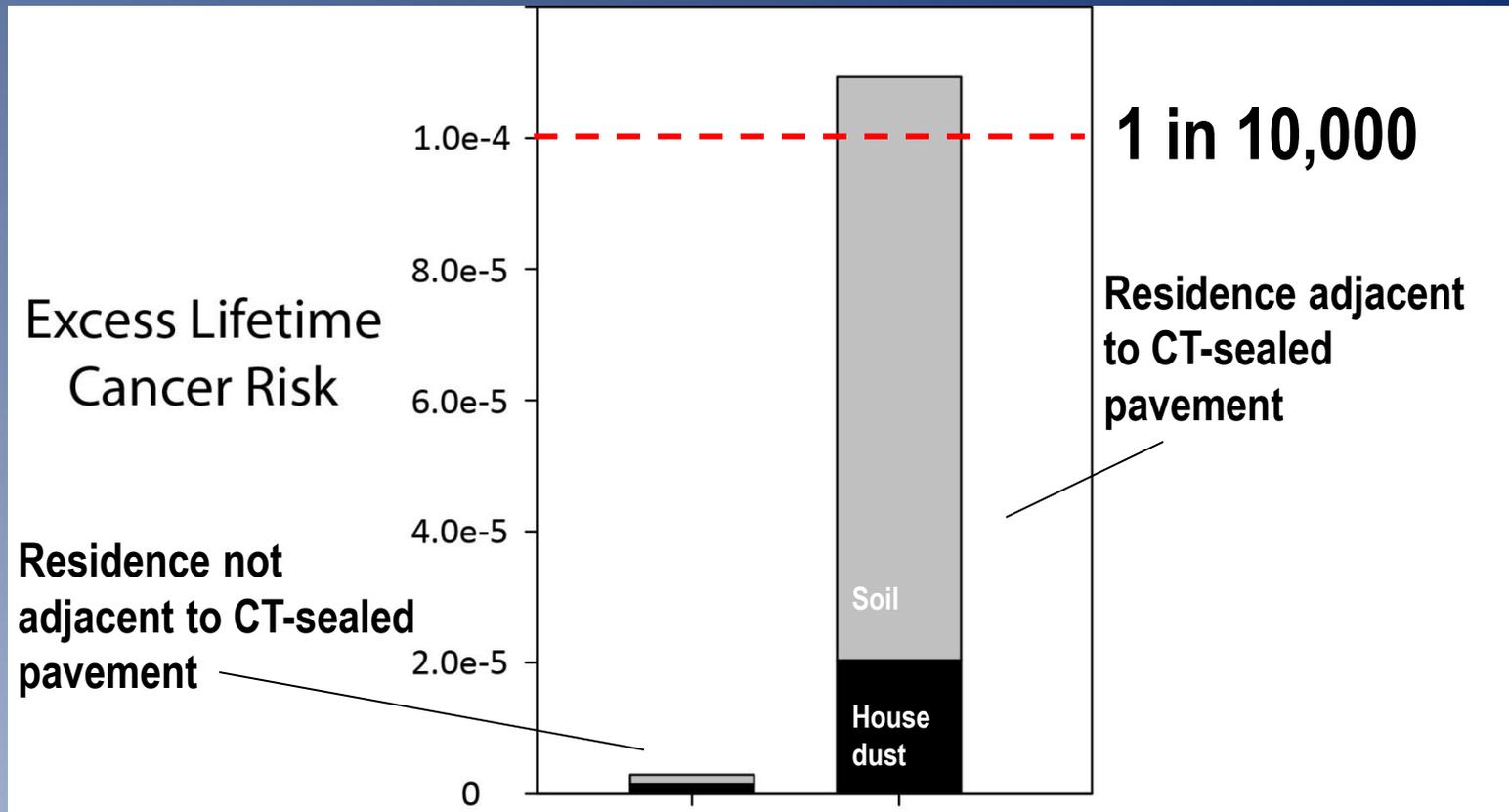
Photo courtesy of CLEARCorps Durham, NC



***“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)

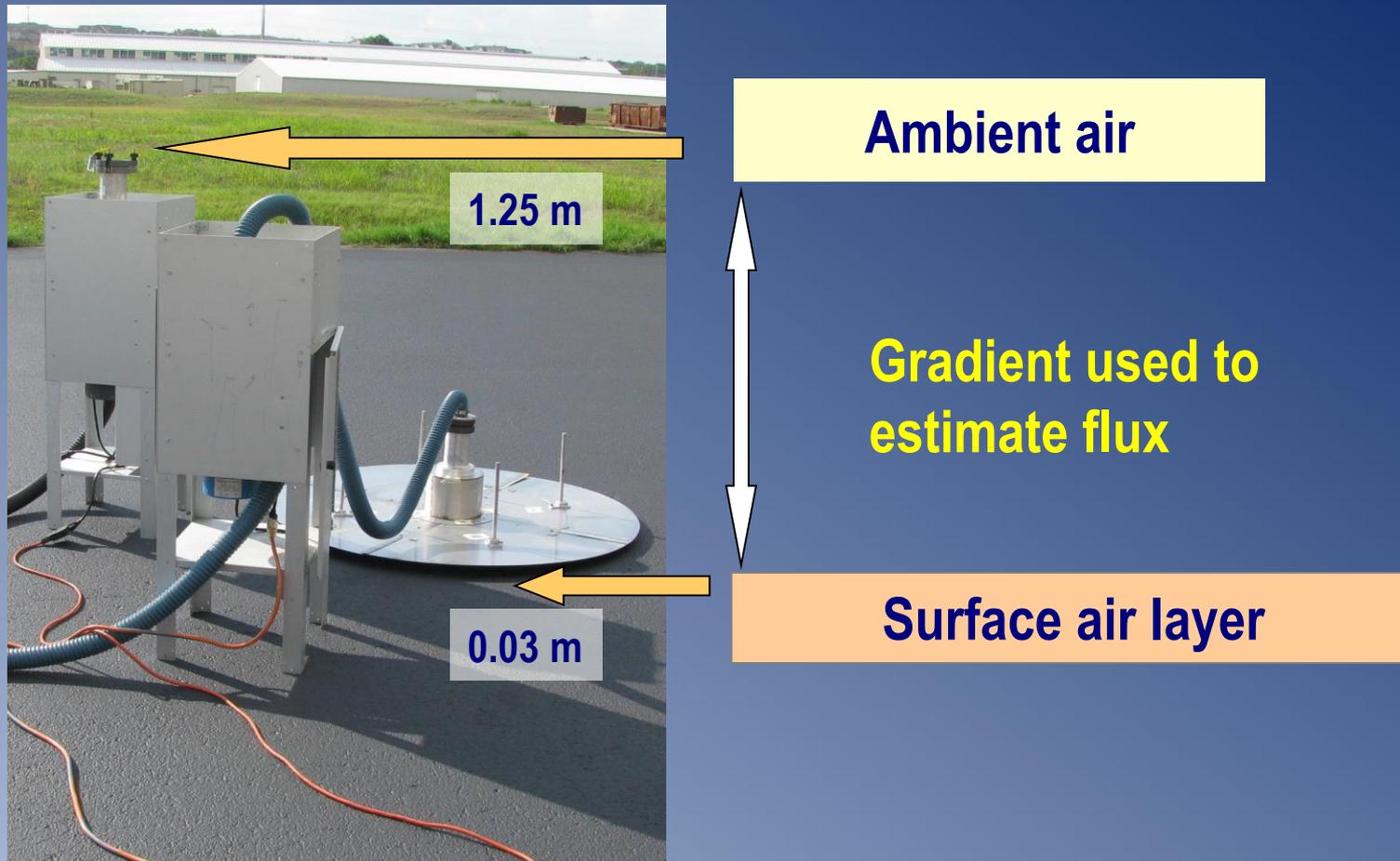


**What are effects on  
air quality?**



# Measuring volatilization

We used paired high volume air samplers to measure PAH volatilization from sealcoated pavement



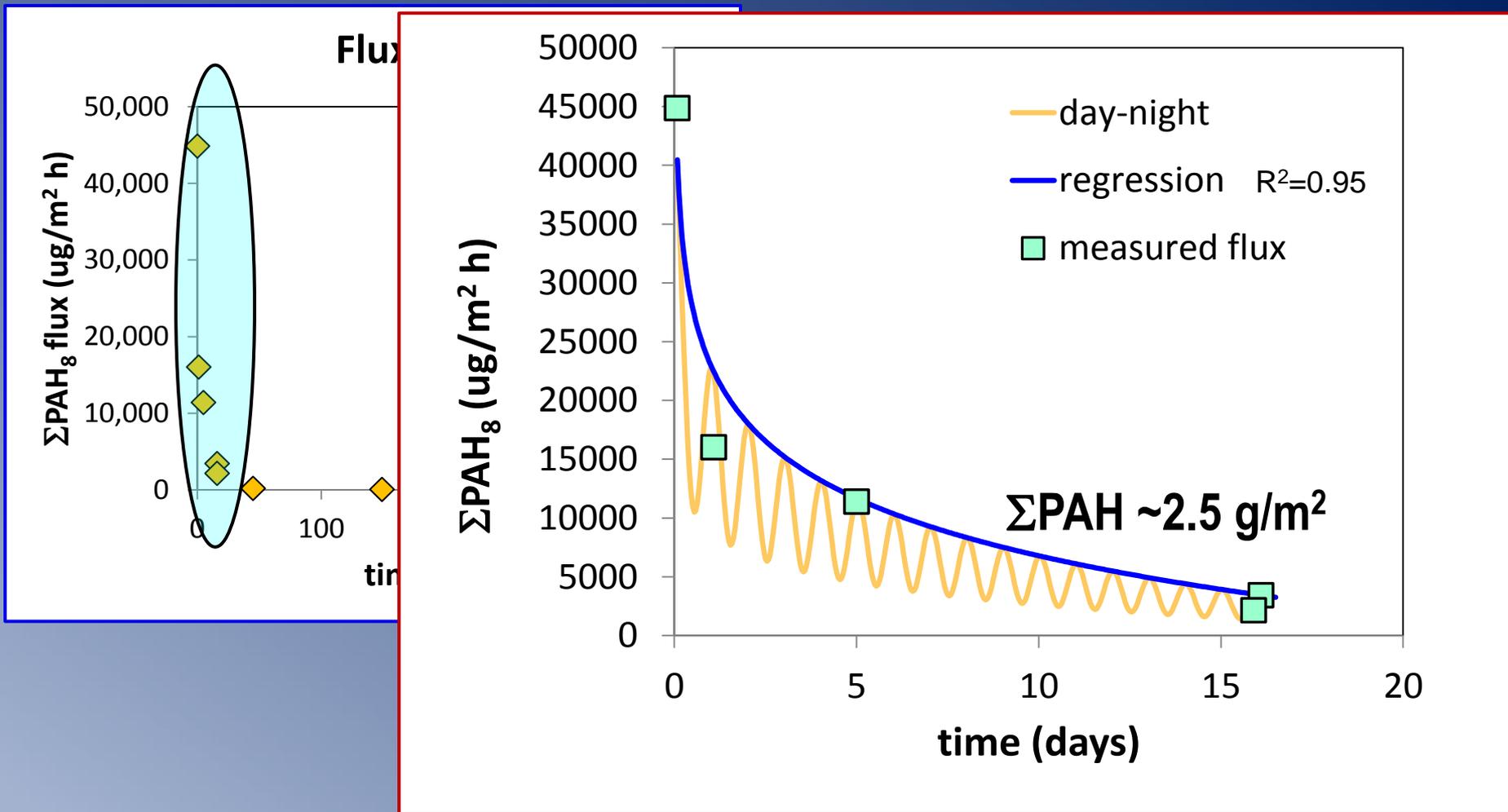
# Fluxes (releases) from in-use CT-sealed lots

Flux =  $1.4 \mu\text{g}/\text{m}^2 \text{ h}$

Flux =  $88 \mu\text{g}/\text{m}^2 \text{ h}$



# Air trends after application



# Total PAH emissions during drying

Annual coal-tar sealcoat use	85 million gal
Area covered	~440 km <sup>2</sup>
Total PAH emitted during drying	2.5 g/m <sup>2</sup>
$\Sigma$ PAH <sub>8</sub> emissions/yr	~1,000 Mg
$\Sigma$ PAH <sub>16</sub> vehicle emissions, 2010	<b>840 Mg*</b>



# PAHs and Coal-Tar-Based Pavement Sealant

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

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