



ASSOCIATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) WITH SIZE FRACTIONATED SEDIMENT PARTICLES


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Introduction


- Non-point sources are major contributors of PAHs to the environment (US EPA 2000)
- PAHs predominantly associate with solids (low solubility and are hydrophobic)
- Adsorption on particulate matter is the main transport and fate mechanism of PAHs in the environment
- Understanding the distribution of contaminants with particle sizes is needed for effective and economical treatment of PAHs in runoff
- Contributing source areas affect the magnitude of PAH concentrations with particles (USGS 2003)



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Sediment Sample Collection and Analyses

- Sampling Location 1: Cribbs Mill Creek
- Major Contributing Source Areas: Residential Area
- Samples were collected at the end of a concrete channel



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Sediment Sample Collection and Analyses

- Sampling Location 2: Hunter Creek
- Major Contributing Source Areas: Commercial (especially, Auto Service Area next to the sampling location), Road Runoff, Residential Trailer Park Areas



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Sediment Sample Collection and Analyses

- Sampling Location 3: Carroll's Creek
- Major Contributing Source Areas: Residential and Commercial areas
- Had past history of sanitary sewage contamination from SSOs

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Sediment Sample Collection and Analyses

- Different particle sizes (< 45µm to >2800µm) of each creek sediment sample were analyzed separately for PAH contamination
- Large Organic Material (LOM) were separated from >2800 µm size fraction for separate analyses
- All size fractions were analyzed for Material Composition and Chemical Oxygen Demand (COD)
- Sediments were analyzed for PAHs by Thermal Desorption (TD) extraction followed by Gas Chromatography – Mass Spectroscopy (GC-MS) detection

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Particle Size Distribution

- For all cases, the particles in the size range of 180 to 355 µm were dominant in the sediments. Overall, most of the particles were distributed in the size range of 90 to 710 µm.

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Chemical Oxygen Demand

- For all cases, sediment CODs showed similar distribution
- The COD values of the >2800µm (LOM only) was 1.3 to 1.6E09 mg/kg
- Median particle size based on COD was about 355µm for three creeks

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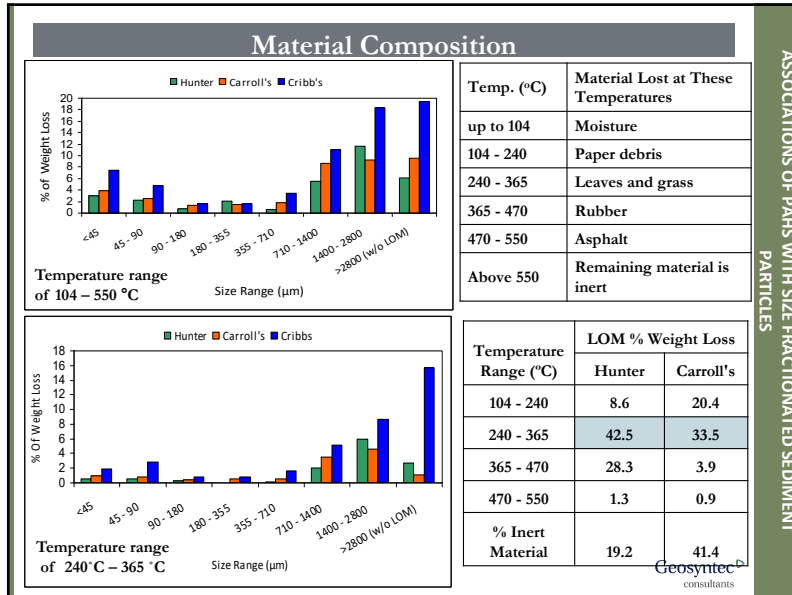
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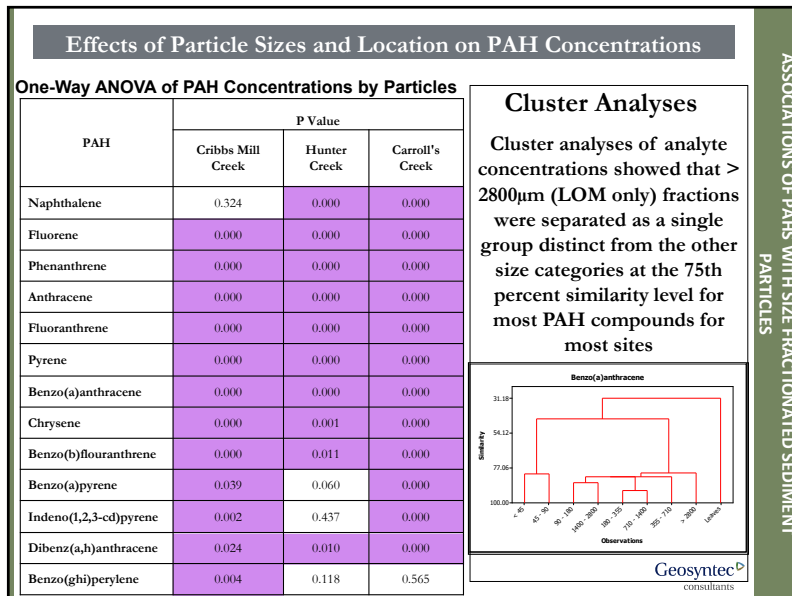
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2-Way ANOVA of PAH Concentrations for Particle Size and Location

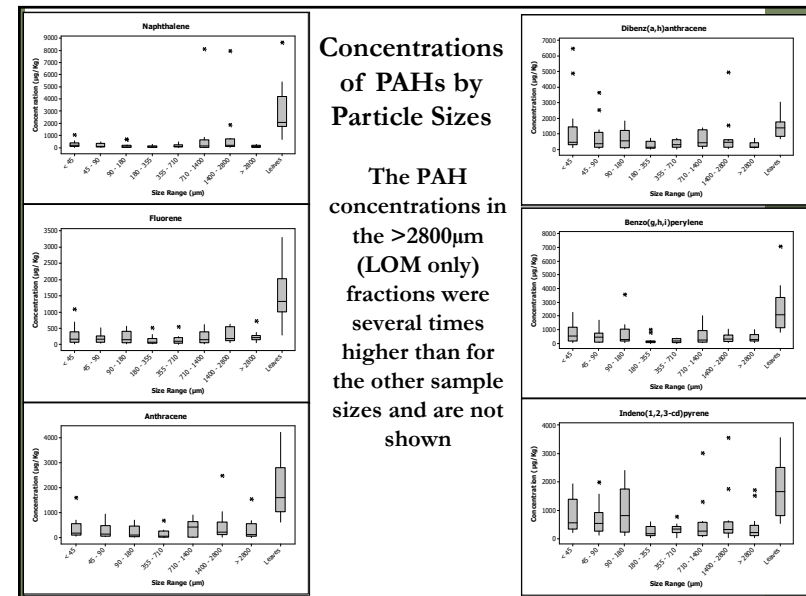
PAH	P Value		
	Size	Location	Size*Location
Naphthalene	0	0.088	0.116
Fluorene	0	0.721	0.481
Phenanthrene	0	0.389	0.043
Anthracene	0	0.032	0.821
Fluoranthene	0	0	0
Pyrene	0	0	0
Benzo(a)anthracene	0	0.005	0.002
Chrysene	0	0.004	0
Benzo(b)fluoranthrene	0	0.002	0.254
Benzo(a)pyrene	0.004	0.032	0.022
Indeno(1,2,3-cd)pyrene	0	0.284	0.25
Dibenz(a,h)anthracene	0	0.019	0.002
Benzo(ghi)perylene	0	0.041	0.493

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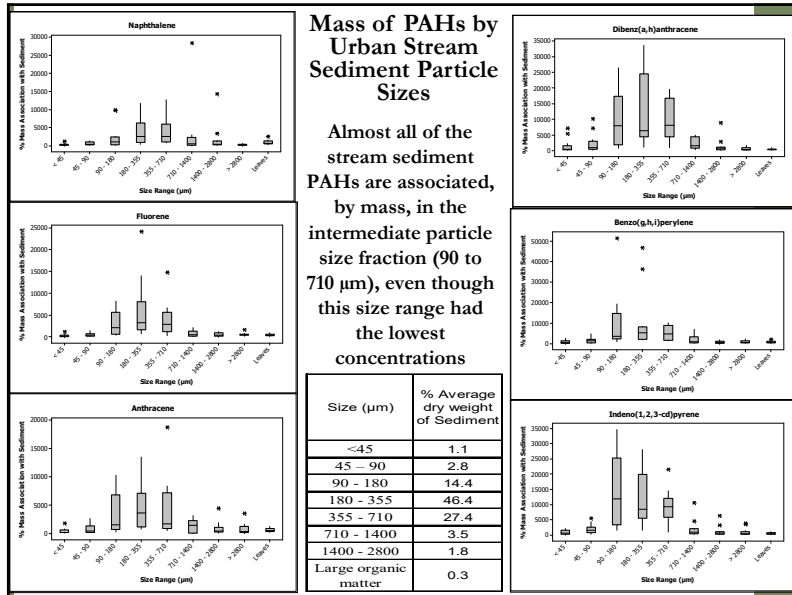
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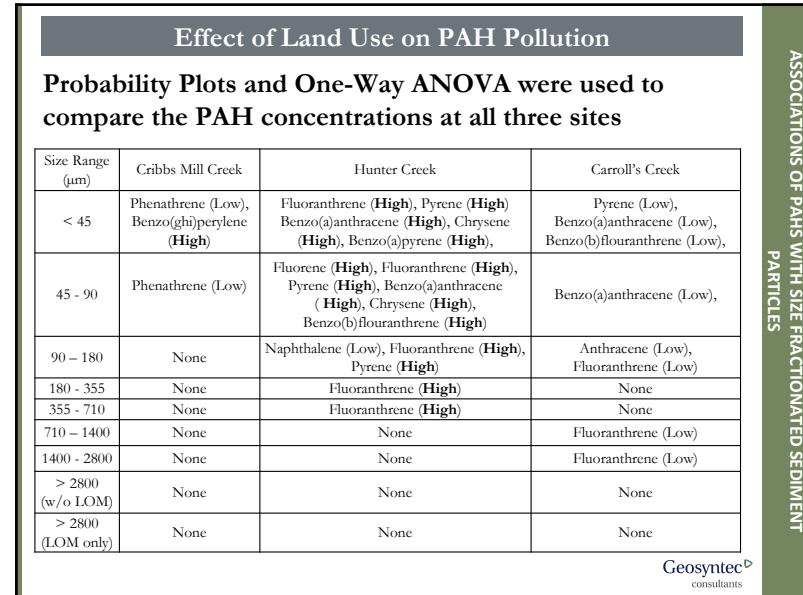
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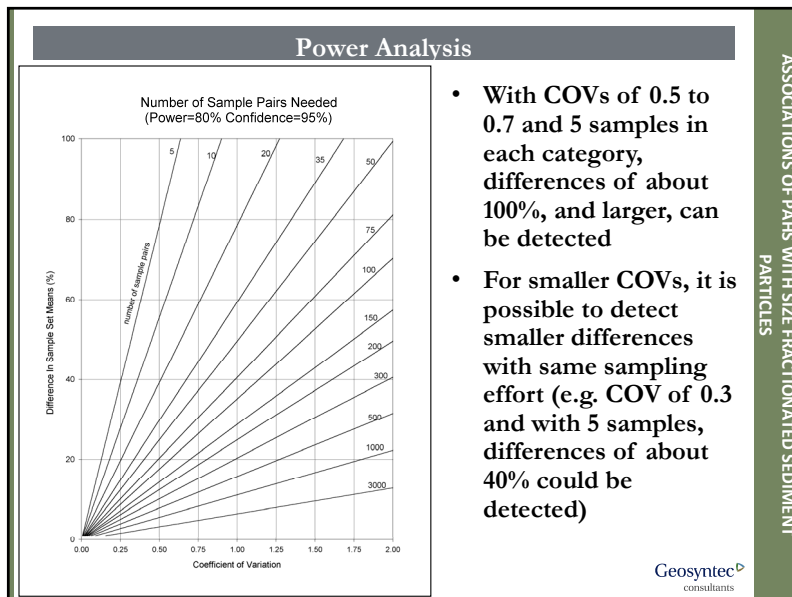
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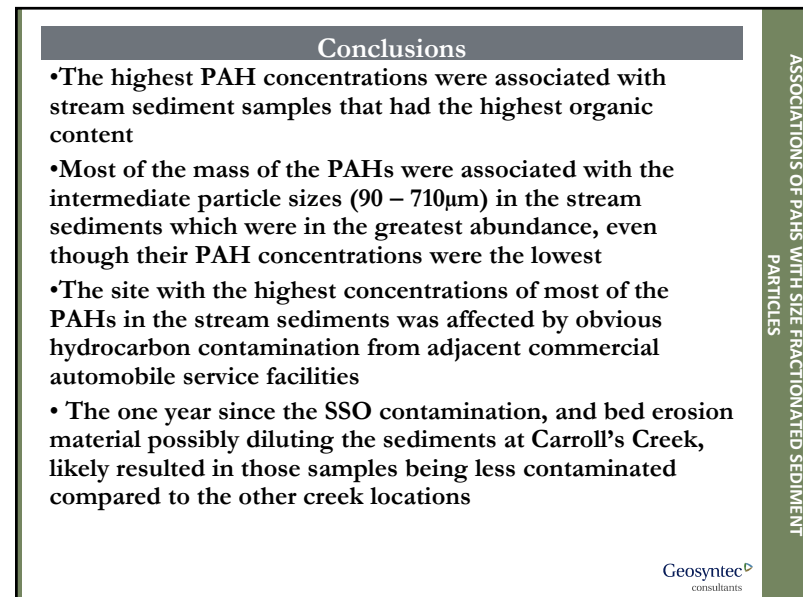
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