

Polychlorinated Biphenyls (PCBs) in Road Paint

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Problem Definition

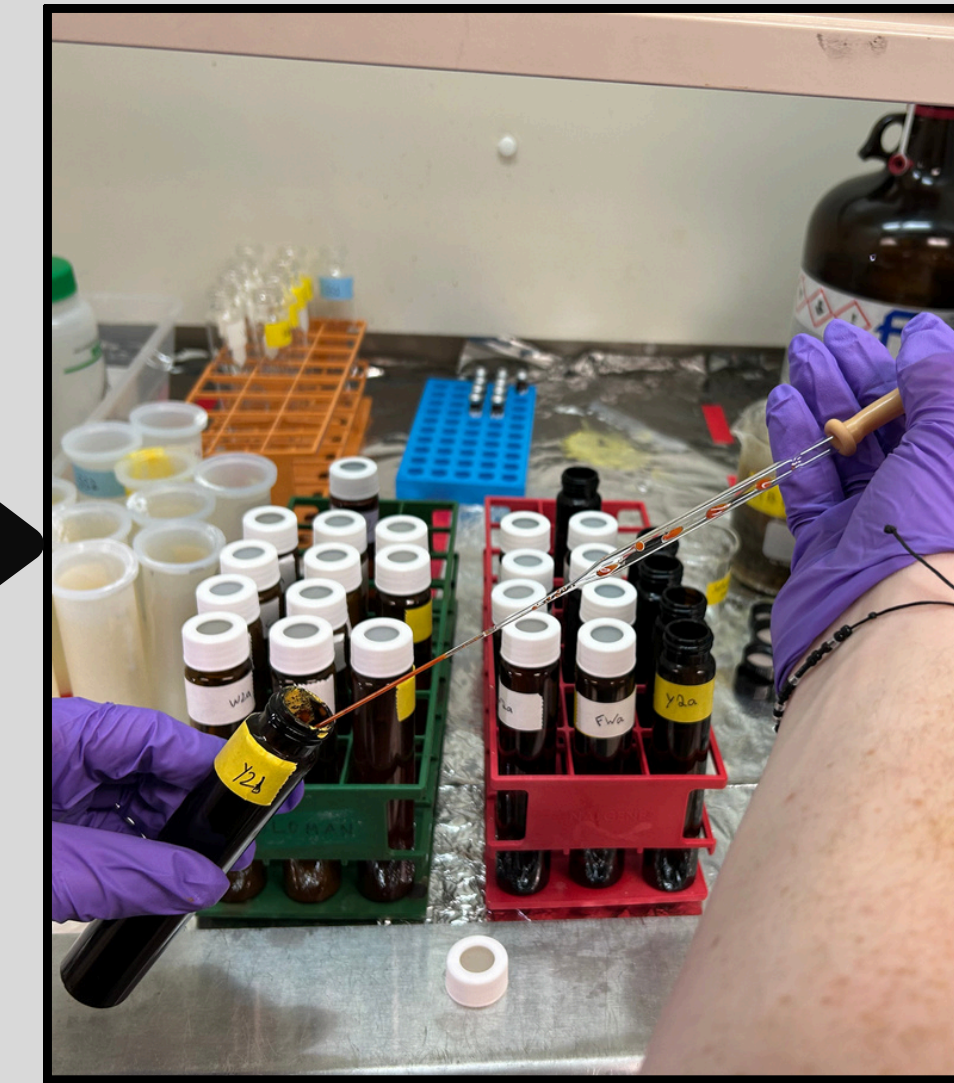
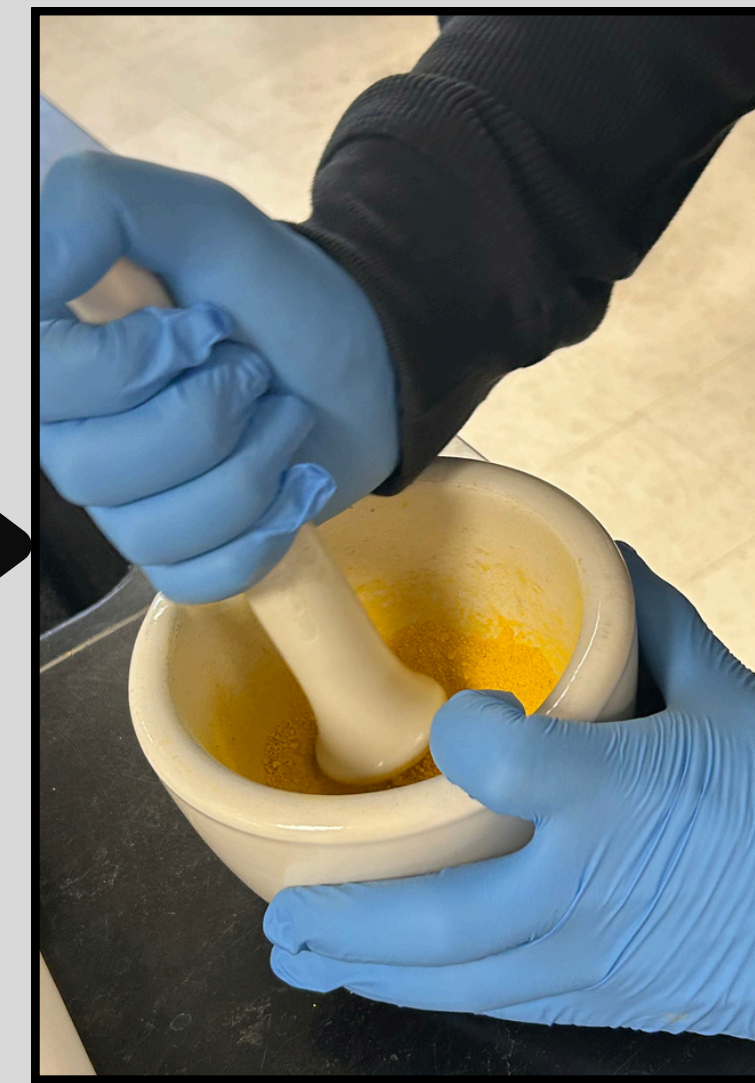


- PCBs were banned in 1979 by the EPA
- They have been found in certain paint dyes (Hornbuckle & Hu, 2009), leading to uncontrolled discharge from runoff
- Anacostia river has an excess of PCBs barring fish consumption
- How much does road paint contribute to the TMDL?
- MDE and local environmental authorities track PCB contamination

Procedure



Figure 1



- Overlay Aerial map in CAD (Fig. 1)
- Draft road striping within area (Fig. 2)
- Collect samples of road paint
- Conducted lab work (Fig. 3 & 4)

Experimental Data

PCB Concentrations

Sample:	2025 Data Set						2024 Data Set					
	FPW1	FPW2	FPW3	FPY1	FPY2	FPY3	OY2	NY1	NY2	OW2	NW1	NW2
Weight	1.96	2.1	1.96	2.03	0	0	1.88	1.99	1.98	2.04	0	0
Total Conc [ng/ml]	3.641	2.984	2.543	3.724	0	0	68.034	88.918	83.661	2.676	0	0
Total Conc [ng/g]	1.8577	1.4210	1.2974	1.8345	0	0	36.188	44.682	42.253	1.312	0	0
Total leachable amount [g of PCBs]	0.0089	0.0068	0.0062	0.0030	0.0000	0.0000	0.0615	0.0829	0.0810	0.0083	0	0

Drafting Data

Color	White	Yellow
Length (ft)	184120.91	34486.91
Total Polyline	9426	298
+/- Error	6880.98	217.54
Area (sqft)	85260.68	28477.47

Figure 3

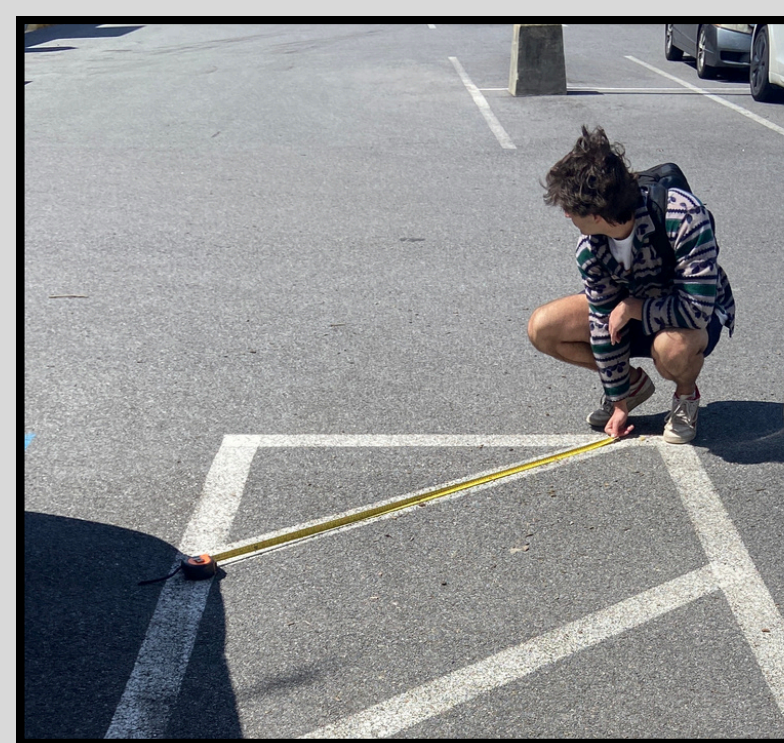
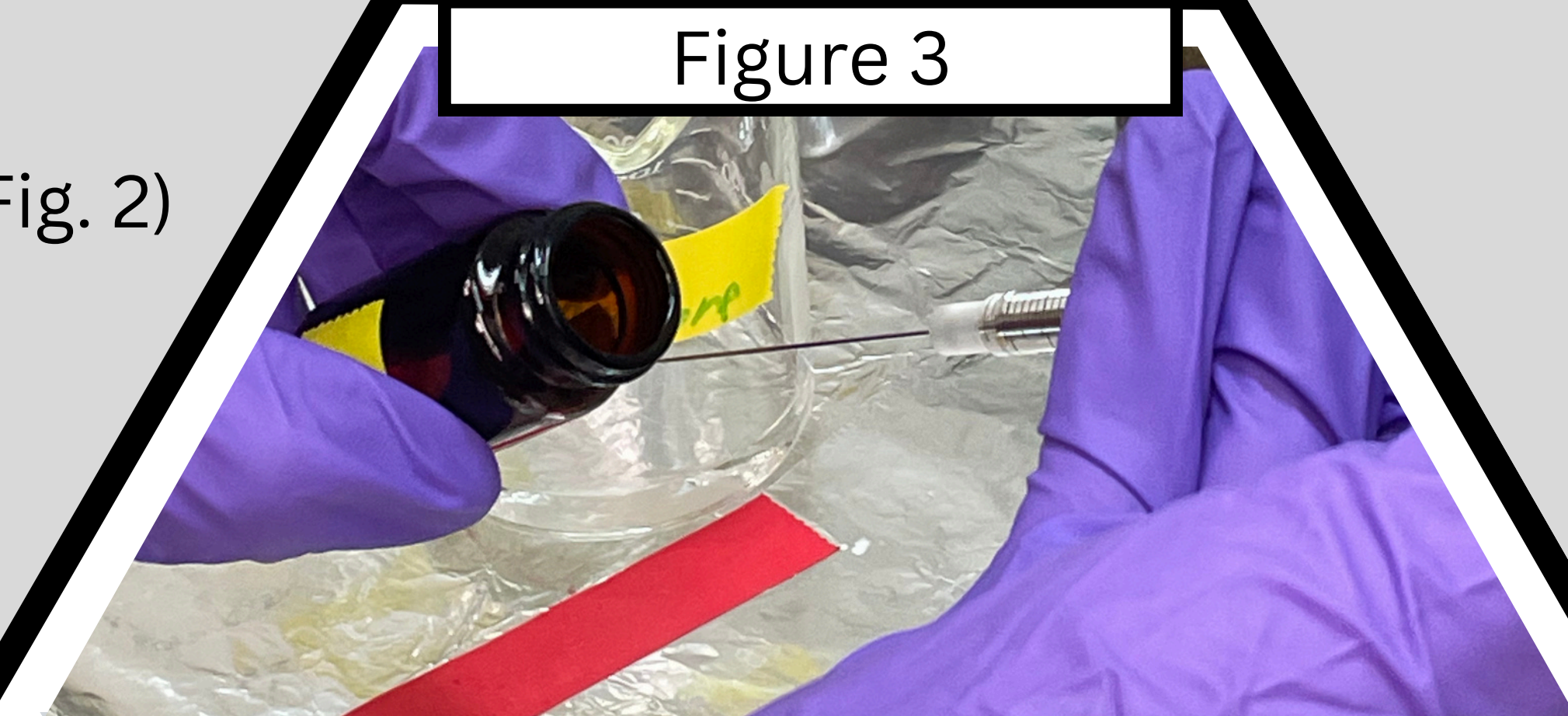
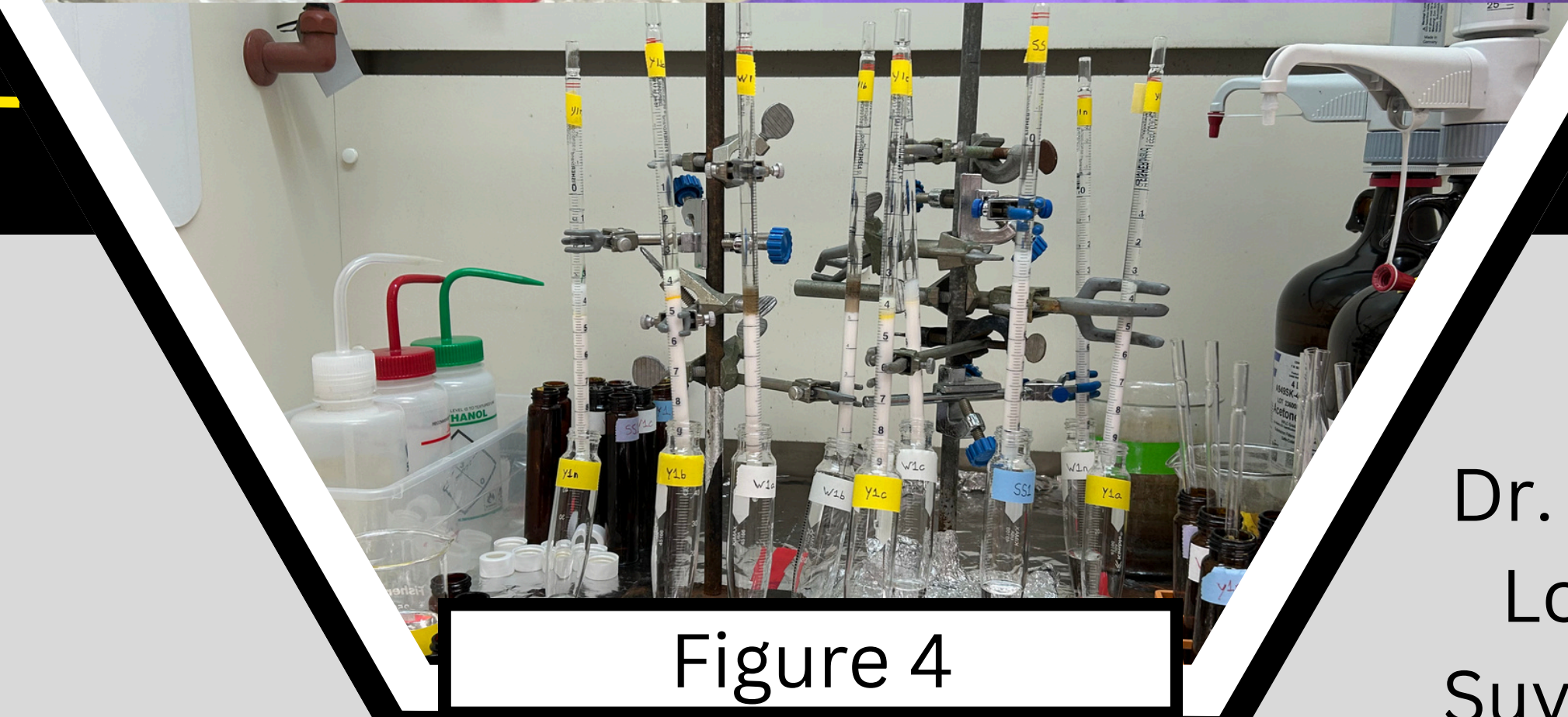
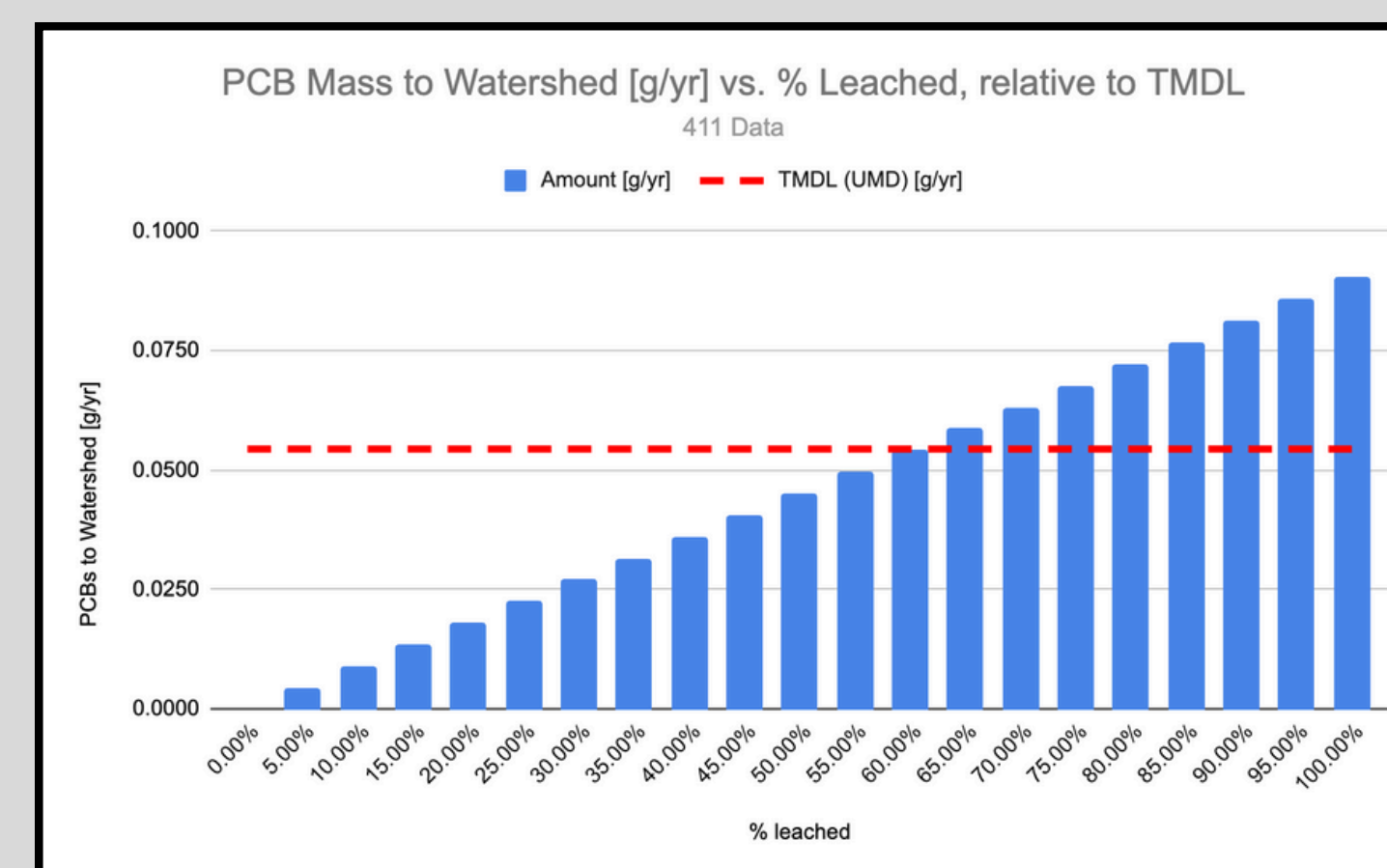
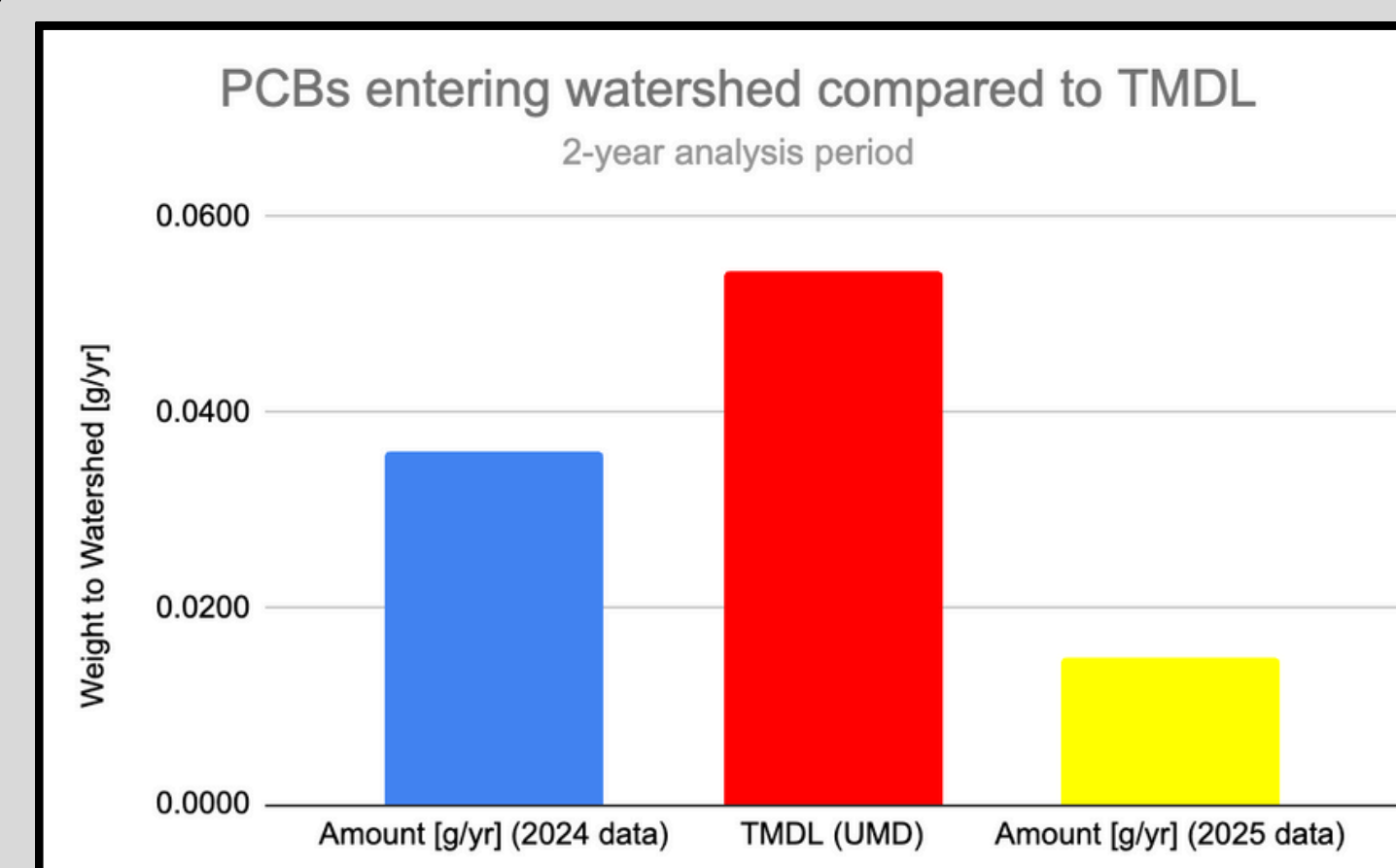


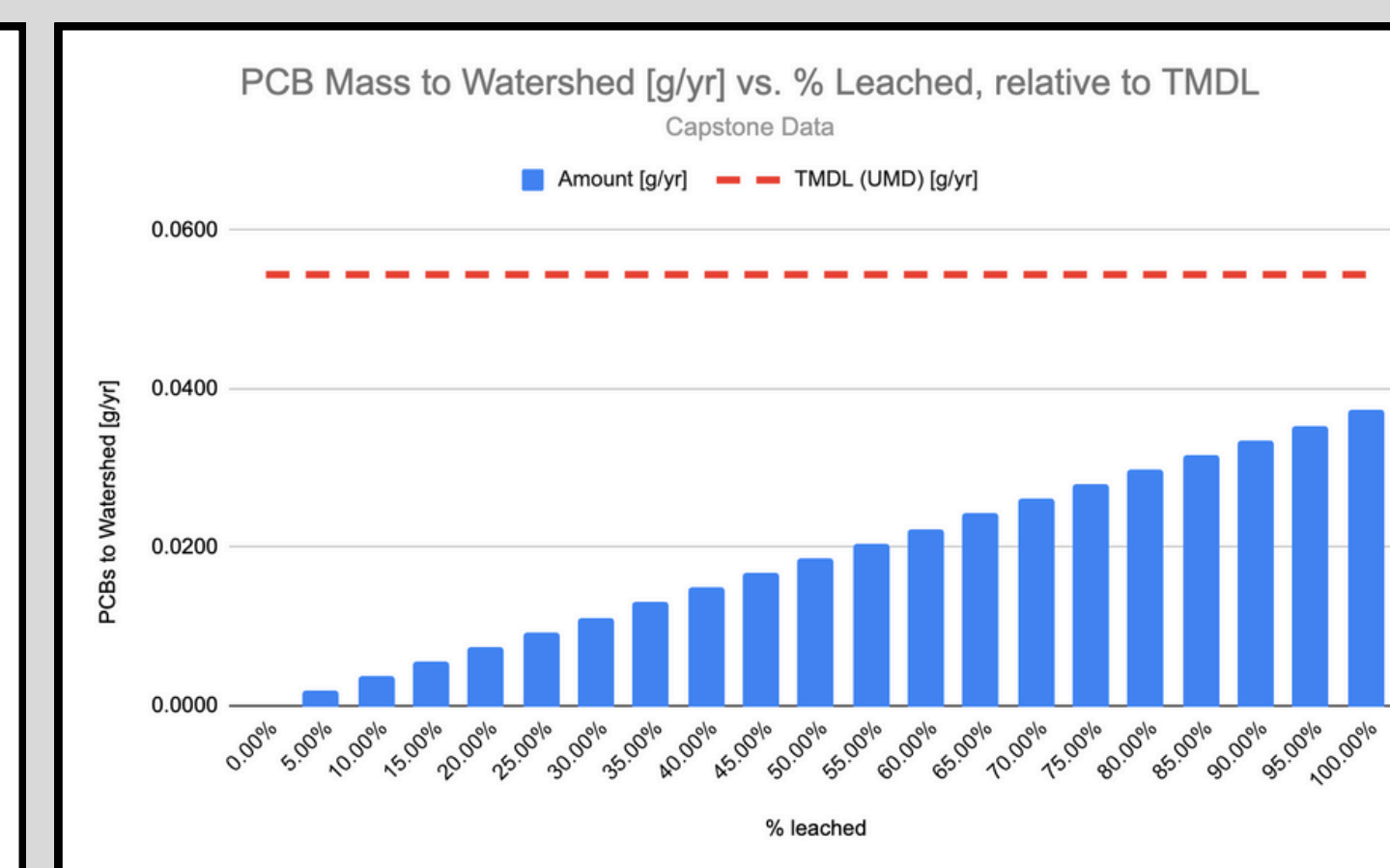
Figure 4



Analysis



Using the calculator we compared the amount of PCBs in the paint to the maximum allowed into the watershed (TMDL)



Design

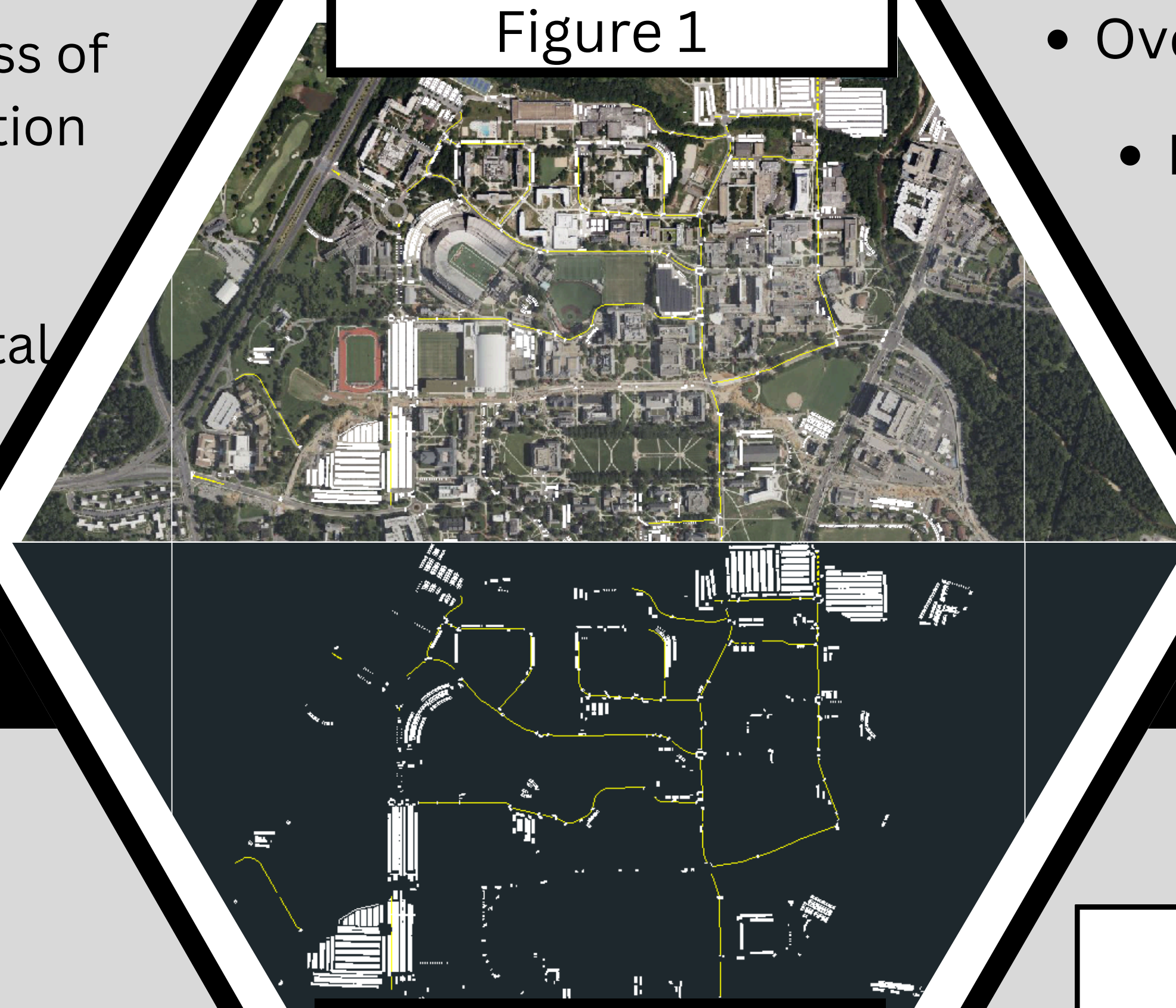


Figure 2

- Estimates paint volume and PCBs coming from road paint given user-collected data
- Option to include more road data for more accurate calculations
- Combines the lab and drafting work into an easy and accessible method for users

Example of Equation

PCB Leaching From Parking Lot:

Best Case $\rightarrow P_p = A_p C_{pw} (0.020)(0.00125)$
 Where:
 P_p = Total PCB leaching from parking lot striping in mg
 C_{pw} = PCB concentration in white paint in mg/ft³
 A_p = User input of parking lot area in ft²

Downloadable online calculator

PCB Calculator

Length of Roadway

Parking Lot Area (ft²)

☒ Make More Specific Calculation

Number of Stop Bars

Number of Crosswalks

Recognition

Thank you to Dr. Kjellerup, Dr. Reilly, Dr. Bensi, Dr. Lovell, Dr. Niemeier, Suyue Cao, Lora Cheng, and Pranav Bolla for the help throughout the project duration

