

Supplementary Materials



Figure S1. Pilot plant used to treat wood blocks.



Figure S2. Rail ties treated with 70% Creosote + 30% Diluent blend used for rainfall simulation before they were cut to smaller pieces.

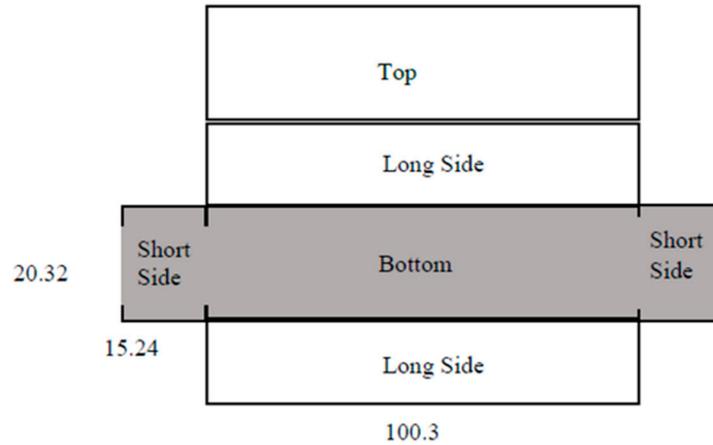


Figure S3. Box design of rail tie with dimensions 100.3cm × 20.32cm × 15.24 cm after being cut for the leaching experiments.



Figure S4. Rainfall simulator where the water is being pumped through the PVC pipes and raining onto the wood sample sitting above the pool of water.

Text S1: Figure S3 is an outline of the rail ties used for the experiment where the shaded boxes indicate the sides that were omitted in rainfall coverage calculation. The total area exposed to rainfall was determined by considering each exposed side of the wood added together. The surface area of the top or bottom was 2038.10 cm², the long side was 1528.5 cm², and the short side was 309.67 cm². Since the rainfall did not reach the bottom of the rail tie, it was not included in the calculation. The short sides were also omitted because they were both sealed with Paraffin Wax, so it was impossible for creosote to leach from them. Therefore, the total area where the creosote can leach from the wood is from the top and both long sides, in which case the total surface area exposed to water was 5094.5 cm².

Text S2: The following catchment equation is used to convert mm of rainfall to L of rainfall based upon the surface area of location being rained on.

$$\text{Catchment Area (m}^2\text{)} \times \text{Annual Rainfall (mm)} = \text{Total Rainfall on Catch Area (L)} \quad (\text{S1})$$

Abbotsford, British Columbia (BC) has one of the highest rainfall rates in Canada with an annual average of 1538 mm (Osborn, 2018). Therefore, using the catchment equation above, if the area of wood exposure in this experiment which is 0.50945 m² is

simulated in this experiment then the total rainfall would be 783.53 L. To determine how many years of rainfall was simulated for the experiment based on the quantity of rainfall given above, the total rainfall simulated in this experiment would be divided by the amount of rainfall in L compared to the annual rainfall in Abbotsford, BC. Therefore, the experiment simulated 14.2 years of rainfall total.

$$4.13 \text{ (L/min)} \times 60 \text{ (min/hour)} \times 45 \text{ hours} = 11,151 \text{ L} \quad (\text{S2})$$

$$0.50945 \text{ m}^2 \times 1538 \text{ mm} = 783.53 \text{ L} \quad (\text{S3})$$

$$11,151 \text{ L} \div 783.53 \text{ L} = 14.2 \text{ years of rainfall} \quad (\text{S4})$$

Reference

Osborn, L. (2018). Wettest Weather. Canada's Raniest Cities. Current Results: Weather and Science Facts. Available from: <https://www.currentresults.com/Weather-Extremes/Canada/wettest-cities.php>. [Last Accessed September 09, 2022].