

Name: _____ Period: ____ Date: _____

Environmental Science

#7-2: Air Pollution in Kent

Introduction

All human activity and many natural processes produce pollution. Pollution is a generic term for contamination from any activity that has a negative impact on the environment or human health. Pollution can travel by three major pathways: air, water, and land. Air pollution generated by transportation such as cars and trucks includes many different pollutants:

- carbon dioxide (CO₂) – major contributor to global warming and climate change
- carbon monoxide (CO) – poisonous, it blocks oxygen from the brain and heart
- nitrogen oxides (NO_x) – causes lung irritation and respiratory infections, makes ozone
- particulate matter (PM) – tiny particles that penetrate deep into the lungs
- sulfur dioxide (SO₂) – hurts asthmatics and reacts in the atmosphere to form acid rain
- volatile organic compounds (VOCs) – react to form ground level ozone and smog

In this activity, we will count the number of cars, light trucks/SUVs and heavy duty trucks that go past Roosevelt High School in 30 minutes. Then, we'll calculate the amount of air pollution produced by each of these vehicles and compare the sources to determine which produces the most pollution.

Purpose

To estimate the air pollution produced by vehicles passing by Roosevelt High School.

Prediction

In this activity, which type of vehicle do you think will produce the most air pollution – cars, light trucks/SUVs, or heavy duty trucks? Why?

Procedure

1. Standing next to State Route 43, count the number of cars, light trucks/SUVs and heavy duty trucks that pass by Roosevelt High School in a 20-minute period.
2. Multiply the total number of each vehicle by 36. This estimates the 12-hour period of greatest activity from 7am to 7pm.
3. Multiply the estimated total of vehicles by the amount of each type of pollution they produce.
4. Divide each pollutant total by 454 to calculate the number of pounds produced.
5. Total up your values for each pollutant.

Data – Table 1 – Number of vehicles

Vehicle type	# Vehicles	Estimated # per day
Passenger car		
Light truck/SUV		
Heavy duty truck		
Total		

Table 2 – Pollutants produced by cars

Pollutant	Estimated vehicles per day <i>(from Table 1)</i>	Multiply by	Total grams per mile per day	Total pounds per mile per day <i>(divide by 454)</i>
CO		× 9.4 =		
CO ₂		× 411 =		
NO _x		× 0.252 =		
PM		× 0.0085 =		
VOCs		× 0.2096 =		

Table 3 – Pollutants produced by light trucks/SUVs

Pollutant	Estimated vehicles per day <i>(from Table 1)</i>	Multiply by	Total grams per mile per day	Total pounds per mile per day <i>(divide by 454)</i>
CO		× 11.84 =		
CO ₂		× 513.5 =		
NO _x		× 0.95 =		
PM		× 0.0094 =		
VOCs		× 1.224 =		

Table 4 – Pollutants produced by heavy duty trucks (“semis”)

Pollutant	Estimated vehicles per day <i>(from Table 1)</i>	Multiply by	Total grams per mile per day	Total pounds per mile per day <i>(divide by 454)</i>
CO		× 2.311 =		
CO ₂		× 2220 =		
NO _x		× 8.613 =		
PM		× 0.421 =		
VOCs		× 0.447 =		

Questions

1. Look back at your initial prediction – was it correct? What do you think of this result?
2. After doing this lab and based on what you’ve learned in class so far, what are your thoughts about air pollution in Kent? How have your understandings changed, if at all?