Name(s)

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Project Number

J0911

Project Title

Reckless Respiration? Levels and Sources of Particulate Air Pollution in South Pasadena

Abstract

Objectives/Goals

There were two objectives--to collect data on levels of particulate air pollution, and to analyze them by distance from various traffic and industrial sources in order to draw conclusions about their causes.

Methods/Materials

The materials used included: 25 microscope slides and cover slips, petroleum jelly, cardboard collection boxes, tape and wire, and a digital microscope (200x magnification).

The method employed consisted of several steps: 1) assemble collection boxes to protect slides; 2)spread a thin layer of vaseline on the slides, place in the boxes and close; 3)hang the boxes in five different locations at a uniform height of 10 feet; 4) after 36 hours, replace the slides with fresh ones and bring the samples back for analysis; 5) after preserving with a cover slip, analyze each of the slides under the microscope--counting the large, medium, and small-sized particles per square millimeter; 6) repeat five times for reliable data; 7) when all data is collected, tabluate, average, and chart the data for different particle types by location and date.

Results

The most striking result was the large difference in pollution levels by location. Collection locations near busy traffic or business locations showed more than twice the level of particulate matter than residential areas. The averages of small, medium and large particles in a city park and quiet residential street were: 76.9, 11.4, and 4.9. Conversely, the averages near a freeway, busy avenue and nearby side street were: 168, 21.9 and 20.1. To summarize, there was variation by particle size and date as well. But location (distance from traffic or business) was by far the most powerful variable.

Conclusions/Discussion

This experiment produced several important findings. First, air pollution levels even in a small, non-industrial town were much higher than expected. Second, the most important determinant of air pollution levels was distance from traffic sources. Third, in all locations the levels of small particulate matter (.25 - 5 microns) was high. This is a great concern because medical research has shown that these small particles--soot, diesel emissions, etc.--easily reach the deepest recesses of the lungs and cause severe health problems.

Summary Statement

This project demonstrated the link between levels of particulate air pollution and distance from traffic or industrial sources.

Help Received

Parents bought microscope; father drove to and from collection points, helped with some graphics for display board.