SWPA-EHP
SOUTHWEST PENNSYLVANIA ENVIRONMENTAL HEALTH PROJECT
www.environmentalhealthproject.org

SWPA-EHP Technical Report
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Protocol for Comparison of the Environmental Health Project's PM2.5 monitoring results and the USEPA PM2.5 Regional Air Quality Index

In an effort to answer the question of public health effects brought on by poor air quality around shale gas activities, The Southwest Pennsylvania Environmental Health Project (EHP) has developed protocols for monitoring the air quality (indoor and outdoor) of residents' homes. EHP is specifically concerned about the direct toxicity of fine particulate matter ($PM_{2.5}$) and potential synergistic actions resulting from the simultaneous transport of other emitted toxic chemicals. EHP also conducts health assessments and a national health survey (the SF-36) which measures quality-of-life and health status, in conjunction with environmental monitoring.

EHP serves communities and individuals as a resource for information on potential exposures to hazardous substances from shale gas development (SGD), as well as offering strategies for limiting the risk of associated health effects. EHP understands that the shortage of objective, reliable data on the health effects of gas extraction activities leaves open many questions about the origins of residents' health problems and the scope of public health risks in communities.

When EHP helps residents monitor the air quality, two particle monitors are placed, one inside and one outside a residence. Each monitor records minute by minute levels of PM2.5 in ug/m3. Hourly averages are calculated for analysis of human health impacts. These hourly averages can be directly compared to The Environmental Protection Agency (EPA) Air Quality Index (AQI) for the same location. By comparing our monitoring results to the AQI for a given locale, EHP has been able to demonstrate that PM2.5 levels can be elevated near SGD sites, and that episodic events of extreme exposures also occur. The AQI essentially provides reference values allowing comparison of Speck readings between locations and between times at a given location.

The EPA created the Air Quality Index to provide publicly accessible information on daily levels of five air contaminants that are regulated by the Clean Air Act. The EPA calculates the AQI for ground-level ozone, particulate matter (PM), carbon monoxide, sulfur dioxide and nitrogen dioxide. Ground-level ozone and PM are the two pollutants that pose the

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greatest threat to human health in this country.[1] PM data is available by geographic location and hourly data is archived.

This document outlines the methods used to access AQI data and compare it to the EHP PM2.5 data.

Purpose: To improve the assessment of EHP's PM monitoring efforts using the Speck monitor and develop a method for comparing local Speck PM data to EPA's regional PM2.5 modeled estimates.

Goal: Provide an accurate assessment of local air quality for residents living near SGD sites.

Objective: Demonstrate a reproducible relationship between the Speck monitor results and the AQI to provide a standardized method of assessment.

Step1: Access AQI data from the Pennsylvania Department of Environmental Protection (PADEP) or from the EPA:

Learn about the AQI (Air quality index) standards from the AirNow website http://airnow.gov/index.cfm?action=aqibasics.aqi. Search the PM2.5 data for the location of interest. Navigate to the Pennsylvania Department of Environmental Protection Air Quality Index page
http://www.portal.state.pa.us/portal/server.pt/community/air_quality_index/21821
Click the link for Monitoring projects, and then "continuous monitoring for historic data" on the AQI:
This link http://www.ahs.dep.pa.gov/aq_apps/aadata/ shows the options available for reviewing PA AQI data.
This link: http://www.ahs.dep.pa.gov/aq_apps/aadata/Reports/ParameterComparison.aspx stores the hourly PM2.5 for every county in PA every day. Select the parameter of choice (PM2.5). By selecting the Monthly Parameter Detail Report:
http://www.ahs.dep.pa.gov/aq_apps/aadata/Reports/MonthlyParamDetail.aspx
you can access hourly data, monthly averages and maximum/minimum values. You will need to download this data month by month. Download and put into an excel workbook.

The PADEP site does not allow you to select customized dates for hourly data. If you want to select customized historic hourly data, another source of PM2.5 data is EPA website (http://aqsdr1.epa.gov/aqsweb/aqstmp/airdata/download_files.html#Raw).

The hourly and daily PM2.5 data (in separate zip files) of all the states from year 1990 to 2014 are available. Download the 2014 (or relevant year) file of PM2.5 data into excel. In this excel file, use the filter function to select the PA data. Then save the PA data in a new excel file. In the PA excel file, you can select any county data by using the filter if needed. Select the data for the dates you are interested in.

[1] http://airnow.gov/index.cfm?action=aqibasics.aqi

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Step2: Calculate the daily AQI data (if needed)

In the downloaded Excel document, calculate daily PM2.5 data by averaging the hourly data for each day.

Step 3: Compare the EHP data with the AQI data

Put the hourly (or daily) EHP data and hourly (or daily) AQI data together in one Excel sheet. Select both hourly (or daily) data sets and form the chart. Use the scatter diagram to show the difference between EPH data and AQI data. In the charts, we can see the trends of the PM2.5 concentration and find the inconsistence between two datasets.

Note: Each state may have a different method of accessing this information.

For New York AQI data:

Step 1: Navigate to the New York State Department of Environmental Conservation website (http://www.dec.ny.gov/). The NY state website records the hourly PM2.5 for several monitoring sites in each county (http://www.dec.ny.gov/airmon/).

Step 2: Download the AQI data

There is a map on the New York State website showing the monitoring locations. Select the appropriate region - for example, Orange County is located in region 3 on that map (http://www.dec.ny.gov/airmon/regionMap.php?regionno=3). Select the closest monitoring location for your study. Click on that site to access the historical PM2.5 data. Select the desired date and download the PM2.5 data in Excel version.

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