Site Report For Bradford Woods VFD Station 115

Center for Atmospheric Particles Studies

Carnegie Mellon University

5000 Forbes Avenue

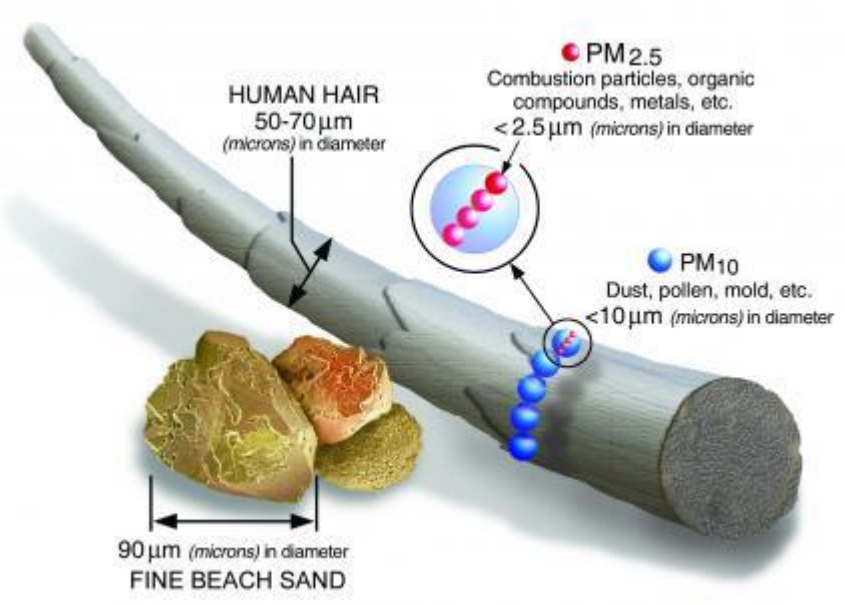
Pittsburgh, PA, 15213

Report Covers: November 1st – November 30th, 2018

Hours Logged: 720

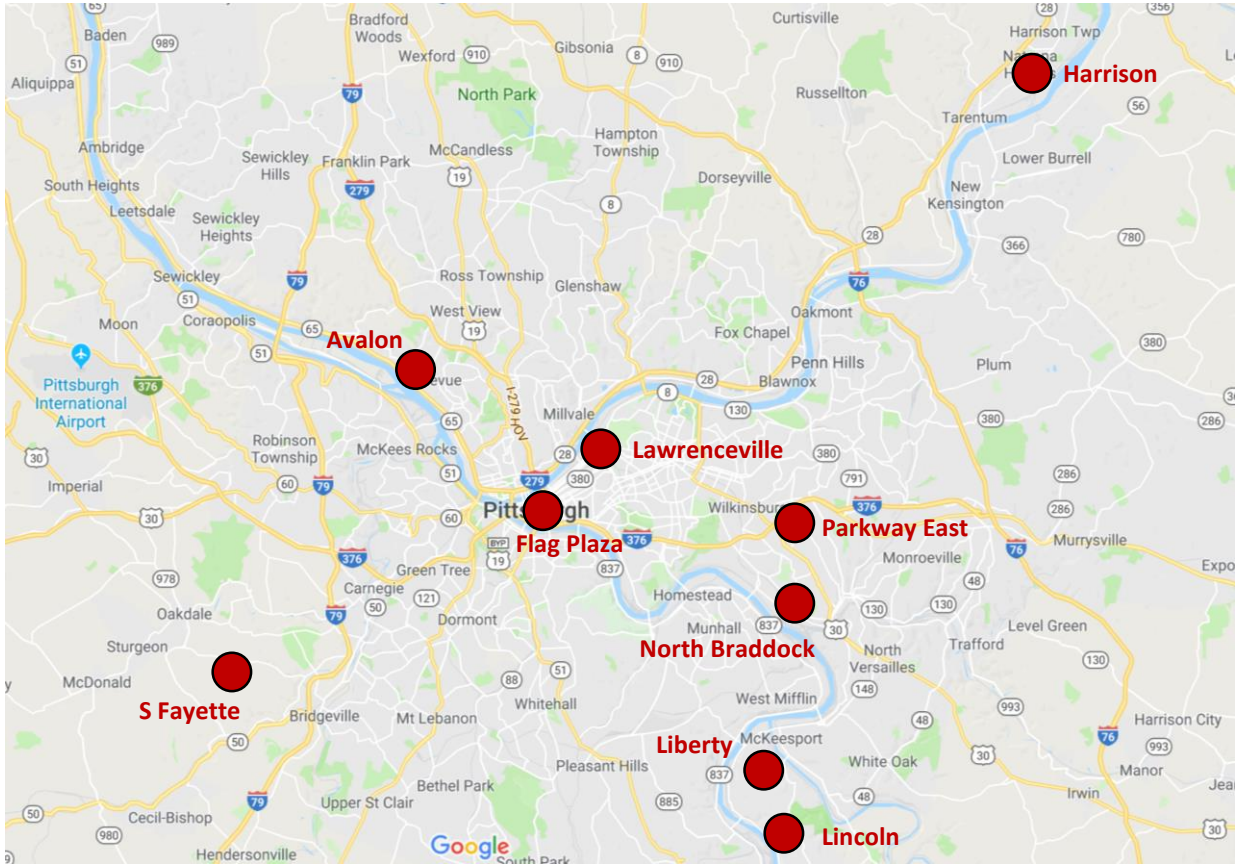
What is $PM_{2.5}$?

- $PM_{2.5}$ is particulate matter (such as smoke, soot, and dust) in the atmosphere that has a diameter of 2.5 micrometers (about 1/30th the width of a human hair) or smaller, allowing them to enter your lungs and bloodstream[1]
- $PM_{2.5}$ has been linked to cardiovascular disease and lung disease[2]
- The National Ambient Air Quality Standards (NAAQS) are set by the Environmental Protection Agency (EPA) and regulate what concentrations of $PM_{2.5}$ are acceptable.[3] $PM_{2.5}$ is measured in micrograms per meter cubed ($\mu g/m^3$). The standards are as follows:
  - Annual average (over 3 years) of $PM_{2.5}$ should not exceed $12\mu g/m^3$
  - 24 hour average (98th percentile over 3 years) should not exceed $35\mu g/m^3$
- For more information, visit https://www.epa.gov/pm-pollution/particulate-matter-pm-basics



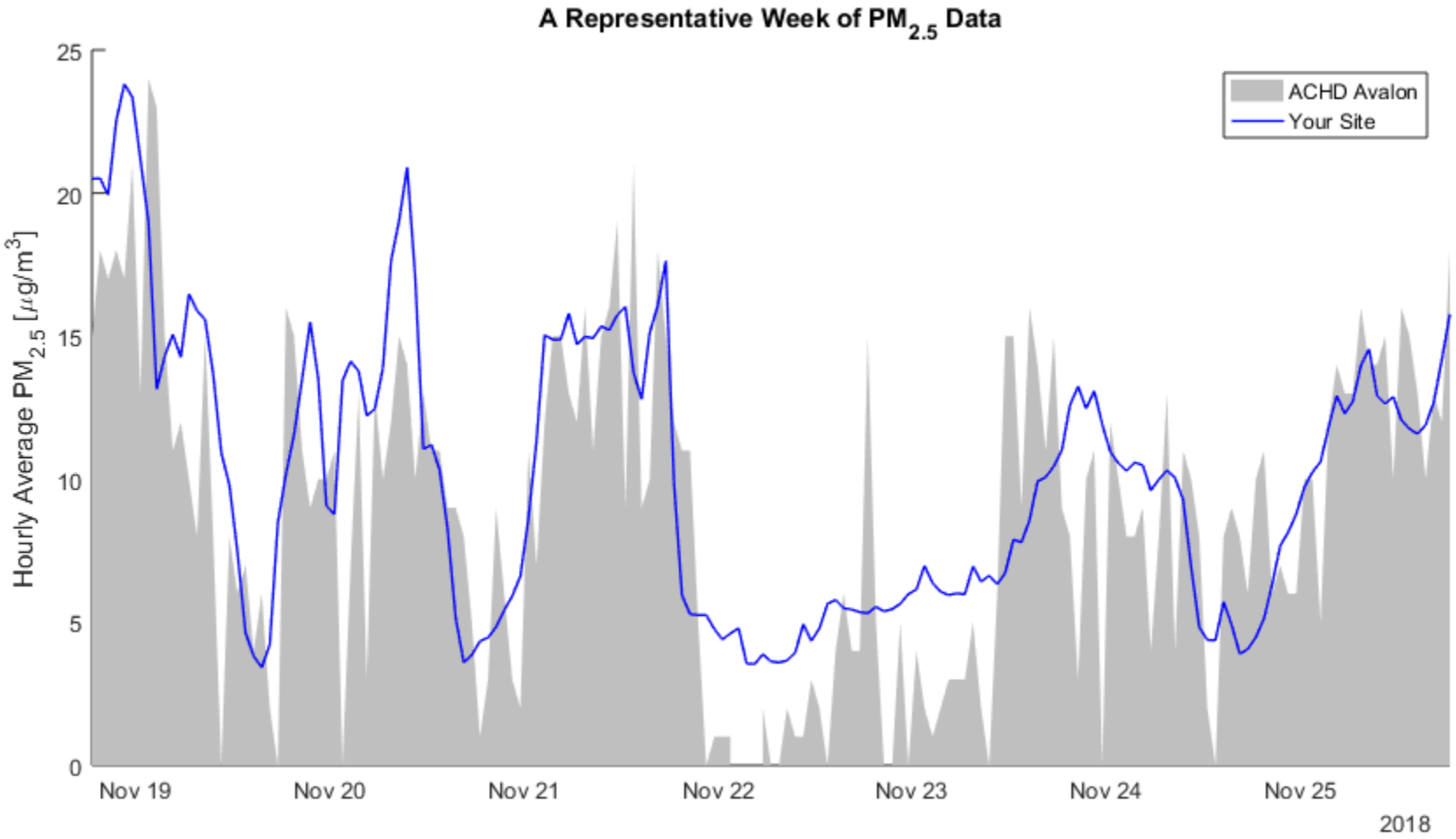
The ACHD Monitoring Network

- To monitor Pittsburgh's compliance with the NAAQS, the Allegheny County Health Department (ACHD) maintains a network of air quality monitoring stations, as shown in the figure.
- This network uses highly precise (but very expensive) instruments to measure levels for the air pollutants regulated by the EPA, including $PM_{2.5}$ (however, not all of the pollutants are measured at all of the sites).
- While not as precise, our RAMP monitors allow us to measure many pollutants at a much larger number of locations, including your site!
- Further information on the ACHD network can be found at: http://www.achd.net/air/index.php



Map of ACHD Monitoring Stations[4]

$PM_{2.5}$ concentration over time



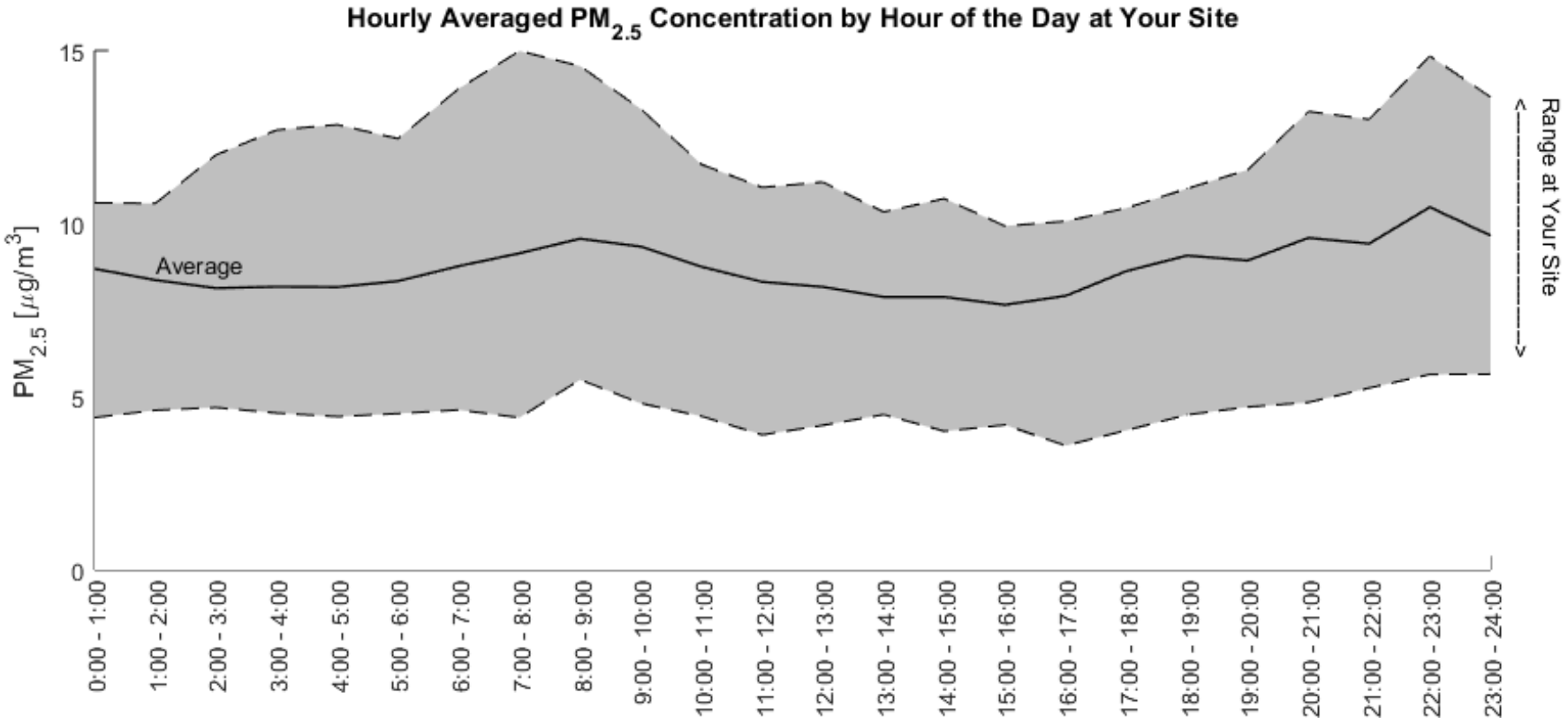
- This chart shows the hourly average concentration of $PM_{2.5}$ at your site (blue) compared to the hourly average at the nearest ACHD monitoring station for a representative week of the year.

How your site compares to others

- The bar graph represents the fraction of hours when the $PM_{2.5}$ concentration is in a certain range:
  - low (0-12 µg/m^3)
  - moderate (12-25µg/m^3)
  - elevated (25-35 µg/m^3)
  - high (more than 35µg/m^3)
- Last month your site had measured a lower proportion of readings over 25µg/m^3 than all ACHD monitoring sites, never exceeding 35µg/m^3 on an hourly basis.
- The proportion of "moderate" readings was similar to ACHD Avalon: slightly lower than Lawrenceville, but higher than in Liberty and Clairton.
- This indicates that your site is normally about as clean as a typical roadside suburban site, but sees lower $PM_{2.5}$ spikes.

- Note: in this chart, collected RAMP data are averaged hourly, as it is at the ACHD stations

What is your site's daily pollution pattern?

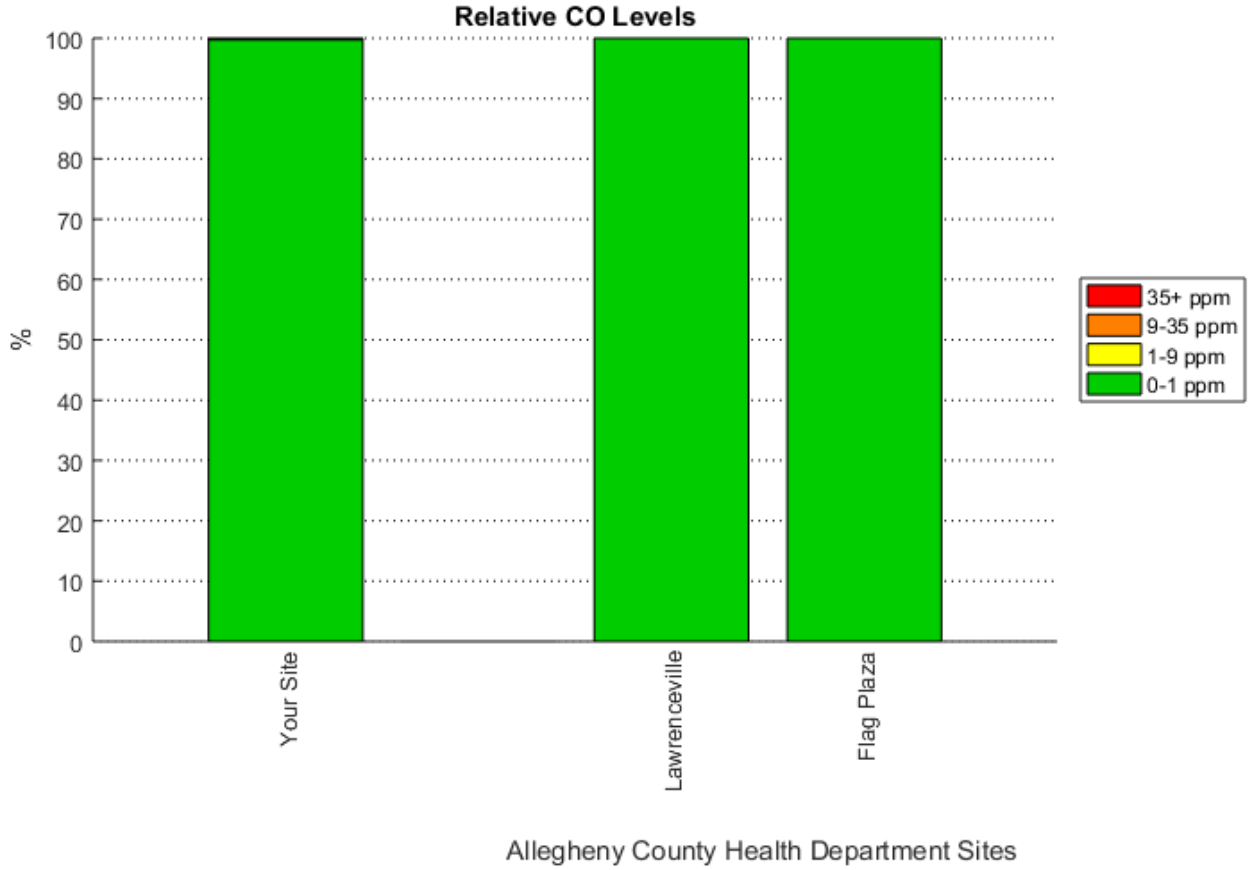


- The mean concentration of $PM_{2.5}$ throughout the day at your site is around 9 µg/m^3
- Higher concentrations typically occurring in the morning (5am to 11am)
- The times of the day with the lowest concentrations tend to be in the early afternoon (1pm to 5pm)

- Note: range shown represents the 25th to 75th percentiles of the data at your site, averaged hourly.

Other Pollutants: Carbon Monoxide

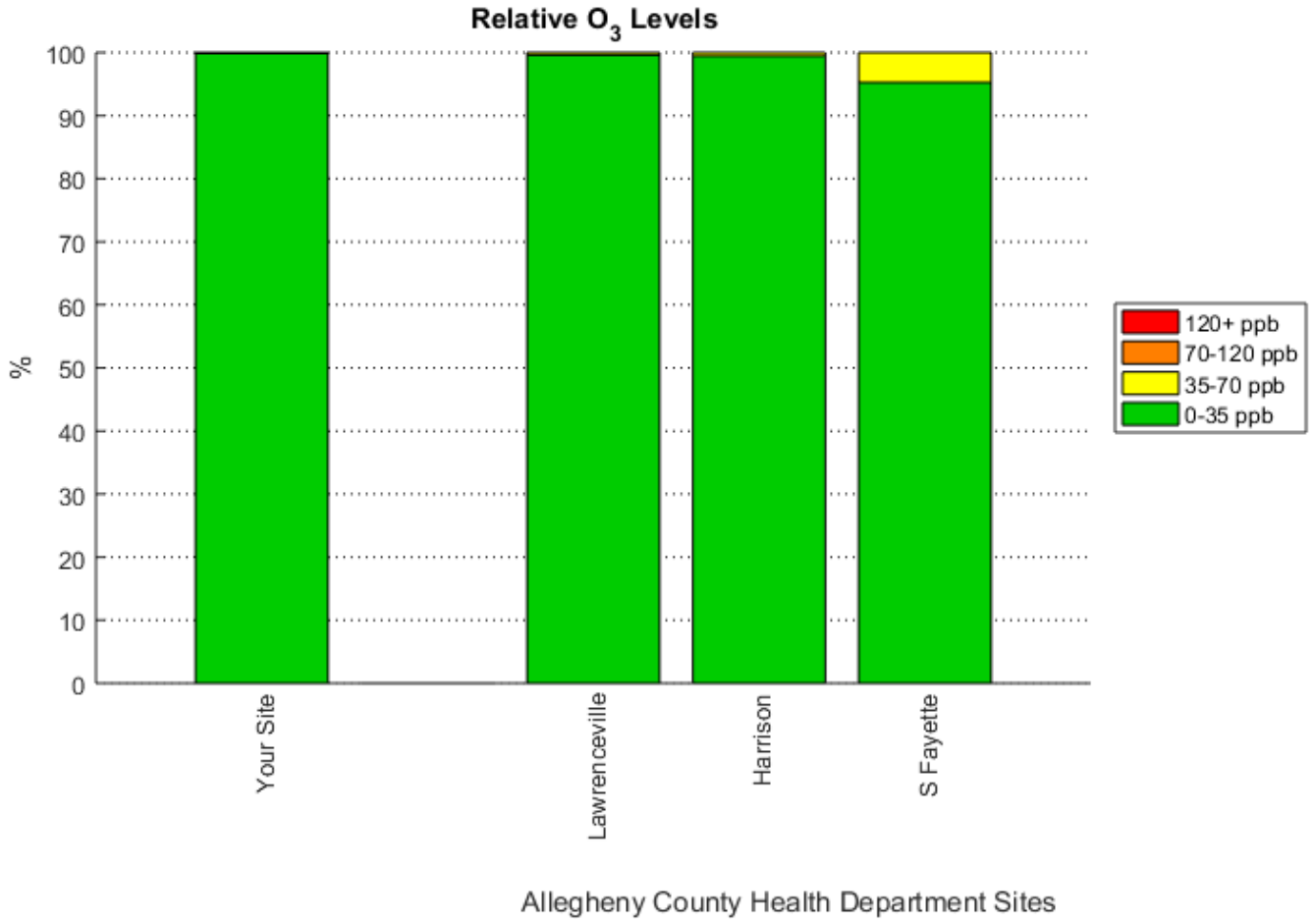
- Carbon Monoxide (CO), measured in parts per million (ppm), is mainly produced by cars, trucks, and other gas-powered vehicles outdoors. Indoor CO levels can also be high if you use gas heaters or stoves in a poorly ventilated area[1]
- Exposure to extreme levels of CO (600+ ppm) can cause loss of consciousness or death. At lower levels, people with heart diseases can be put under increased stress[1]
- The NAAQS for CO are[3]
  - CO should not exceed 35 ppm in one hour
  - CO should not exceed 9 ppm over eight hours
- The CO levels at your site were well within EPA limits, never exceeding 9 ppm on an hourly basis, exceeding 1ppm about 0.25% of the time.
- Relative to other sites, your site has similarly low levels of CO to the county monitoring sites.



- Note: in this chart, collected RAMP data are averaged hourly, as it is at the ACHD stations

Other Pollutants: Ozone

- Ozone (O_3), measured in parts per billion (ppb), can be beneficial when it is high in the atmosphere, but breathing in Ozone at ground level can have many harmful effects, such as causing coughing and chest pain, damaging throat and lung tissues, and exacerbating other health problems like asthma and bronchitis[1]
- The NAAQS for O_3 are[3]
  - O_3 should not exceed 120 ppb in one hour
  - O_3 should not exceed 70 ppb over eight hours
- The O_3 levels at your site were well within EPA limits, with maximum hourly level of 30 ppb.
- The O_3 levels at your site were lower than at any other ACHD monitoring site this month.



- Note: in this chart, collected RAMP data are averaged hourly, as it is at the ACHD stations

References

[1] EPA website: https://www.epa.gov/criteria-air-pollutants

[2] Dockery, D. W., Pope III, C. A., Xu, X., Spengler, J. D., Ware, J. H., Fay, M. E., … Speizer, F. E. (1993). The New England Journal of Medicine as published by New England Journal of Medicine. Downloaded from www.nejm.org on August 16, 2010. For personal use only. No other uses without permission. Copyright © 1993 Massachusetts Medical Society. All rights reser. *N Engl J Med*, *329*(24), 1753–1759. https://doi.org/10.1056/NEJM199410063311401

[3] EPA website: https://www.epa.gov/criteria-air-pollutants/naaqs-table

[4] Allegheny County Health Department Air Quality Program; Draft Monitoring Plan for 2019. http://www.achd.net/air/publiccomment2018/ANP2019draft.pdf.

If you would like any additional information about anything presented in this report, please contact us:

CMU CAPS RAMP Project Team

Dr. Albert Presto: apresto@andrew.cmu.edu (Principal Investigator)

Aliaksei Hauryliuk: ahauryli@andrew.cmu.edu (Sensor Technician)