

Stay at Home, Save Your Lungs

April 22, 2020

The response to the COVID-19 coronavirus and air pollution in Philadelphia

Thanks to increasingly stringent air quality regulations, Philadelphia has the lowest levels of air pollution in decades. In 2018, the latest year reported on, Philadelphia experienced 217 Good Air Quality Days. This was the first time that more than 200 Good Air Quality Days were recorded in a single calendar year in Philadelphia. Only 10 days were rated as Unhealthy for the entire year.

Philadelphia measures air pollutant levels against the National Ambient Air Quality Standards (NAAQS), which are set by the U.S. Environmental Protection Agency, as directed by the Clean Air Act. In 2018, Philadelphia was found in attainment for five of the six so-called criteria pollutants (i.e., ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead), except ozone.

Air Quality Index (AQI) Values	Levels of Health Concern
<i>When the AQI is in this range:</i>	<i>..air quality conditions are:</i>
0 to 50	Good
51 to 100	Moderate
101 to 150	Unhealthy for Sensitive Groups
151 to 200	Unhealthy
201 to 300	Very Unhealthy
301 to 500	Hazardous

The COVID-19 Coronavirus Response

The 2020 pandemic of COVID-19 coronavirus caused an unprecedented response by government agencies around the globe, as strict social distancing and Stay at Home orders were issued. Businesses have been ordered shut and schools and day cares closed. As a result, traffic dropped precipitously.

Anecdotes and images from cities around the world who implemented social distancing orders showed newly-clear skies and vistas that hadn't been seen in decades. The shutdown of society offered a natural experiment: can cutting back on automobile

traffic lower air pollution in Philadelphia?



Air Pollution in Philadelphia

Air pollution produced in Philadelphia comes from a variety of sources. Many are point sources, meaning they are a facility or single point that produces air pollution. One of the biggest polluters in Philadelphia, though, are mobile sources of pollution, like cars, trucks, and buses. Mobile sources of pollution produce, among other things, nitrogen dioxide and particulate matter.

Nitrogen dioxide, or NO₂, is a gas that gets in the air from the burning of fuels like gasoline. NO₂ may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. NO₂ also reacts with volatile organic compounds and sunlight to produce ozone. Ozone can irritate and damage your lungs, and is especially dangerous to people with asthma and COPD. Ozone is also the only criteria air pollutant that is not in attainment in Philadelphia.

Fine particulate matter, or PM_{2.5}, is a mixture of solid particles and liquid droplets found in the air. Some particles, like dirt or soot, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, and aggravated asthma.



Carbon Monoxide, or CO, is a colorless, odorless, and at high concentrations a poisonous gas. It is formed when carbon in fuels are not burned completely. The major source of CO is motor vehicle emissions. Carbon monoxide enters the bloodstream and reduces oxygen delivery to the body's organs and tissues. The health threat from carbon monoxide is most serious for those who suffer from cardiovascular disease.

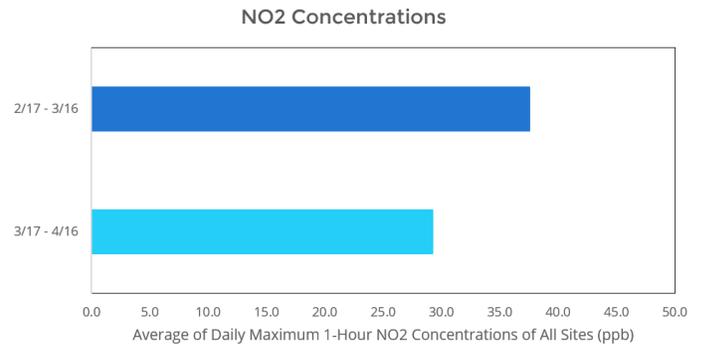
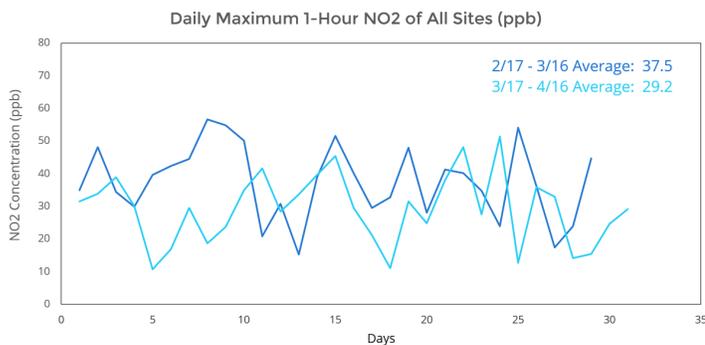
The Effects of Statewide Mitigation Orders on Air Pollution



Governor Wolf instituted a Statewide Mitigation Orders starting at midnight on March 17, 2020. This order asked all Pennsylvanians to refrain from non-essential travel, closed all schools in the Commonwealth, and closed all non-essential businesses. This order precipitated a sharp curtailment in automobile traffic across the state, including in Philadelphia. The Health Department, through its citywide network of ten air pollution monitors, compared air pollution levels from the month before and the month after the Order to quantify the effect on air quality in Philadelphia. The following charts compare values from February 17 – March 17, 2020 (Before the Order) and from March 17, 2020 – April 17, 2020 (After the Order).

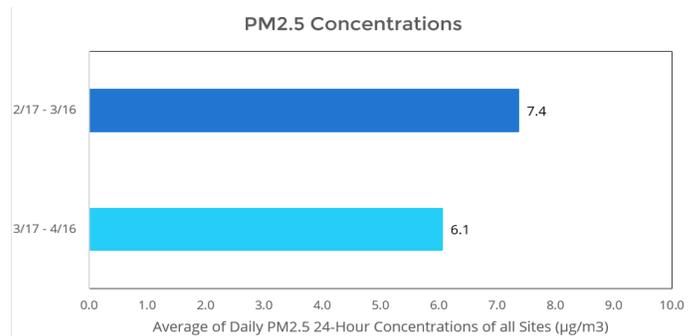
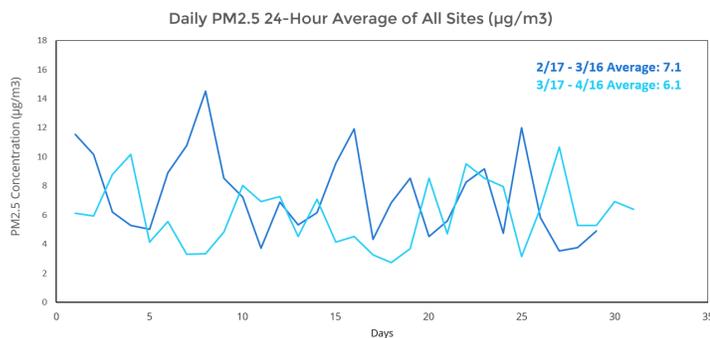
Results

NO2



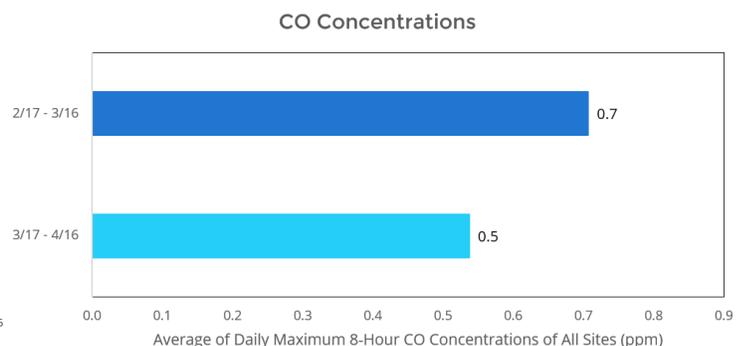
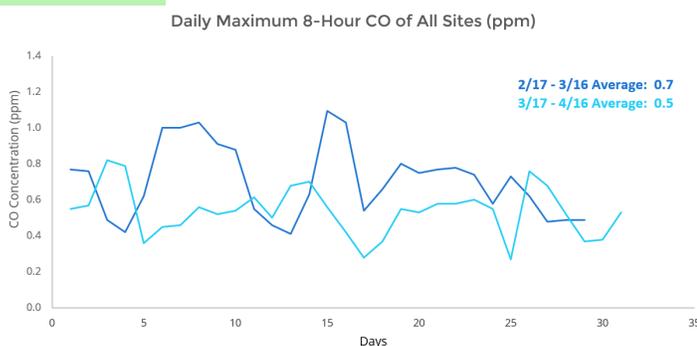
The average daily maximum one-hour NO₂ concentration recorded for the month Before the Order was 37.5 parts per billion. After the Order, the average concentration recorded was only 29.2 ppb. That means that NO₂ concentrations in Philadelphia dropped by about 22% since Governor Wolf's Statewide Mitigation Order.

PM25



The daily average PM_{2.5} concentration recorded for the month Before the Order was 7.4 µg/m³. After the Order, the average concentration recorded was only 6.1 µg/m³. That means that PM_{2.5} concentrations in Philadelphia dropped by about 18% since Governor Wolf's Statewide Mitigation Order.

CO



The average maximum daily eight-hour CO concentration recorded for the month Before the Order was 0.7 ppm. After the Order, the average concentration recorded was only 0.5 ppm. That means that CO concentrations in Philadelphia dropped by about 25% since Governor Wolf's Statewide Mitigation Order.

What This Means

The data collected by the Philadelphia Department of Public Health's Air Management Services division shows that by restricting business and movement by the public, levels of certain air pollutants in Philadelphia will drop by significant amounts. While it is understood that maintaining this level of shutdown is inadvisable and dangerous, the Health Department maintains that there is something to be learned from it. Reducing the number of cars and trucks on the road and the amount of pollution from industrial point sources pays dividends in air quality.

Research has shown that communities of color suffer disproportionately from poor air quality and negative health outcomes as a result. Research from Harvard has indicated that people from regions with worse air quality are more likely to die from COVID-19 than people from areas with cleaner air, making the issue of environmental justice and its ramifications come into clearer focus for Philadelphia.

Lessons from the COVID-19 Stay at Home and Mitigation Orders should be used to identify ways to reduce air pollution in ways that will help the most vulnerable. For example, Milan is looking to reprioritize public right of ways to increase space for walking and biking in order to retain the air pollution reduction achieved during the lockdown. In Philadelphia, investing in our public transit system to make it faster, safer, and more affordable would help to support low - income residents that rely on SEPTA while also reducing air pollution. It is also expected that as companies that can implement work from home policies, these policies may become more prevalent, and reduce the number of cars on the road.

The City will continue to investigate areas such as:

- Continuing to invest in walking, biking and public transit infrastructure to reduce air pollution and increase mobility and explore policy options to support their use
- Transitioning to electric vehicles that reduce localized air pollutants
- Enforcing on existing air pollution permits and considering ways to reduce pollution in overburdened communities
- Expanding community air monitoring to identify hot spots for further intervention
- Launching an Environmental Justice Advisory Commission to provide feedback and guidance to the City on policies that impact marginalized communities

About Air Management Services

AMS is responsible for the prevention, abatement, and control of air pollution and air pollution nuisances, achieving and maintain the National Ambient Air Quality Standards (NAAQS) in Philadelphia, and protecting the health and quality of life of the Philadelphia community from the adverse effects of air contaminants and noise.