Air Quality
A Perspective

Small Business Compliance Advisory Committee
July 22, 2020
Harrisburg, PA
Agenda

– Perception of our Air
– Historical Emissions Trends
– Ozone Design Values
– Fine Particulate Matter (PM$_{2.5}$) Design Values
  • Annual
  • Daily
– Sulfur Dioxide (SO$_2$) Design Values
– Challenges
– EPA’s View
– The AQI
– Then and Now
Corner of 5th and Liberty circa 1940

Corner of Liberty and Fifth Avenue (Archives Services Center, U. of Pittsburgh)
Recent Headlines:

- U.S. air quality is getting worse. Here are the costs - Oct 23, 2019
- 20 Pa. counties, including several near Clairton Coke Works, on code orange air quality alert – FEB 4, 2019
- Six mid-state counties on code orange air quality alert - FEB 5, 2019
- Snow-less in Boston. From deep freeze to “air quality” alert in Philly. What is with this winter?- FEB 3, 2019
- Group says air quality in Pennsylvania is getting worse – JULY 15, 2018
- Editorial: We need to know what's in our air- APRIL 14, 2019

https://stateimpact.npr.org/pennsylvania/2019/02/04/20-pa-counties-including-several-near-clairton-coke-works-on-code-orange-air-quality-alert/
https://www.pbs.org/newshour/nation/u-s-air-quality-is-getting-worse-here-are-the-costs
The 2017 American Lung Association report ranks Philadelphia #24 nationally for ozone pollution.

- Pittsburgh and Lancaster are tied for #8, Philadelphia at #12, Harrisburg at #15 and Johnstown at #18 for long term fine particulate pollution.
- Pittsburgh is ranked at #10, Lancaster at #13 and Harrisburg at #22 for short term fine particulate pollution.

American Lung Association
- 14 counties are graded as an F, eight get a D, six get a C, six get a B and only two get an A (Bradford and Franklin) for Ozone pollution
- Four counties get an F, one gets a D, three get a C, seven get a B and nine get an A short term fine particulate pollution

https://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/states/pennsylvania/
The Penn Environment Policy and Research Center issued a report in July of 2018 named Trouble in the Air -

"The Gettysburg area experienced 81 days of degraded air quality. York and Hanover experienced 128 bad air days. Harrisburg suffered 132 days of bad air,.. and finally in Lebanon and Lancaster there were over 170 bad air days. That's one out of every two days," she said.
Emissions Trends
NOx Emissions are down 83%
SOx Emissions are down 93%
PM Emissions (Tons)

Particulate Matter Emissions (Tons)

PM Emissions are down 31%
VOC Emissions are down 60%
Total Emissions are down 88%
Total Emissions (Tons)

Total Criteria Pollutants (Tons)
Historical 8-hour Ozone Concentrations in PA
1980 8-Hour Ozone Design Values

Appearing in Red - 1980 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
Appearing in Blue - 1980 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
1991 8-Hour Ozone Design Values

Appearing in Blue - 1991 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2002 8-Hour Ozone Design Values

Appearing in Red - 2002 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)

Appearing in Blue - 2002 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2005 8-Hour Ozone Design Values

Appearing in Red - 2005 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
Appearing in Blue - 2005 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2016 8-Hour Ozone Design Values

Appearing in Red - 2016 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
Appearing in Blue - 2016 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2017 8-Hour Ozone Design Values

 Appearing in Red - 2017 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
 Appearing in Blue - 2017 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2018 8-Hour Ozone Design Values

Appearing in Red - 2018 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
Appearing in Blue - 2018 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
2019 8-Hour Ozone Design Values

As of October 22, 2019 - 2019 Ozone Data Has Not Been Fully QA/QC'd

- **Blue**: Projected 2019 8-Hour Ozone Design Value at or below 70 ppb (2015 Ozone Standard)
Historical Annual PM$_{2.5}$ Concentrations in PA
2005 Annual PM$_{2.5}$ Design Values

- Appearing in Red - 2005 Annual PM2.5 Design Value above 12.0 ug/m$^3$ (2012 PM2.5 Standard)
- Appearing in Blue - 2005 24-Hour PM2.5 Design Value at or below 12.0 ug/m$^3$ (2012 PM2.5 Standard)
2016 Annual PM_{2.5} Design Values

Appearing in Red - 2016 Annual PM_{2.5} Design Values Above the Standard of 12.0 \text{ug/m}^3

Appearing in Blue - 2016 Annual PM_{2.5} Design Values Below the Standard of 12.0 \text{ug/m}^3
2019 Annual PM$_{2.5}$ Design Values

Appearing in Red - 2019 Annual PM$_{2.5}$ Design Values Above the Standard of 12.0 ug/m$^3$

Appearing in Blue - 2019 Annual PM$_{2.5}$ Design Values Below the Standard of 12.0 ug/m$^3$
Historical 24-hour PM$_{2.5}$ Concentrations in PA
2005 24-hour PM$_{2.5}$ Design Values

- **Appearing in Red**: 2005 24-Hour PM$_{2.5}$ Design Value above 35 ug/m$^3$ (2006 PM$_{2.5}$ Standard)
- **Appearing in Blue**: 2005 24-Hour PM$_{2.5}$ Design Value at or below 35 ug/m$^3$ (2006 PM$_{2.5}$ Standard)
2016 24-hour PM$_{2.5}$ Design Values

 Appearing in Red - 2016 24-hour PM$_{2.5}$ Design Values Above the Standard of 35 ug/m$^3$

 Appearing in Blue - 2016 24-hour PM$_{2.5}$ Design Values Below the Standard of 35 ug/m$^3$
2017 24-hour PM$_{2.5}$ Design Values

Appearing in Red - 2017 24-hour PM$_{2.5}$ Design Values Above the Standard of 35 ug/m$^3$

Appearing in Blue - 2017 24-hour PM$_{2.5}$ Design Values Below the Standard of 35 ug/m$^3$
Historical 1-hour SO$_2$ Concentrations in PA
1980 1-hour SO$_2$ Design Values

Appearing in Red - 1980 1-Hour SO2 Design Value above 75 ppb (2010 SO2 Standard)
Appearing in Blue - 1980 1-Hour SO2 Design Value at or below 75 ppb (2015 SO2 Standard)
1991 1-hour SO$_2$ Design Values

 Appearing in Red - 1991 1-Hour SO$_2$ Design Value above 75 ppb (2010 SO$_2$ Standard)
 Appearing in Blue - 1991 1-Hour SO$_2$ Design Value at or below 75 ppb (2015 SO$_2$ Standard)
2005 1-hour $\text{SO}_2$ Design Values

Appearing in Red - 2005 1-Hour SO2 Design Value above 75 ppb (2010 SO2 Standard)
Appearing in Blue - 2005 1-Hour SO2 Design Value at or below 75 ppb (2015 SO2 Standard)
2016 1-hour SO$_2$ Design Values

Appending in Red - 2016 1-Hour SO$_2$ Design Value above 75 ppb (2010 SO$_2$ Standard)

Appending in Blue - 2016 1-Hour SO$_2$ Design Value at or below 75 ppb (2010 SO$_2$ Standard)
2019 1-hour SO₂ Design Values

Appearing in Red - 2019 1-Hour SO₂ Design Value above 75 ppb (2010 SO₂ Standard)
Appearing in Blue - 2019 1-Hour SO₂ Design Value at or below 75 ppb (2010 SO₂ Standard)

Asterick (*) Appearing Behind the 2019 1-Hour SO₂ Design Value Means the Data is Incomplete During 3-Year Period
Challenges
Of course we still have challenges

- Staffing and funding are always a challenge.
- We have an ozone issue in Philadelphia that will not be easy to solve.
- There are facilities statewide that we spend quite a bit of time on from coke batteries to zinc smelters.
- We have picked the most of the low hanging fruit so future improvements will require a lot more effort.
  - Cars are cleaner.
  - Major facilities have emissions controls.
  - We have taken lead out of gasoline.
- Asthma rates have climbed from 3.1% in 1980 to 10.1% in 2015.
- Approximately 90% of adults from western countries spend almost 22 hours a day INDOORS where air pollution can be many times worse than outdoor air.
- Children spend half the time their parents did playing outside.
- Medical research indicates possible health effects at levels below the current NAAQS.

https://www.cdc.gov/asthma/most_recent_data_states.htm
EPA’s View
EPA’s View

Economic Growth with Clean Air
Between 1970 and 2017, the combined emissions of the six common pollutants (PM2.5 and PM10, NOx, SO2, CO and Pb) dropped by 73 percent. This progress occurred while the U.S. economy continued to grow, Americans drove more miles and population and energy use increased.

Comparison of Growth Areas and Declining Emissions
1970-2017

Air Quality Trends Show Clean Air Progress
While some pollutants continue to pose serious air quality problems in areas of the U.S., nationally, criteria air pollutant concentrations have dropped significantly since 1990 improving quality of life for many Americans. Air quality improves as America grows.

Air Pollutant Emissions Decreasing
Emissions of key air pollutants continue to decline from 1990 levels. These reductions are driven by federal and state implementation of stationary and mobile source regulations.

Unhealthy Air Quality Days Trending Down
The Air Quality Index (AQI) is a color-coded index EPA uses to communicate daily air pollution for ozone, particle pollution, NO2, CO, and SO2. A value in the unhealthy range, above national air quality standard for any pollutant, is of concern first for sensitive groups, than for everyone as the AQI value increases. Fewer unhealthy air quality days means better health, longevity, and quality of life for all of us.

Number of Days Reaching “Unhealthy for Sensitive Groups” Level or Above on the Air Quality Index (Among 35 Major U.S. Cities for Ozone and PM2.5 Combined)
Comparison of Growth Areas and Declining Emissions
1970-2017

https://gispub.epa.gov/air/trendsreport/2018/#growth_w_cleaner_air
Nationally, concentrations of air pollutants have dropped significantly since 1990:

- Carbon Monoxide (CO) 8-Hour, ↓ 77%
- Lead (Pb) 3-Month Average, ↓ 80%
- Nitrogen Dioxide (NO₂) Annual, ↓ 56%
- Nitrogen Dioxide (NO₂) 1-Hour, ↓ 50%
- Ozone (O₃) 8-Hour, ↓ 22%
- Particulate Matter 10 microns (PM_{10}) 24-Hour, ↓ 34%
- Particulate Matter 2.5 microns (PM_{2.5}) Annual, ↓ 41%
- Particulate Matter 2.5 microns (PM_{2.5}) 24-Hour, ↓ 40%
- Sulfur Dioxide (SO₂) 1-Hour, ↓ 88%
- Numerous air toxics have declined with percentages varying by pollutant.

During this same period, the U.S. economy continued to grow, Americans drove more miles and population and energy use increased.

https://gispub.epa.gov/air/trendsreport/2018/#growth_w_cleaner_air
Air Quality Index
Then and Now
Corner of 5th and Liberty circa 1940

Corner of Liberty and Fifth Avenue (Archives Services Center, U. of Pittsburgh)
Corner of 5th and Liberty Today
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