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 1996 - 2017

65% Emissions Reduction From 1996

VOC Emissions 1996 - 2017

36% Emissions Reduction From 1996

1000 Tons

Year

35% PM-10 Emissions Reduction From 1996
27% PM$_{2.5}$ Emissions Reduction From 1996
SO$_2$ Emissions 1996 - 2017

90 % Emissions Reduction From 1996

CO Total Emissions 1996-2017

69% Emissions Reduction from 1996
Total Emissions 1996 - 2017
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)
2017 8-Hour Ozone Design Values

Appearance in Red - 2017 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
Appearance 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

- Appearing in Red - Projected 2019 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)
- Appearing in 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/m3 (2012 PM2.5 Standard)
Appearing in Blue - 2005 24-Hour PM2.5 Design Value at or below 12.0 ug/m3 (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 ug/m$^3$

Appearing in Blue - 2016 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 PM2.5 Design Value above 35 ug/m$^3$ (2006 PM2.5 Standard)
 Appearing in Blue - 2005 24-Hour PM2.5 Design Value at or below 35 ug/m$^3$ (2006 PM2.5 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$^3$
2018 24-hour PM$_{2.5}$ Design Values

Appearing in Red - 2018 24-hour PM$_{2.5}$ Design Values Above the Standard of 35 ug/m$^3$

Appearing in Blue - 2018 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 SO2 Design Value above 75 ppb (2010 SO2 Standard)
Appearing in Blue - 1991 1-Hour SO2 Design Value at or below 75 ppb (2015 SO2 Standard)
2005 1-hour 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 SO₂ Design Values

Appearing in Red - 2016 1-Hour SO₂ Design Value above 75 ppb (2010 SO₂ Standard)
Appearing in Blue - 2016 1-Hour SO₂ Design Value at or below 75 ppb (2010 SO₂ Standard)
2017 1-hour SO₂ Design Values

Appearance in Red - 2017 1-Hour SO₂ Design Value above 75 ppb (2010 SO₂ Standard)
Appearance in Blue - 2017 1-Hour SO₂ Design Value at or below 75 ppb (2010 SO₂ Standard)
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

Our Nation’s Air
Air Quality Improves as America Grows
Status and Trends Through 2018

Comparison of Growth Areas and Declining Emissions 1970-2017

- Gross Domestic Product: 262%
- Vehicles Miles Traveled: 189%
- Population: 59%
- Energy Consumption: 44%
- CO2 Emissions: 23%
- Aggregate Emissions (Six Common Pollutants): -73%

Source: Various

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 (PM₁₀) 24-Hour, ↓ 34%
- Particulate Matter 2.5 microns (PM₂.₅) Annual, ↓ 41%
- Particulate Matter 2.5 microns (PM₂.₅) 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.
SO2 Satellite Imagery
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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