


Air Quality
A Perspective

AQTAC

DEC 12, 2019

Harrisburg, PA

Tom Wolf, Governor

Patrick McDonnell, Secretary

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

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Corner of 5th and Liberty circa 1940

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

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Perception

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/
http://www.witf.org/news/2019/02/six-midstate-counties-on-code-orange-air-quality-alert.php
http://www.witf.org/news/2018/07/group-says-air-quality-in-pennsylvania-is-getting-worse.php
https://www.philly.com/news/philadelphia-snow-boston-raleigh-winter-new-york-blizzard-equinox-20190203.html
https://poststar.com/opinion/editorial/editorial-we-need-to-know-what-s-in-our-air/article_e7512fd9-799a-59d0-a55c-b492d5144aeb.html
https://www.pbs.org/newshour/nation/u-s-air-quality-is-getting-worse-here-are-the-costs

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Perception

- 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

https://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/most-polluted-cities.html

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Perception

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/

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Perception

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.

https://pennenvironmentcenter.org/reports/pae/trouble-air
http://www.witf.org/news/2018/07/group-says-air-quality-in-pennsylvania-is-getting-worse.php

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Emissions Trends

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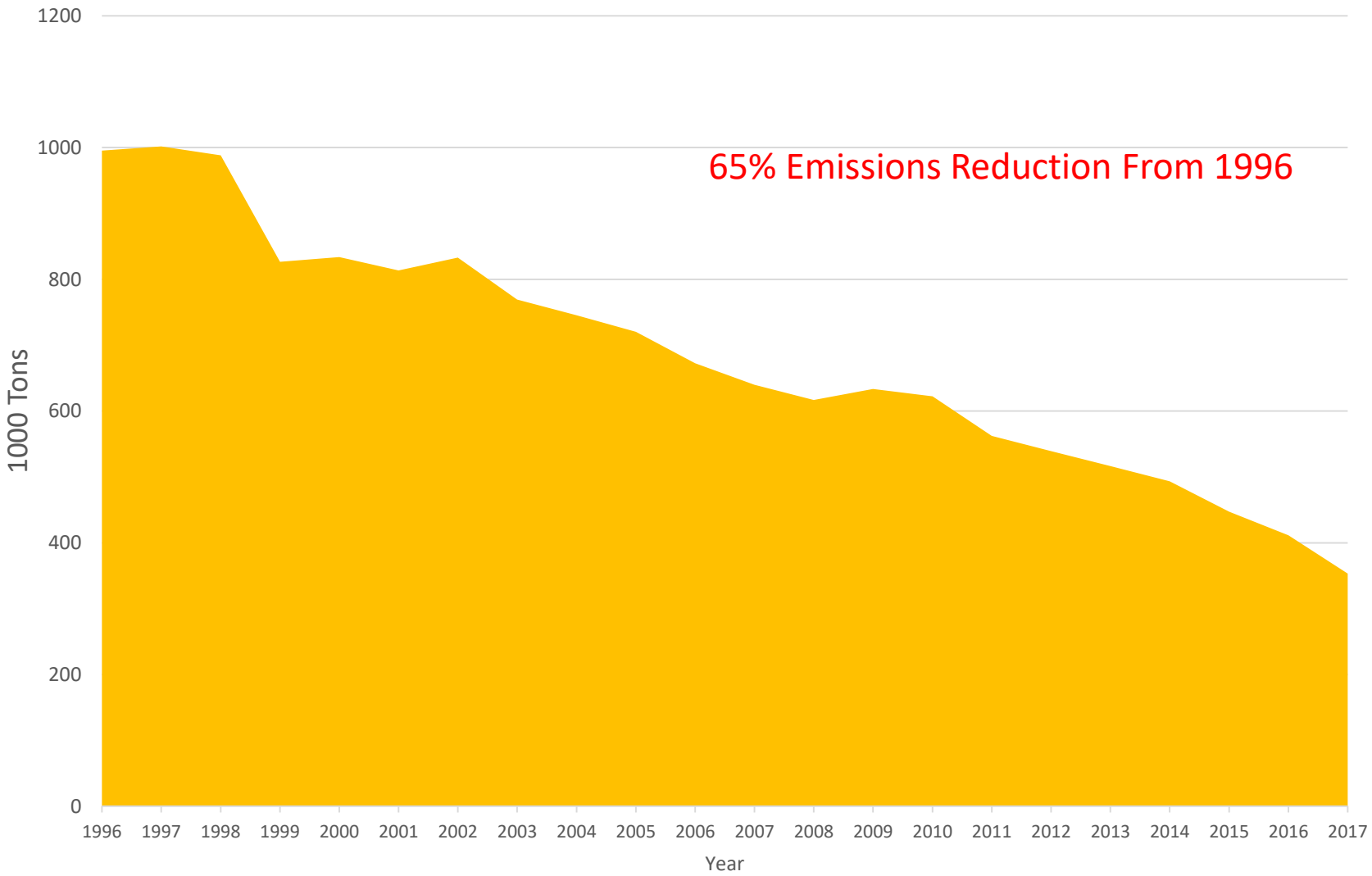
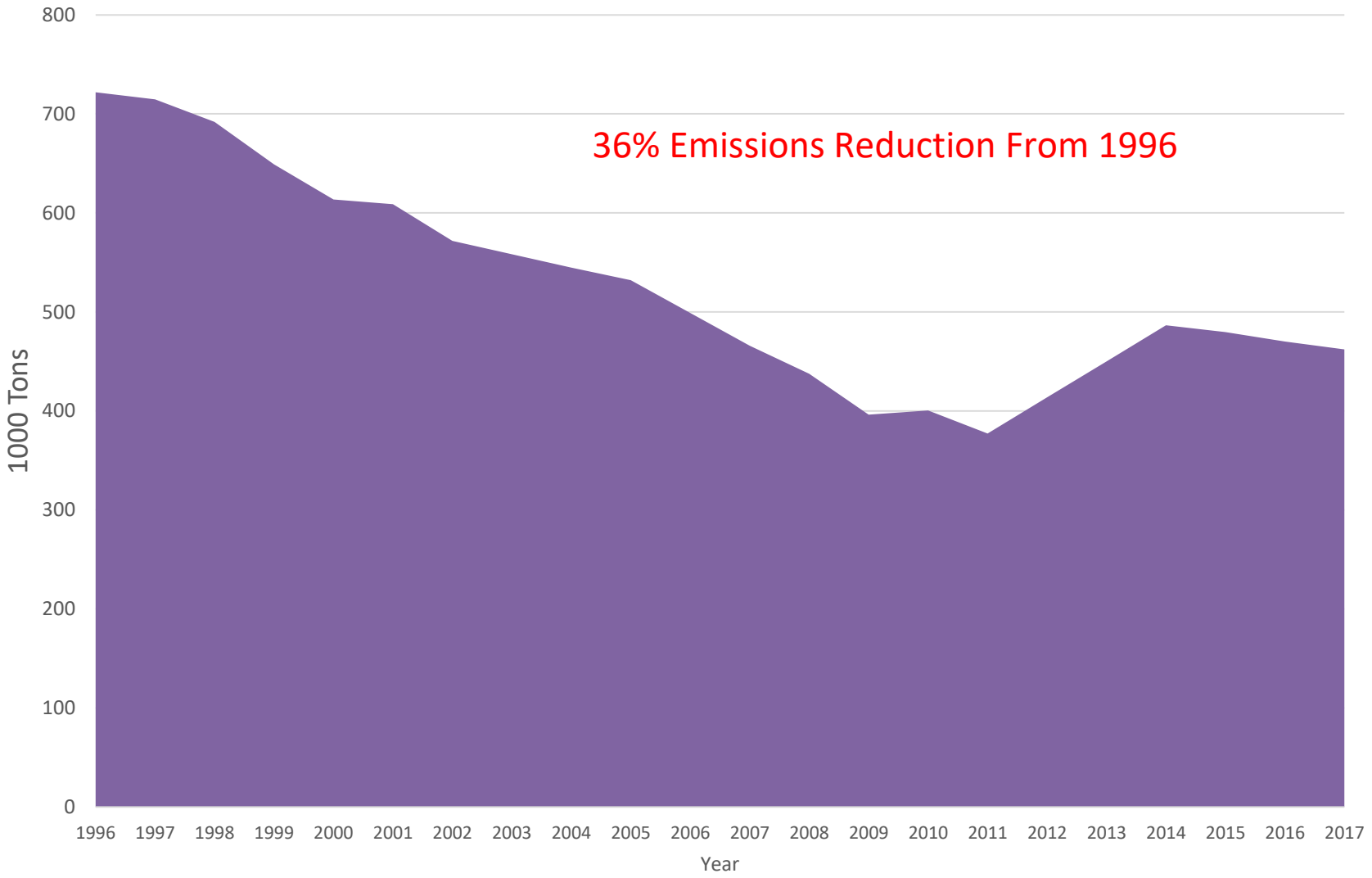
NOx Emissions 1996 - 2017



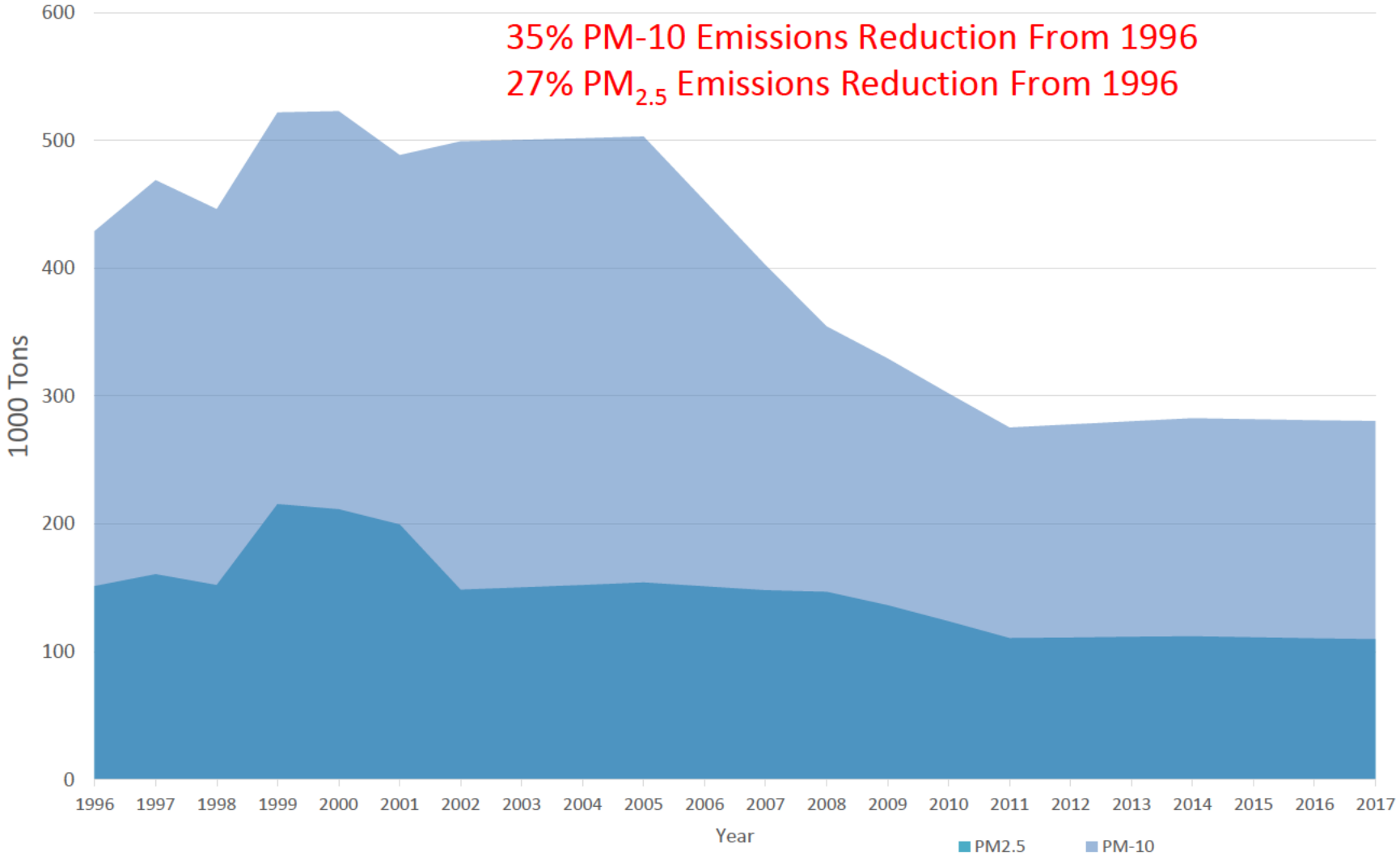
Source: U.S. EPA - State Annual Emissions Trend Data Report, https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data

VOC Emissions 1996 - 2017

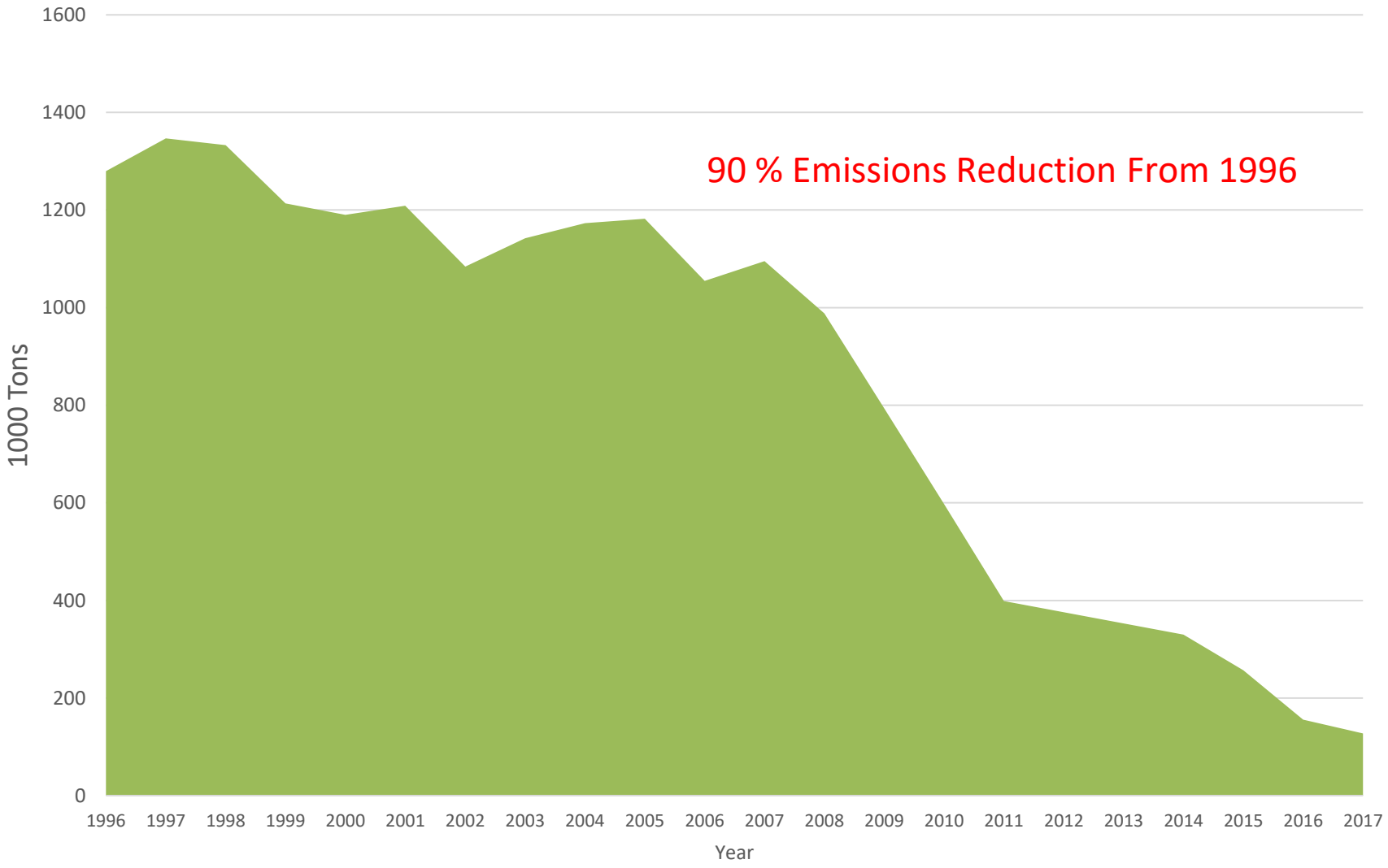


Source: U.S. EPA - State Annual Emissions Trend Data Report, https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data

$PM_{2.5}$ and PM-10 Emissions 1996-2017

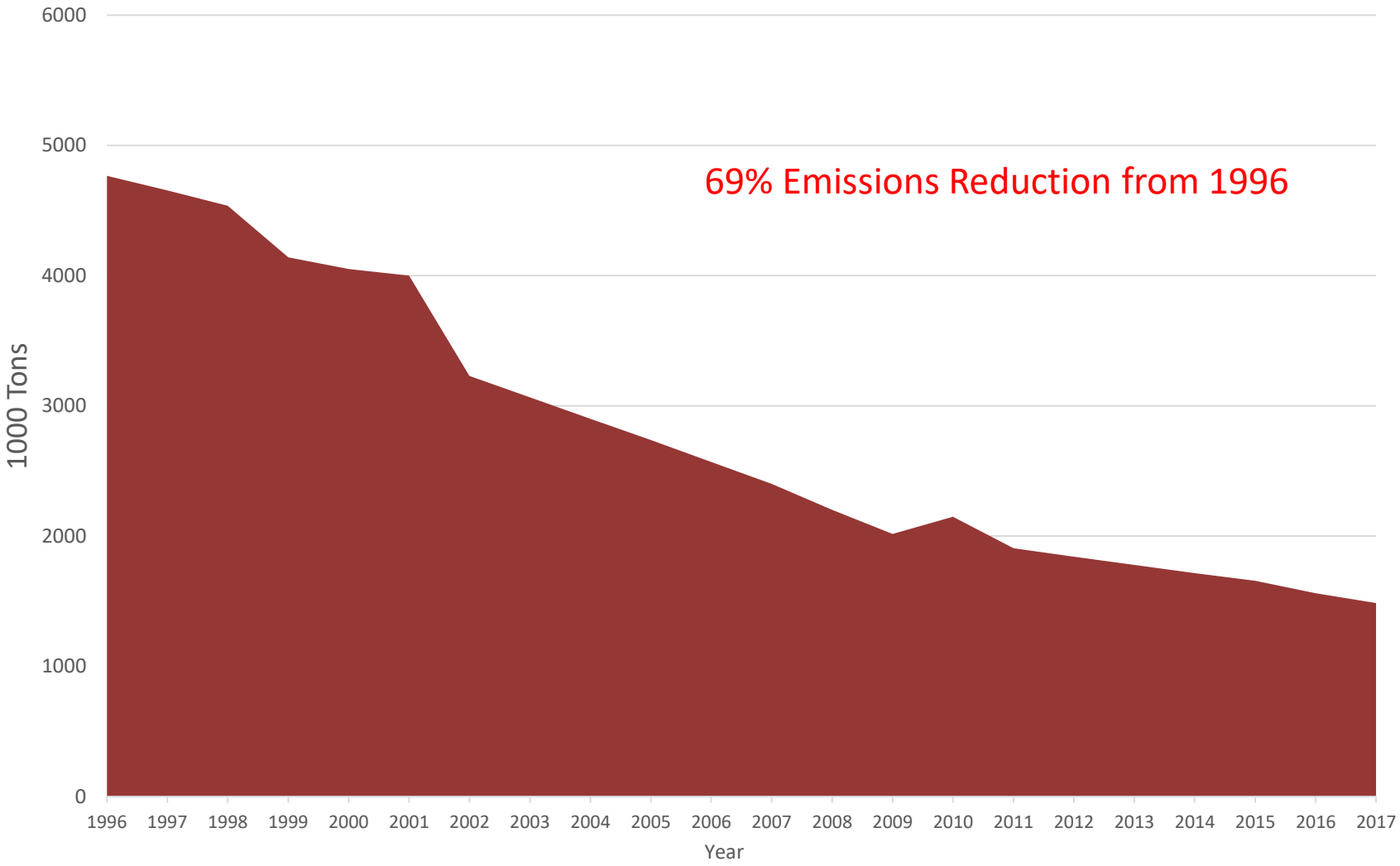


SO_2 Emissions 1996 - 2017

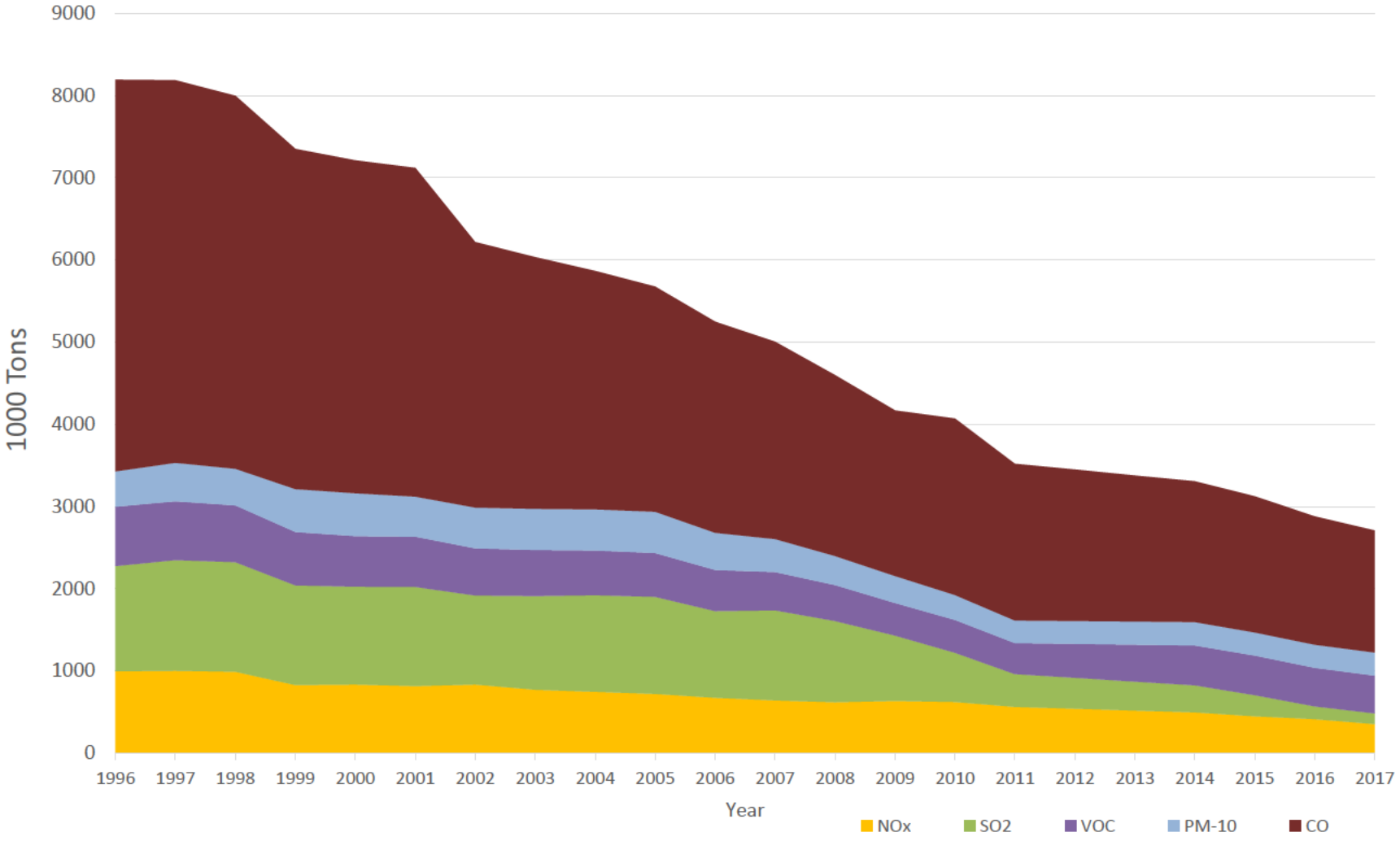


Source: U.S. EPA - State Annual Emissions Trend Data Report, https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data

CO Total Emissions 1996-2017



Total Emissions 1996 - 2017



Historical 8-hour Ozone Concentrations in PA

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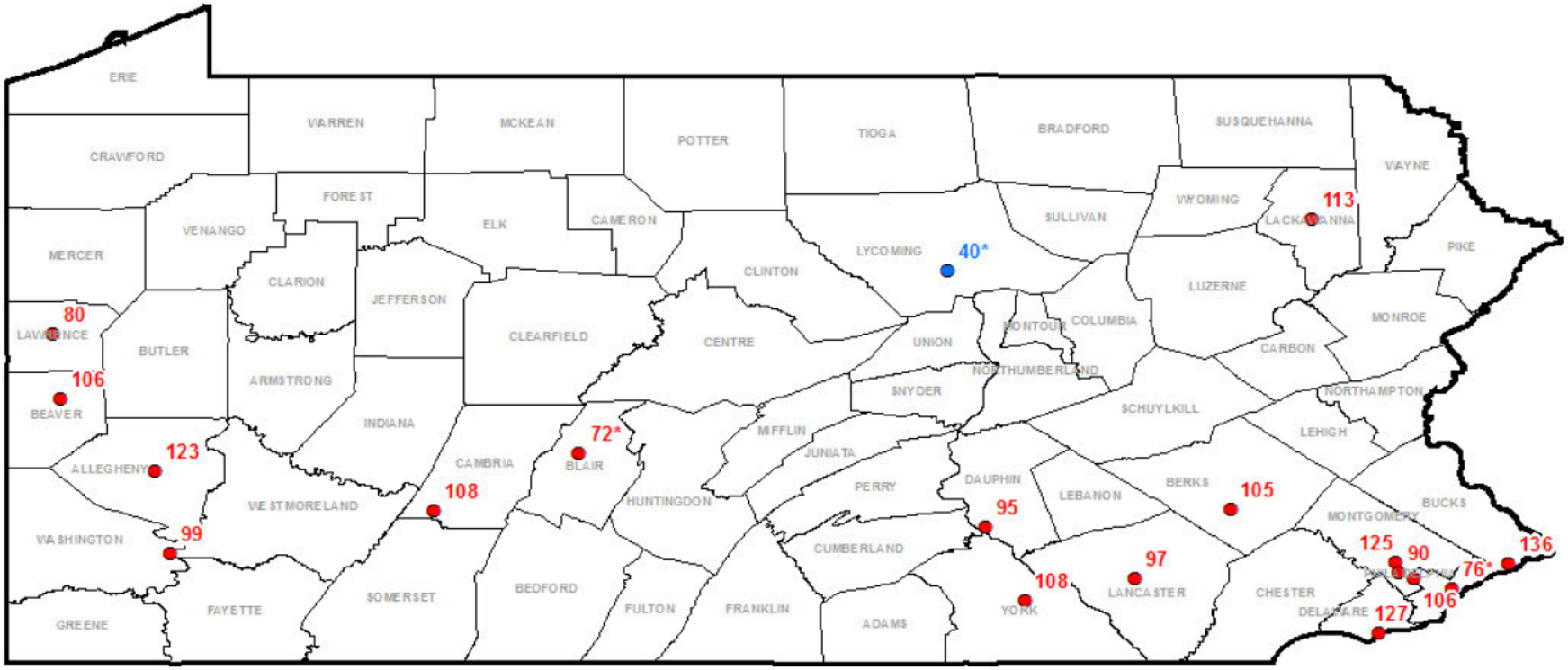
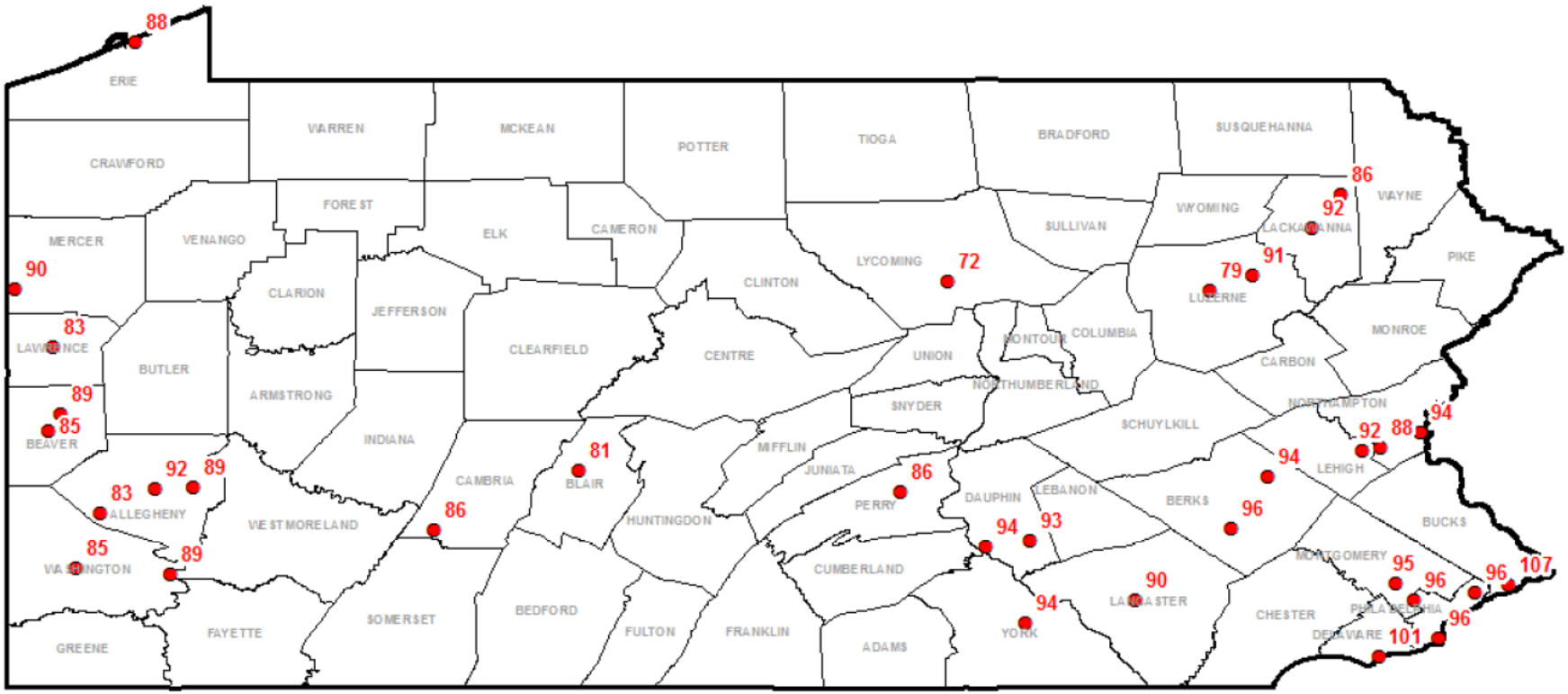
1980 8-Hour Ozone Design Values



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)

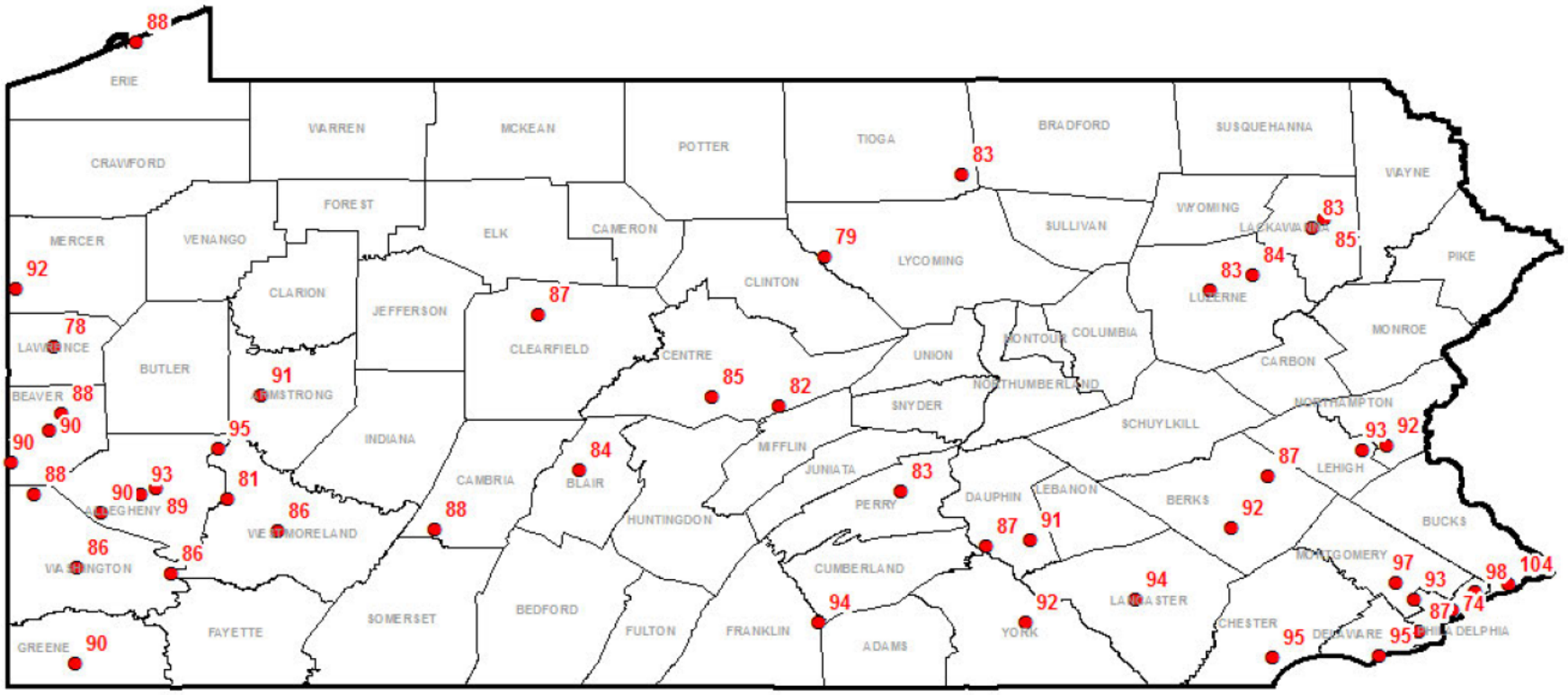
1991 8-Hour Ozone Design Values



Appearing in Red - 1991 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)

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

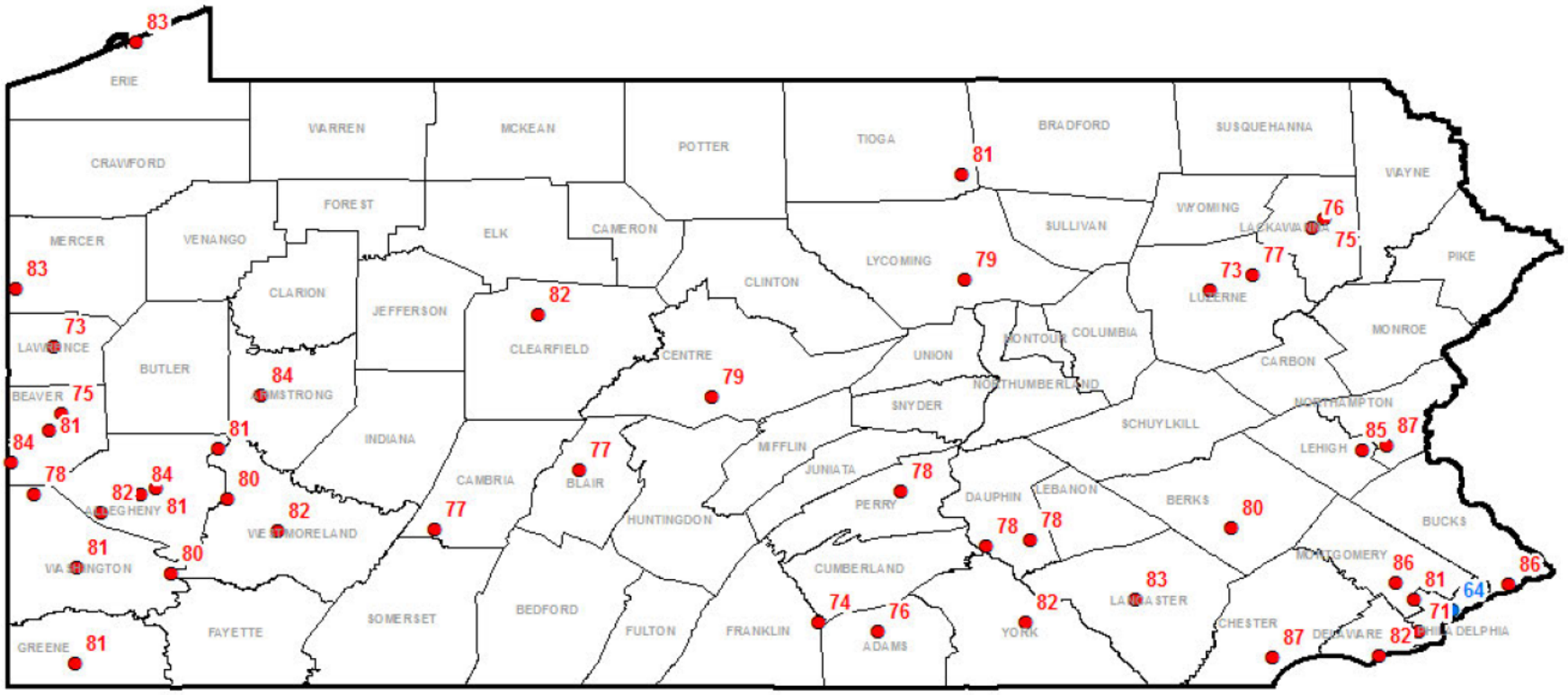
2002 8-Hour Ozone Design Values



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)

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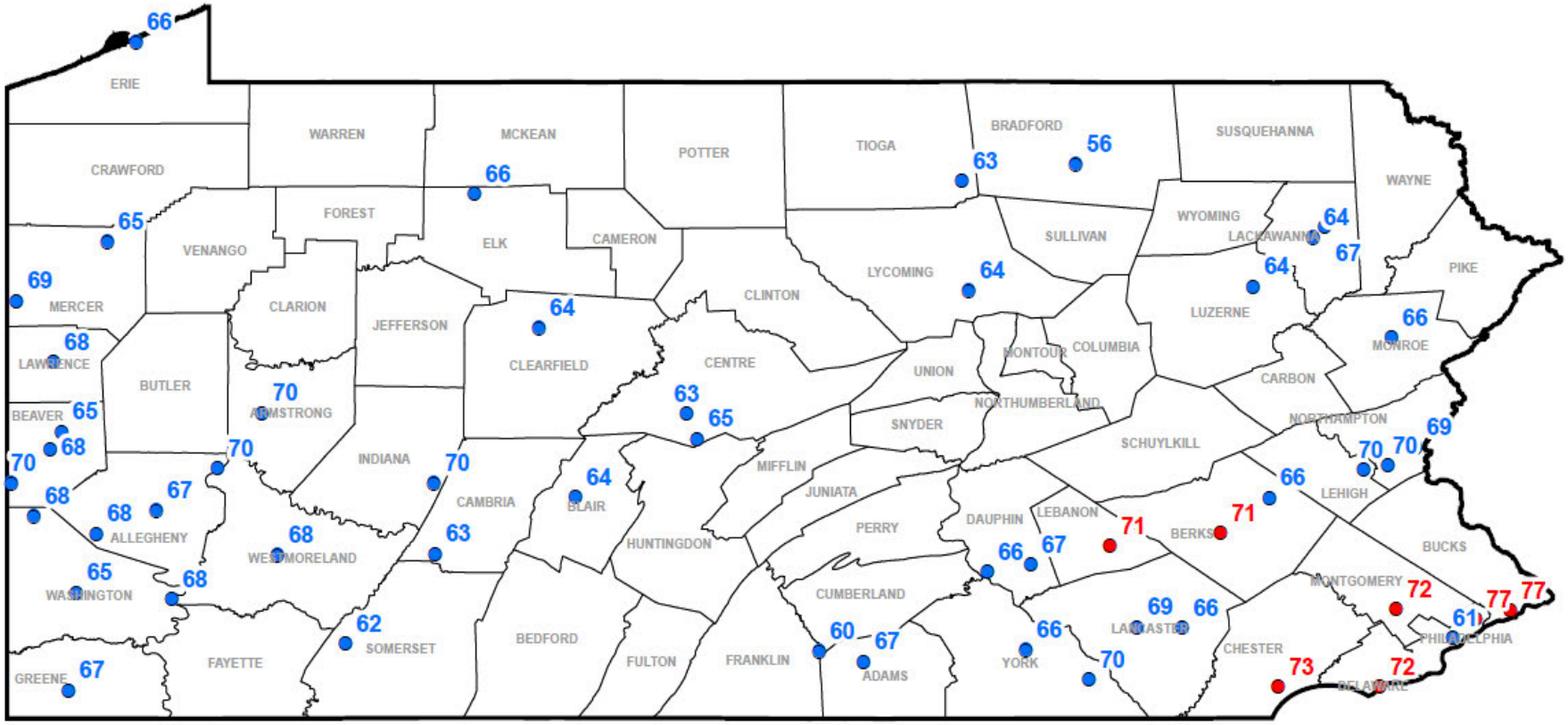
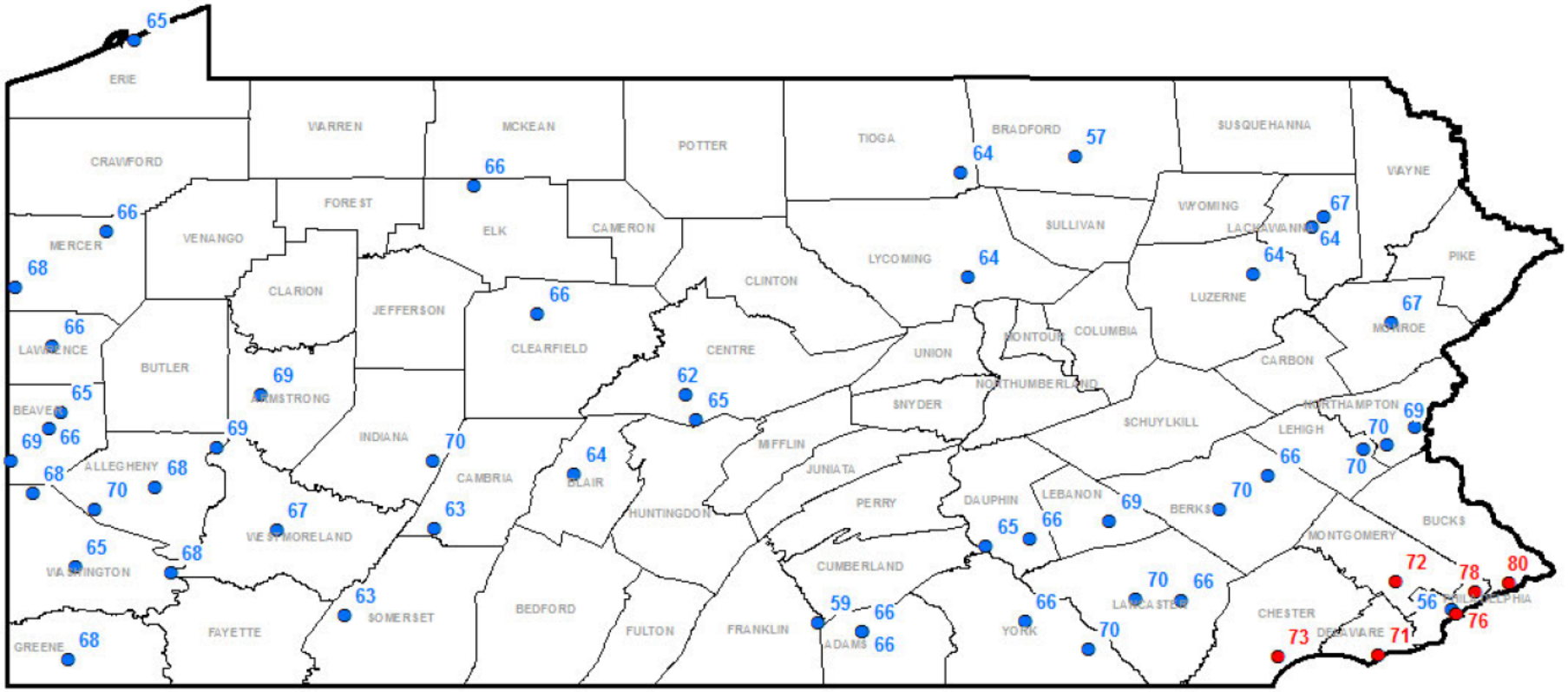
2016 8-Hour Ozone Design Values



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)

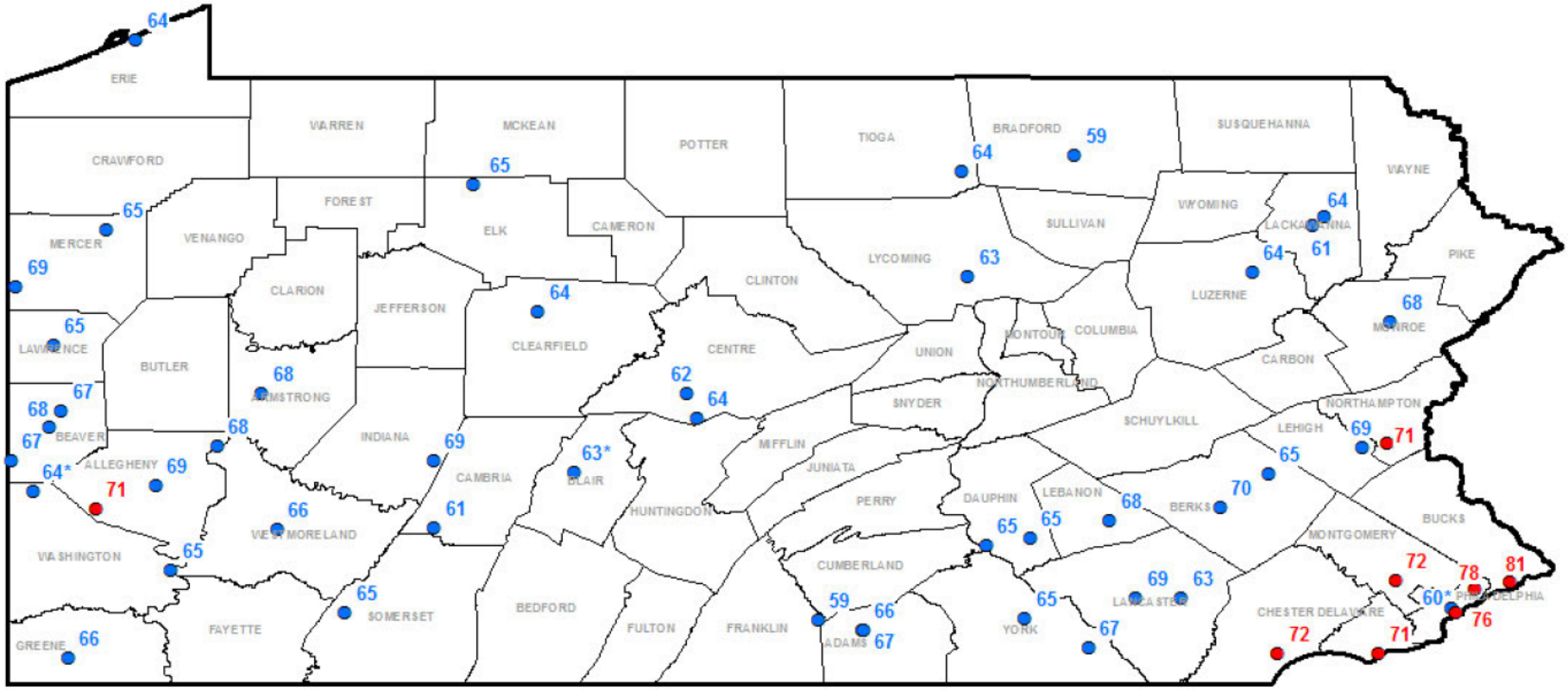
2017 8-Hour Ozone Design Values



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

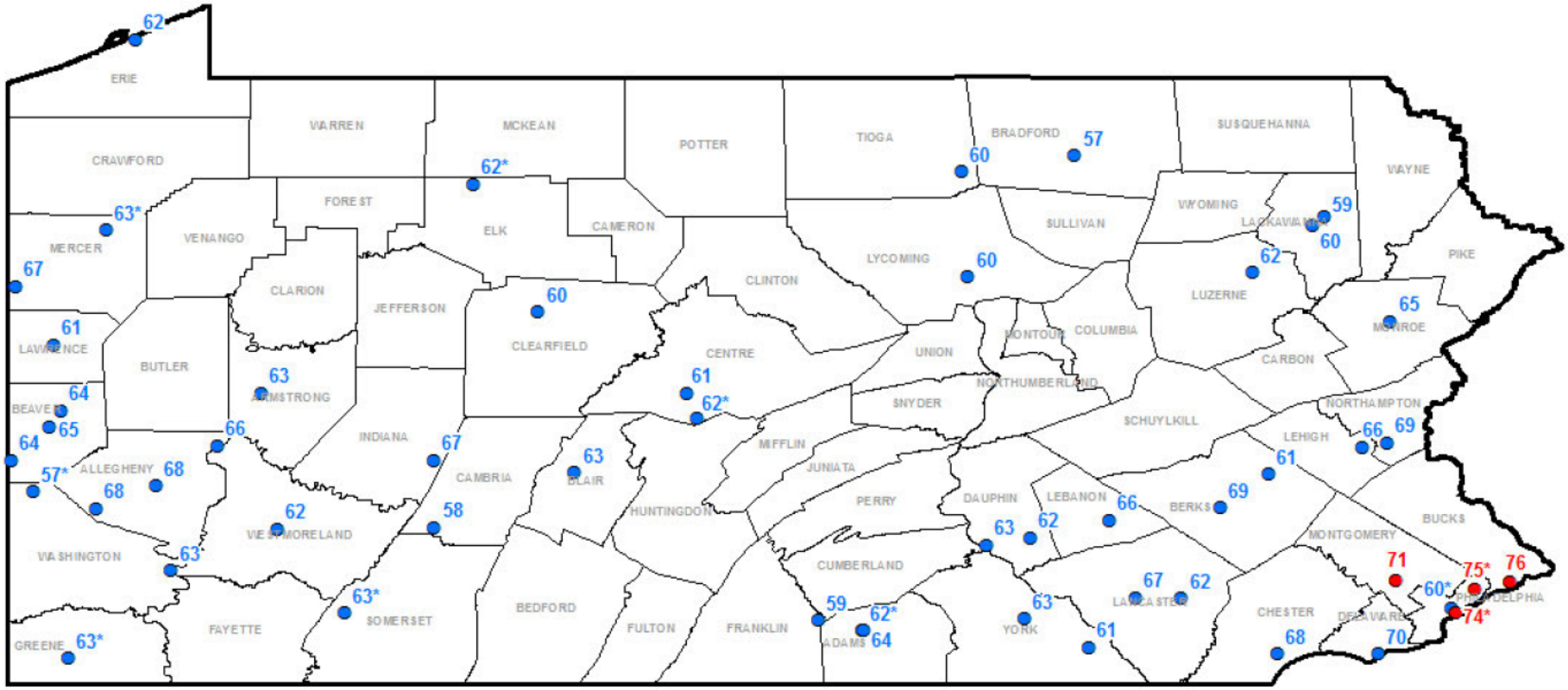


Appearing in Red - 2018 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)

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



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

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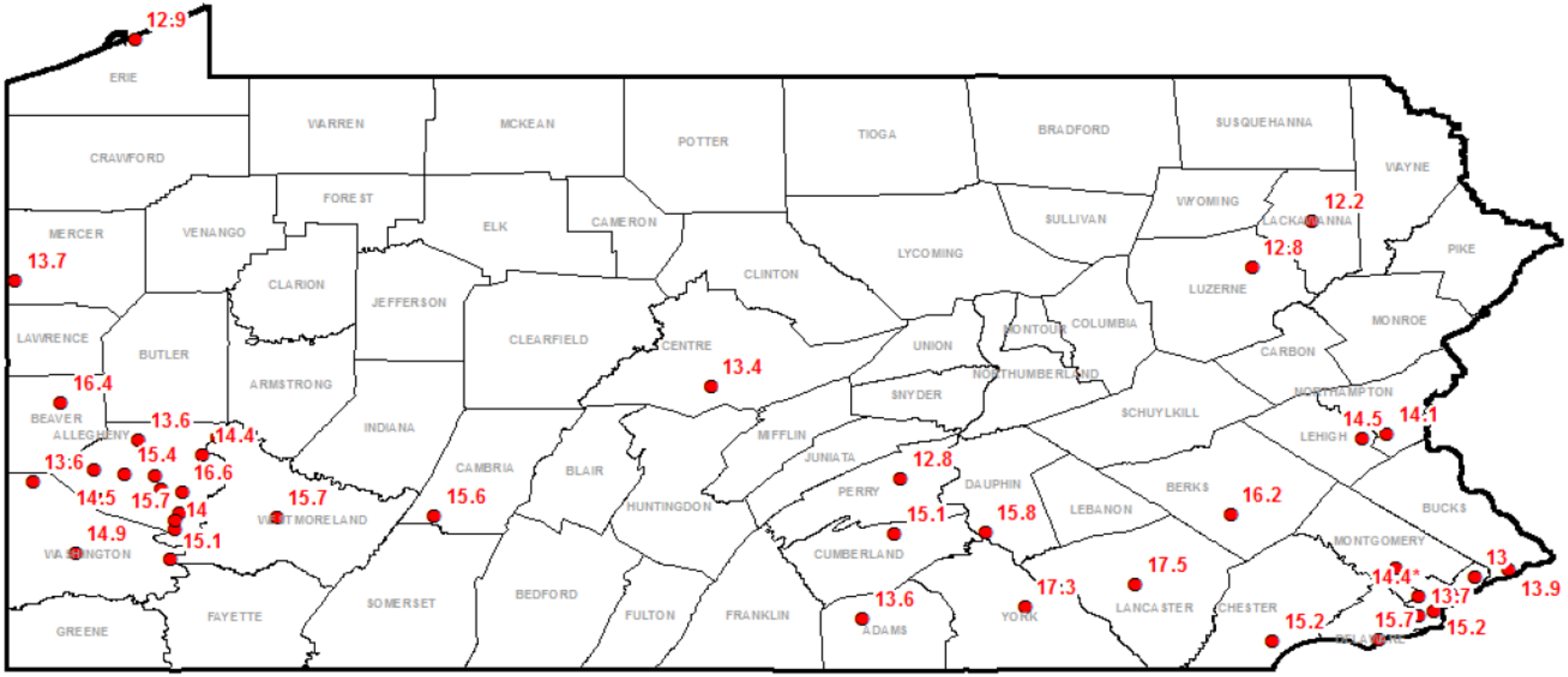
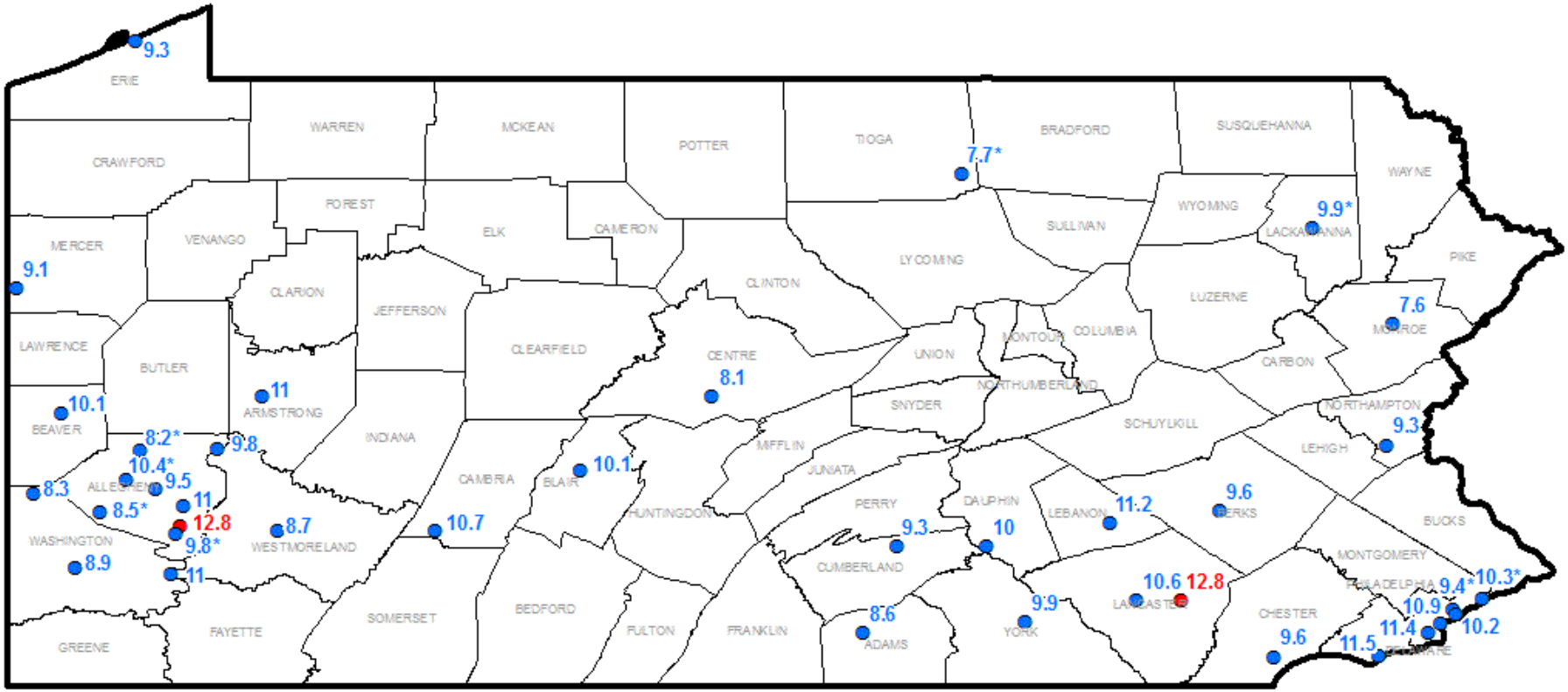
2005 Annual $PM_{2.5}$ Design Values



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)

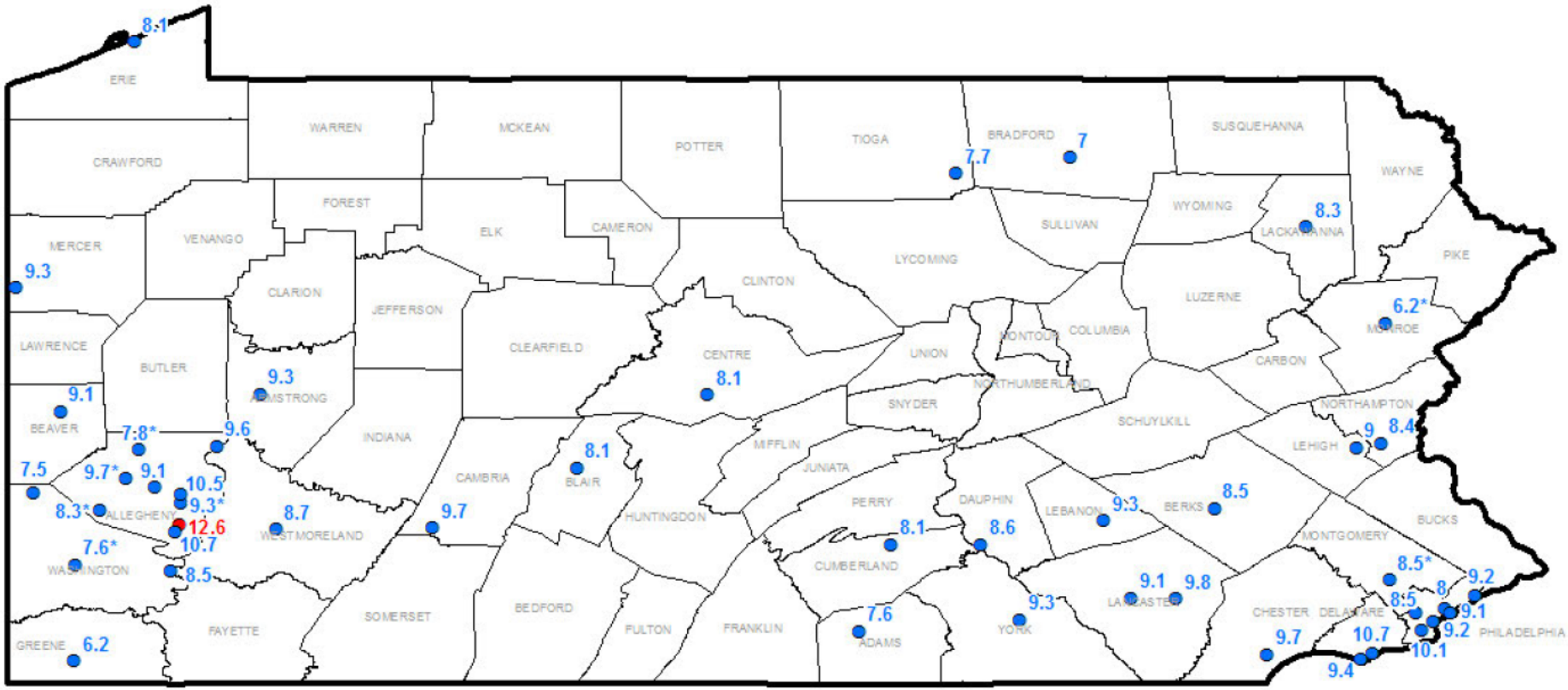
2016 Annual $PM_{2.5}$ Design Values



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

2018 Annual $PM_{2.5}$ Design Values



Appearing in Red - 2018 Annual $PM_{2.5}$ Design Values Above the Standard of 12.0 ug/m^3

Appearing in Blue - 2018 Annual $PM_{2.5}$ Design Values Below the Standard of 12.0 ug/m^3

Historical 24-hour $PM_{2.5}$ Concentrations in PA

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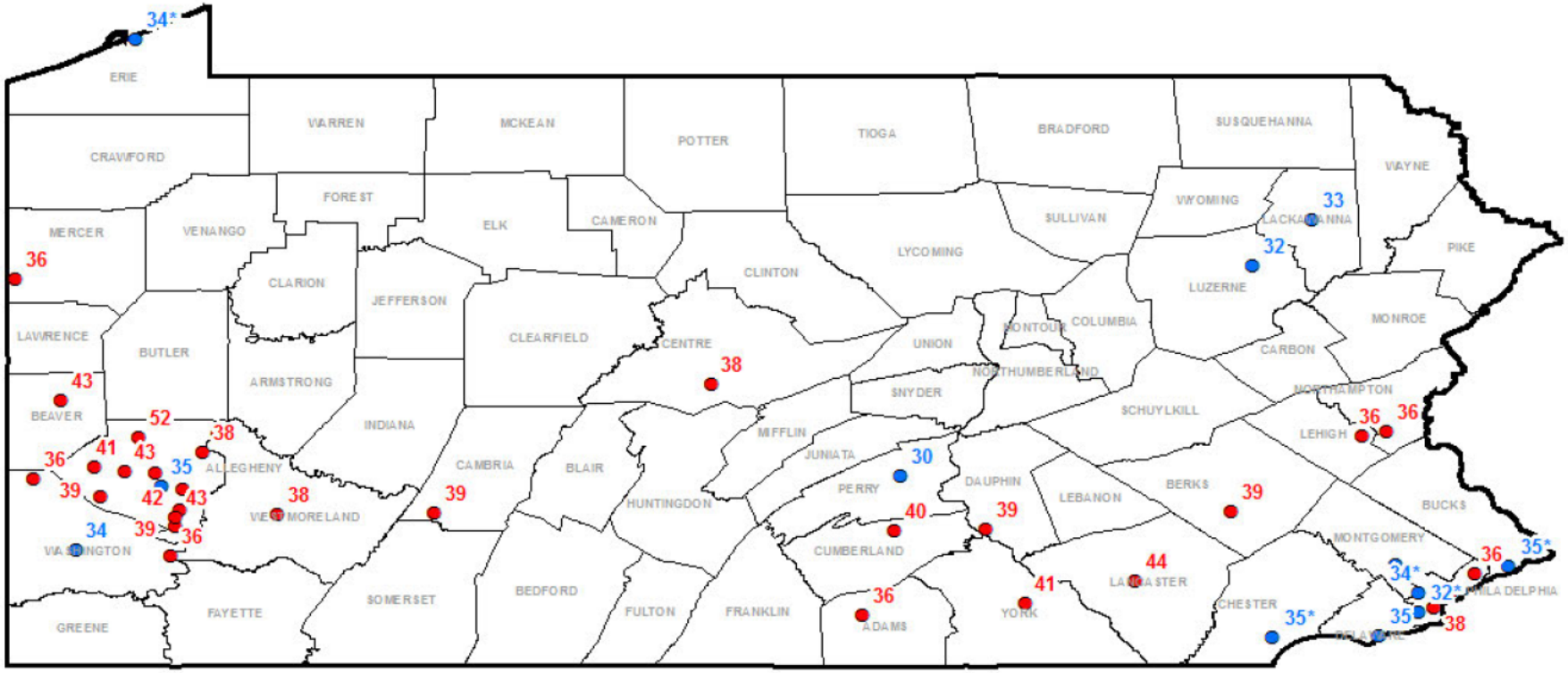
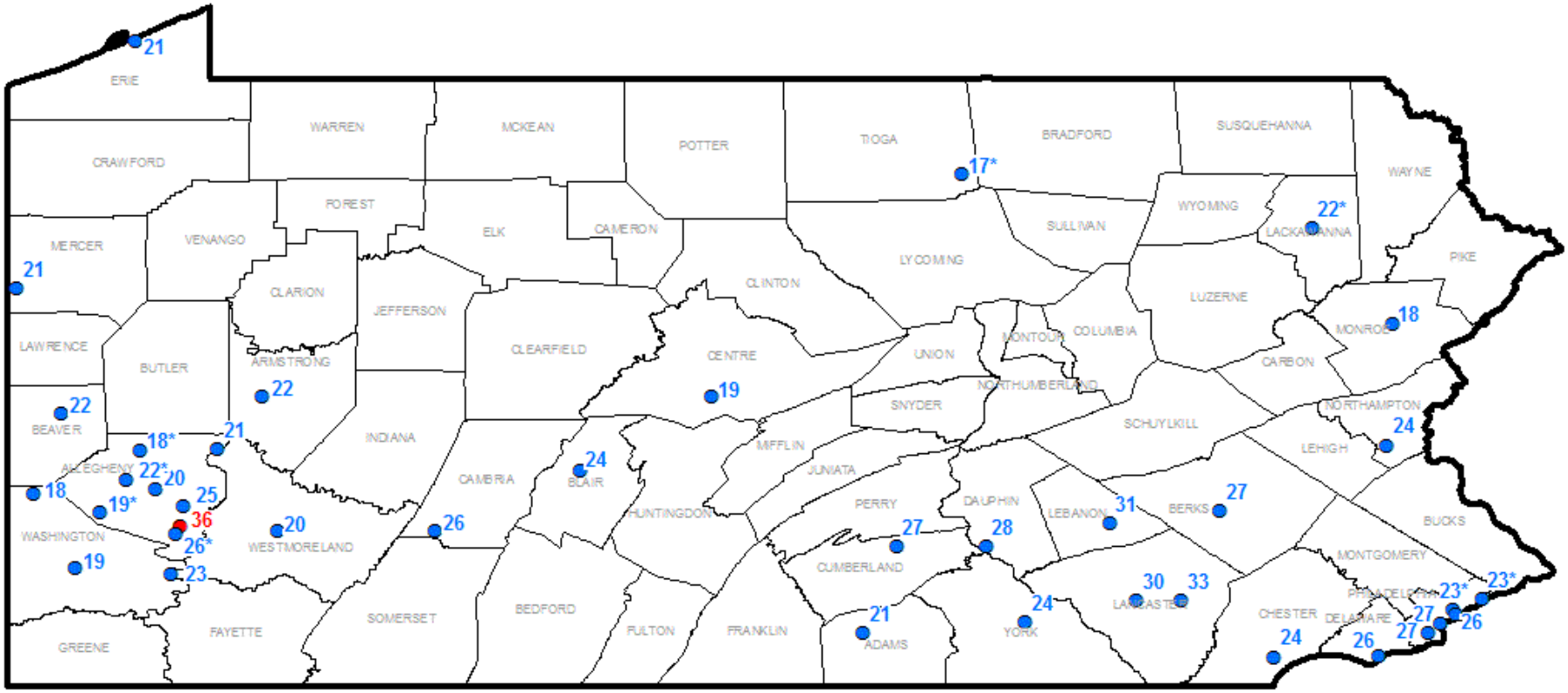
2005 24-hour $PM_{2.5}$ Design Values



Appearing in Red - 2005 24-Hour PM2.5 Design Value above 35 ug/m3 (2006 PM2.5 Standard)

Appearing in Blue - 2005 24-Hour PM2.5 Design Value at or below 35 ug/m3 (2006 PM2.5 Standard)

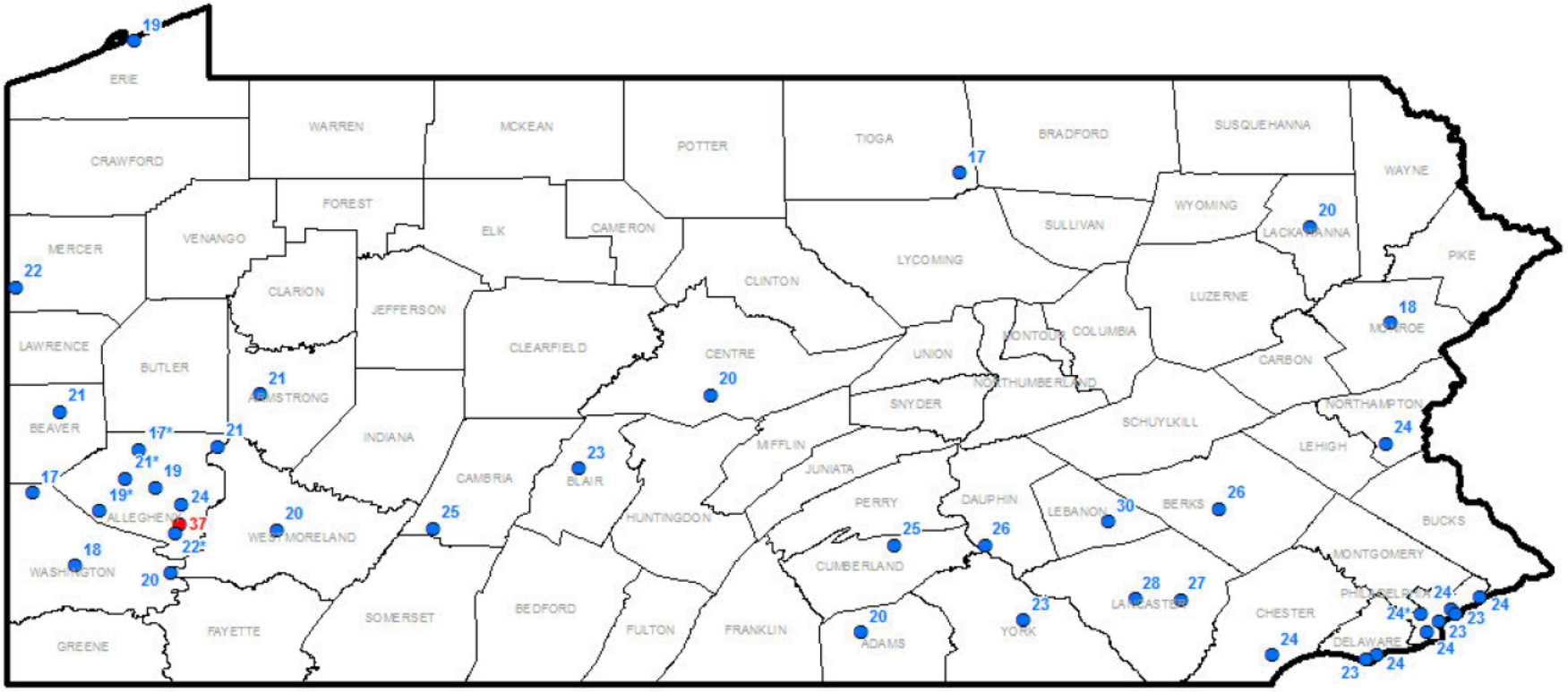
2016 24-hour $PM_{2.5}$ Design Values



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

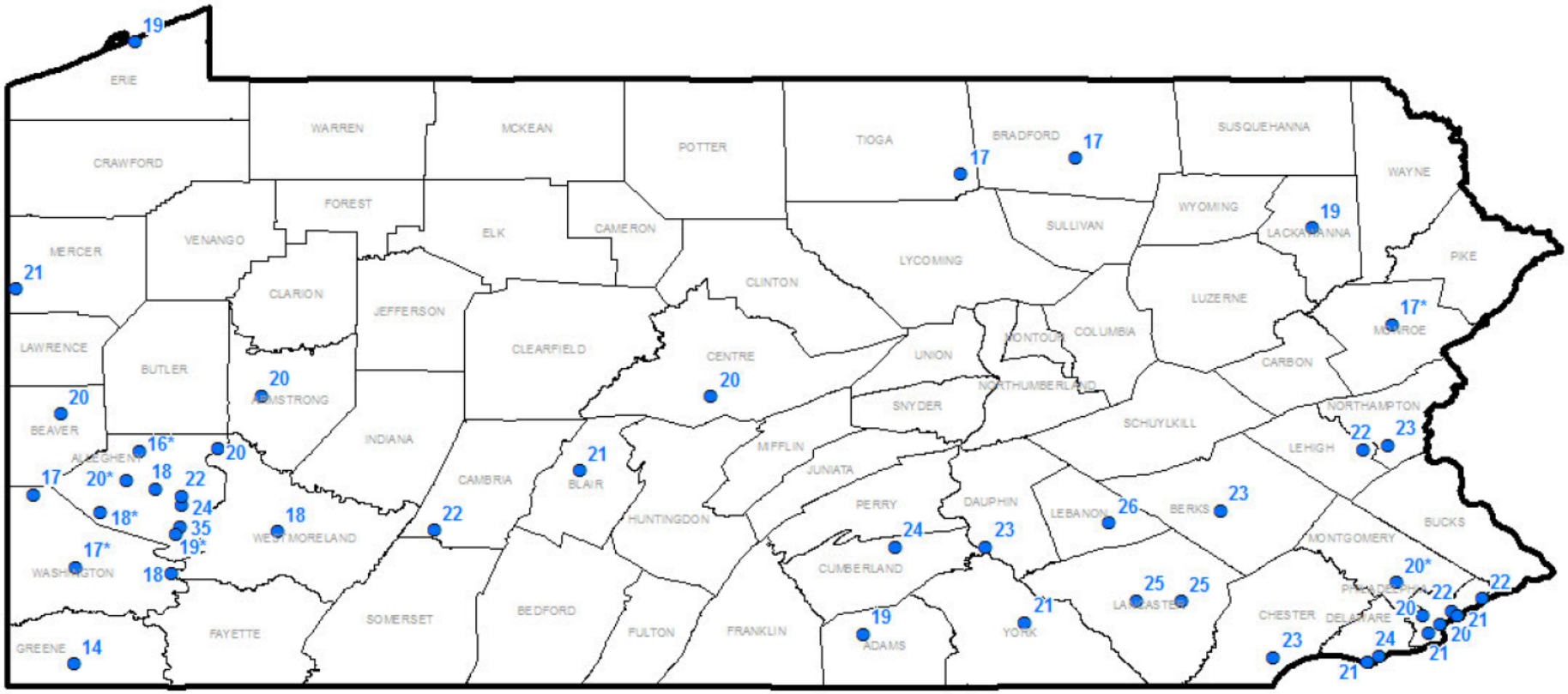
2017 24-hour $PM_{2.5}$ Design Values



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

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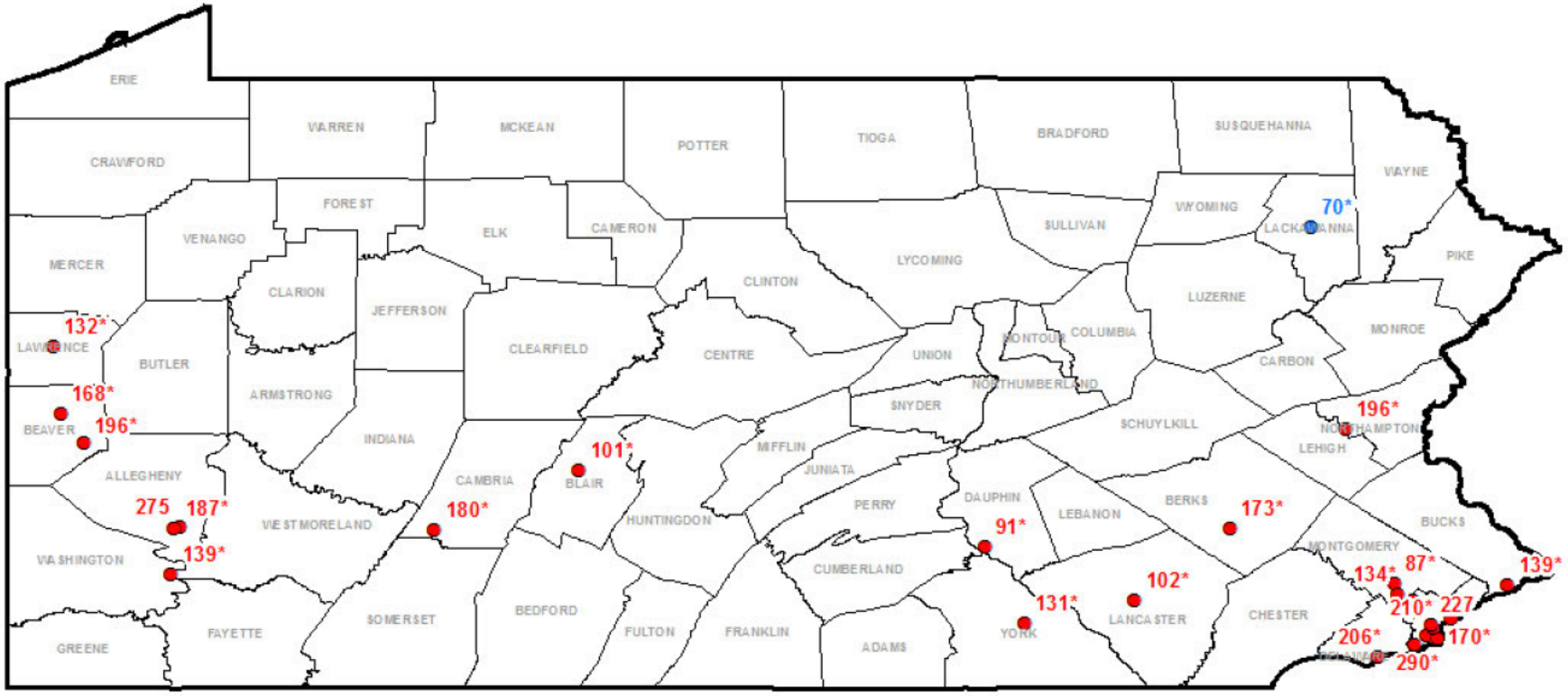
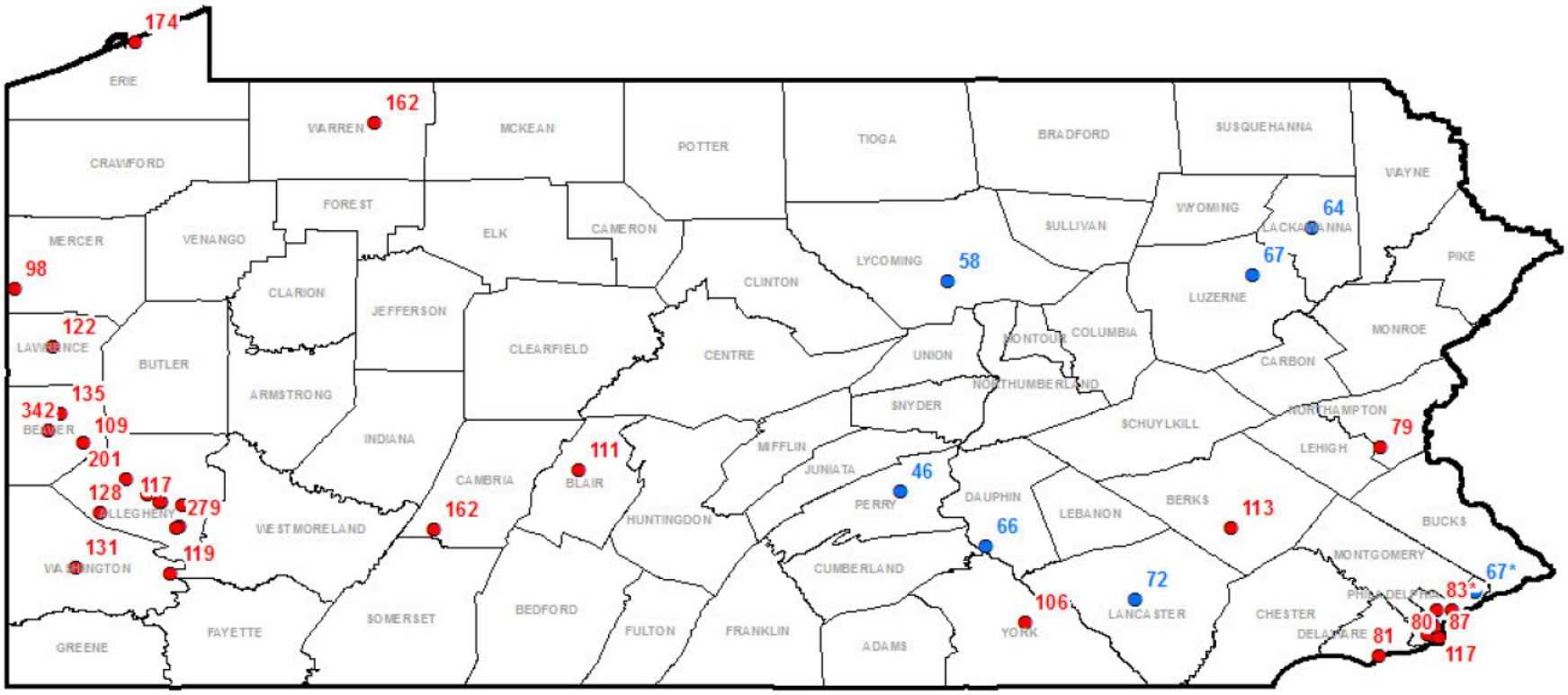
1980 1-hour SO_2 Design Values



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)

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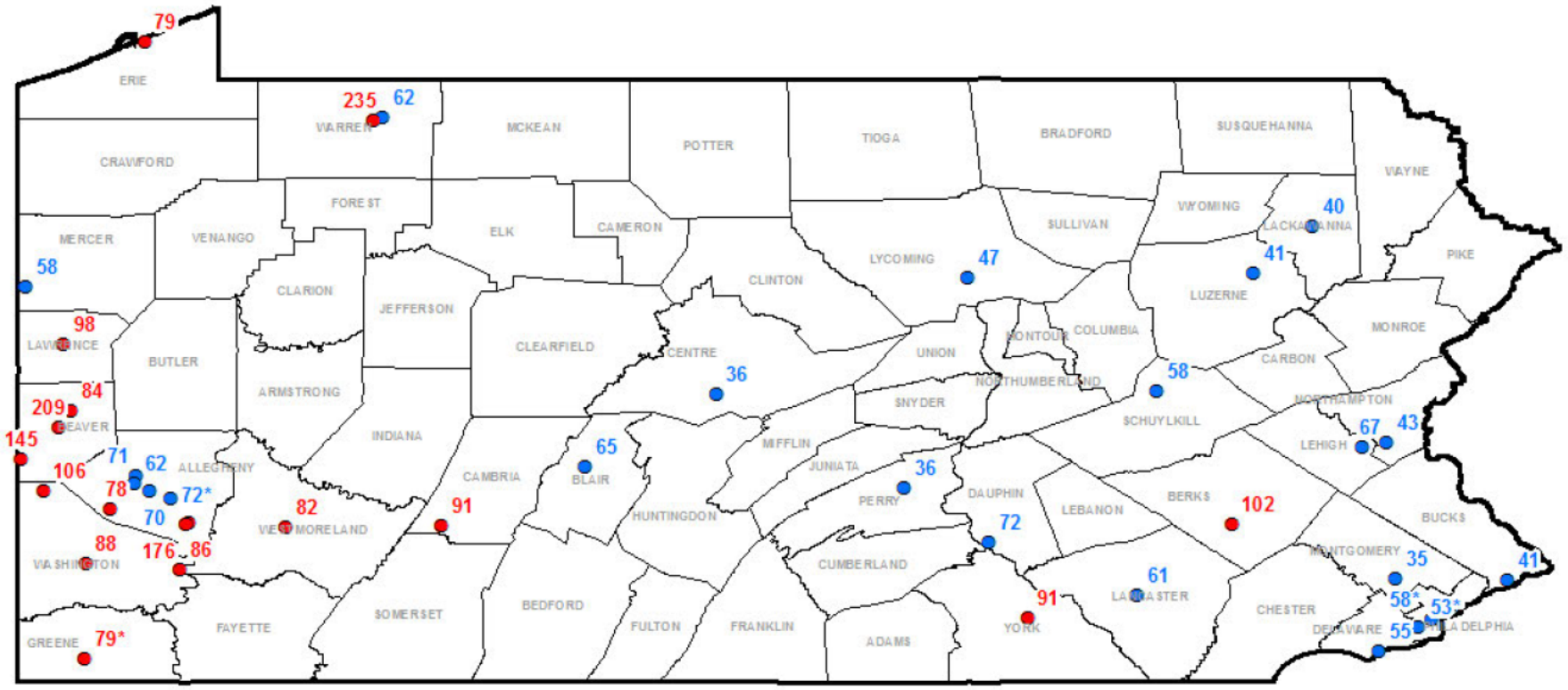
2005 1-hour SO_2 Design Values



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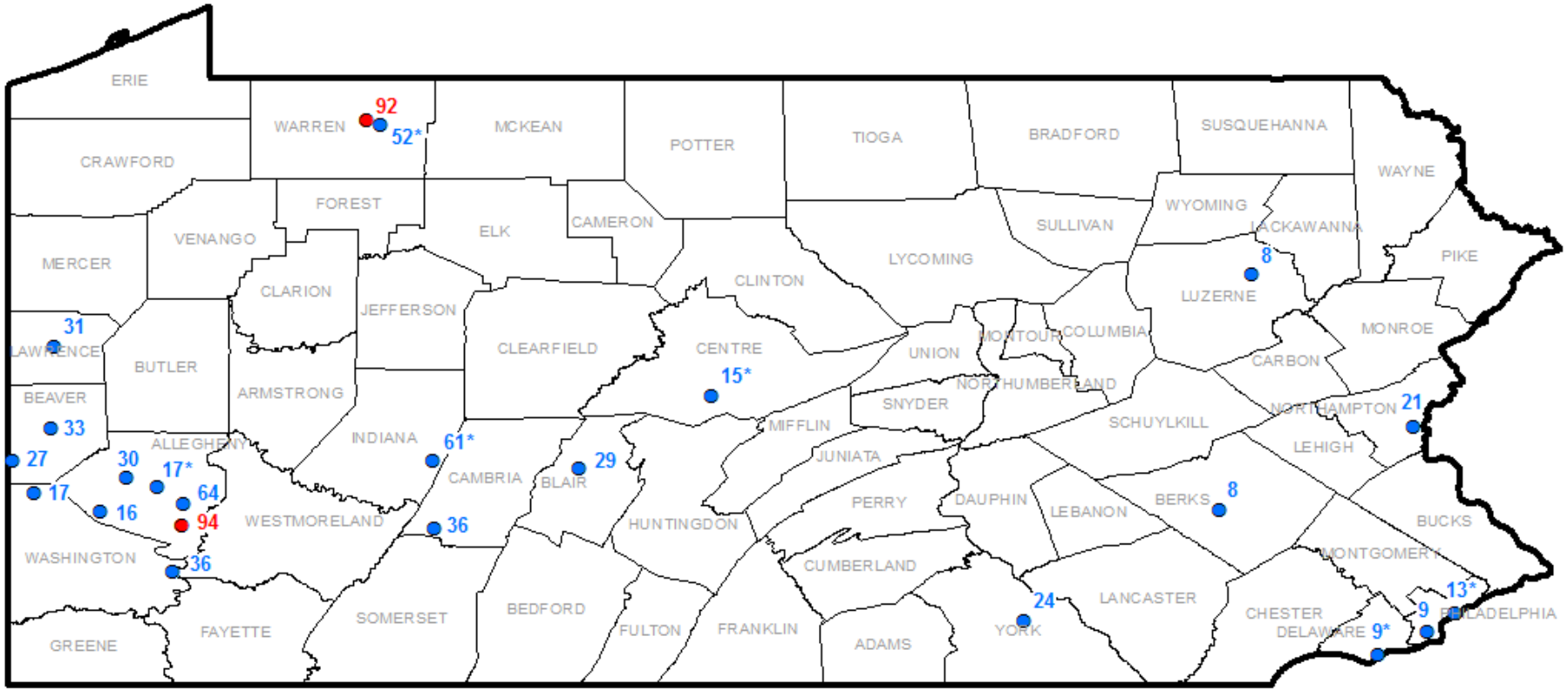
2016 1-hour SO_2 Design Values



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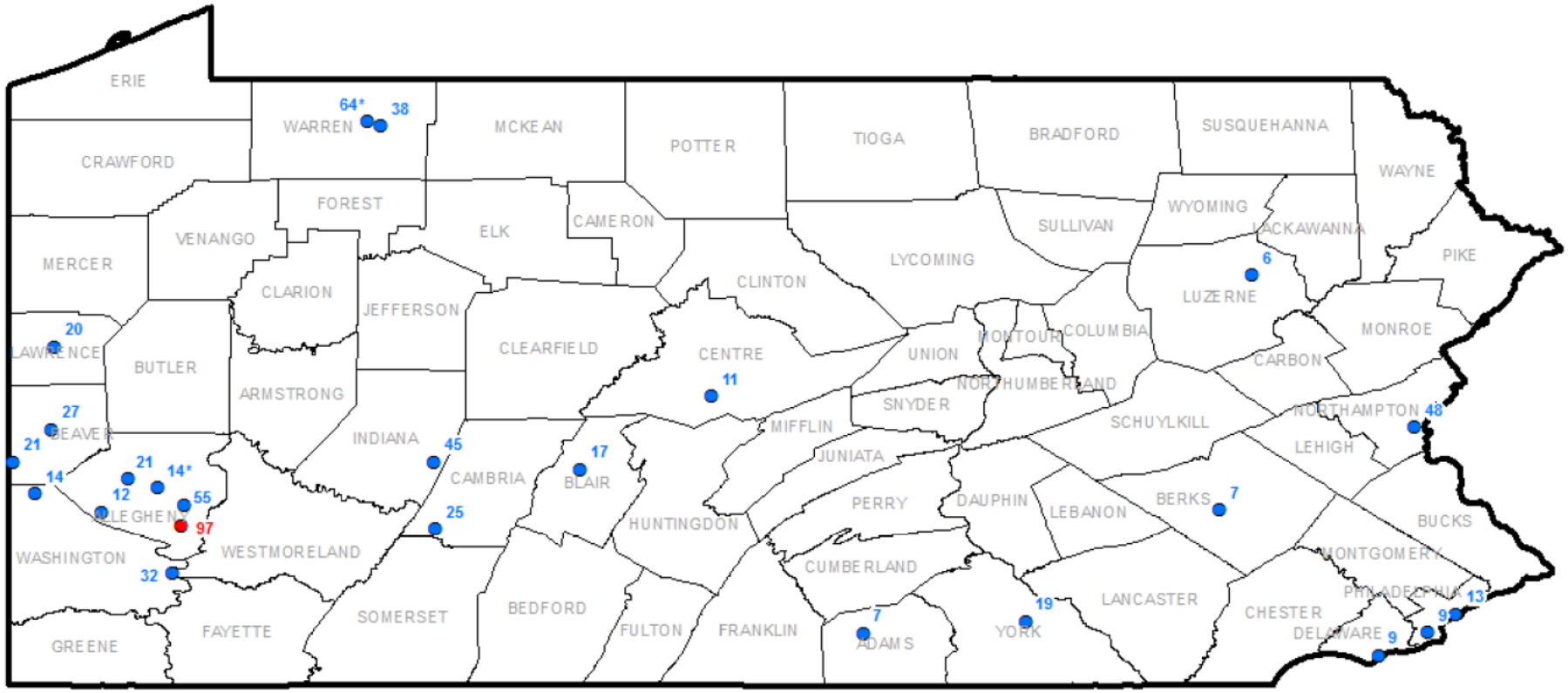
2017 1-hour SO_2 Design Values



Appearing in Red - 2017 1-Hour SO_2 Design Value above 75 ppb (2010 SO_2 Standard)

Appearing in Blue - 2017 1-Hour SO_2 Design Value at or below 75 ppb (2010 SO_2 Standard)

Challenges

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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
https://www.usatoday.com/story/sponsor-story/velux/2018/05/15/indoor-generation-and-health-risks-spending-more-time-inside/610289002/
https://www.theguardian.com/environment/2016/jul/27/children-spend-only-half-the-time-playing-outside-as-their-parents-did

EPA's View

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EPA's View

Our Nation's Air

Air Quality Improves as America Grows

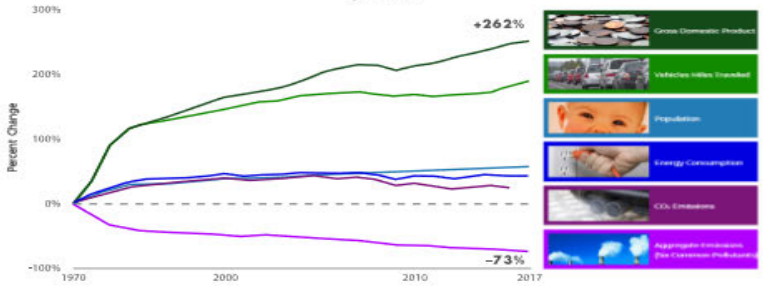
Status and Trends Through 2018

https://gispub.epa.gov/air/trendsreport/2018

Economic Growth with Clean Air

Between 1970 and 2017, the combined emissions of the six common pollutants ($PM_{2.5}$ and PM_{10}, SO_2, NO_X, VOCs, 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.

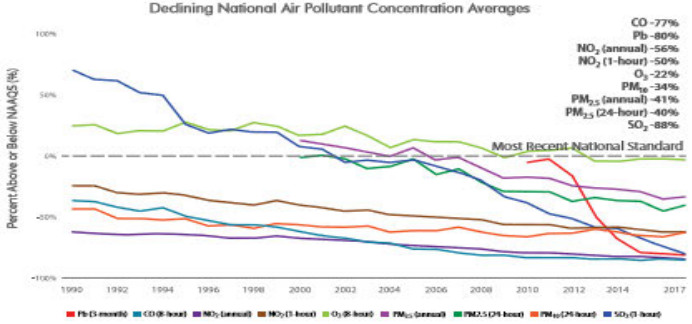
Comparison of Growth Areas and Declining Emissions
1970-2017



Air Quality Trends Show Clean Air Progress

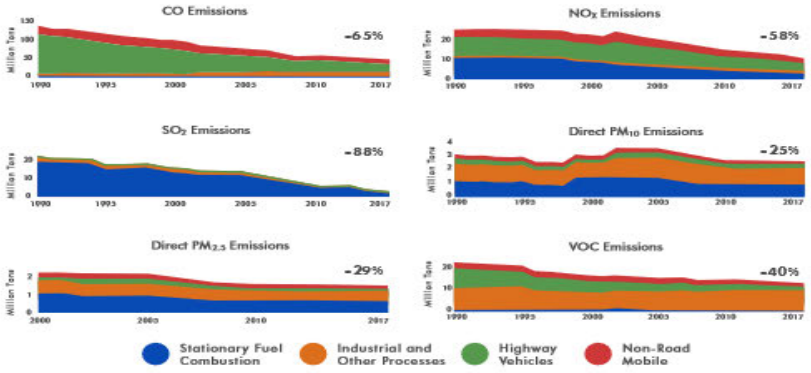
While some pollutants continue to pose serious air quality problems in areas of the U.S., nationally, criteria air pollutant concentrations have dropped significantly since 1990 improving quality of life for many Americans. Air quality improves as America grows.

Declining National Air Pollutant Concentration Averages



Air Pollutant Emissions Decreasing

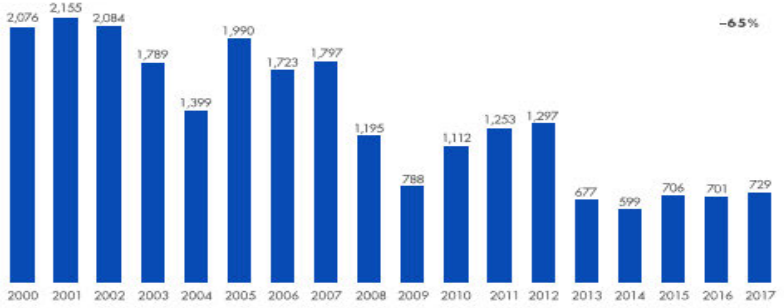
Emissions of key air pollutants continue to decline from 1990 levels. These reductions are driven by federal and state implementation of stationary and mobile source regulations.



Unhealthy Air Quality Days Trending Down

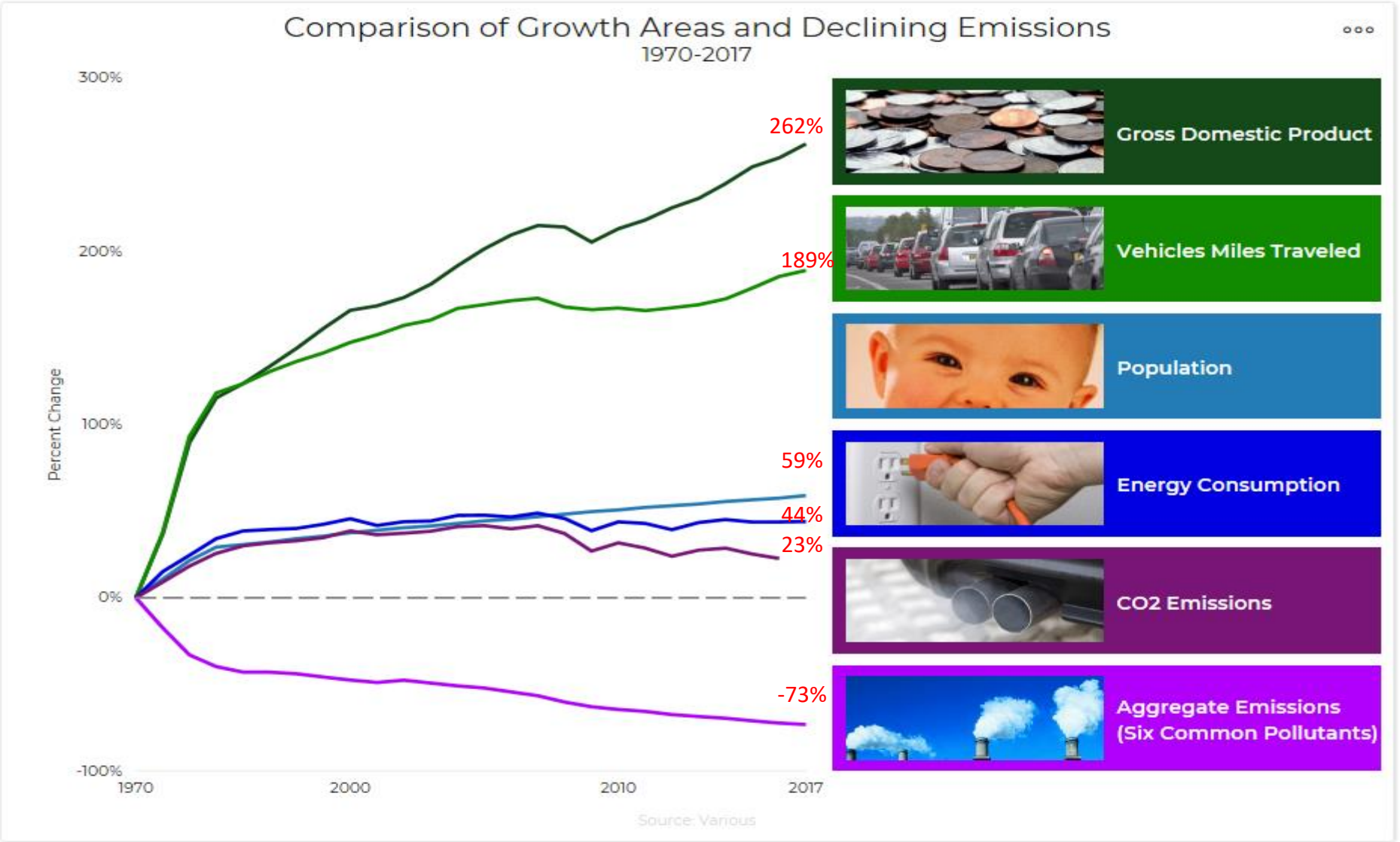
The Air Quality Index (AQI) is a color-coded index EPA uses to communicate daily air pollution for ozone, particle pollution, NO_2, CO, and SO_2. A value in the unhealthy range, above national air quality standard for any pollutant, is of concern first for sensitive groups, then for everyone as the AQI 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 $PM_{2.5}$ Combined)



https://gispub.epa.gov/air/trendsreport/2018/documentation/AirTrends_Flyer.pdf

EPA's View



https://gispub.epa.gov/air/trendsreport/2018/#growth_w_cleaner_air

EPA's View

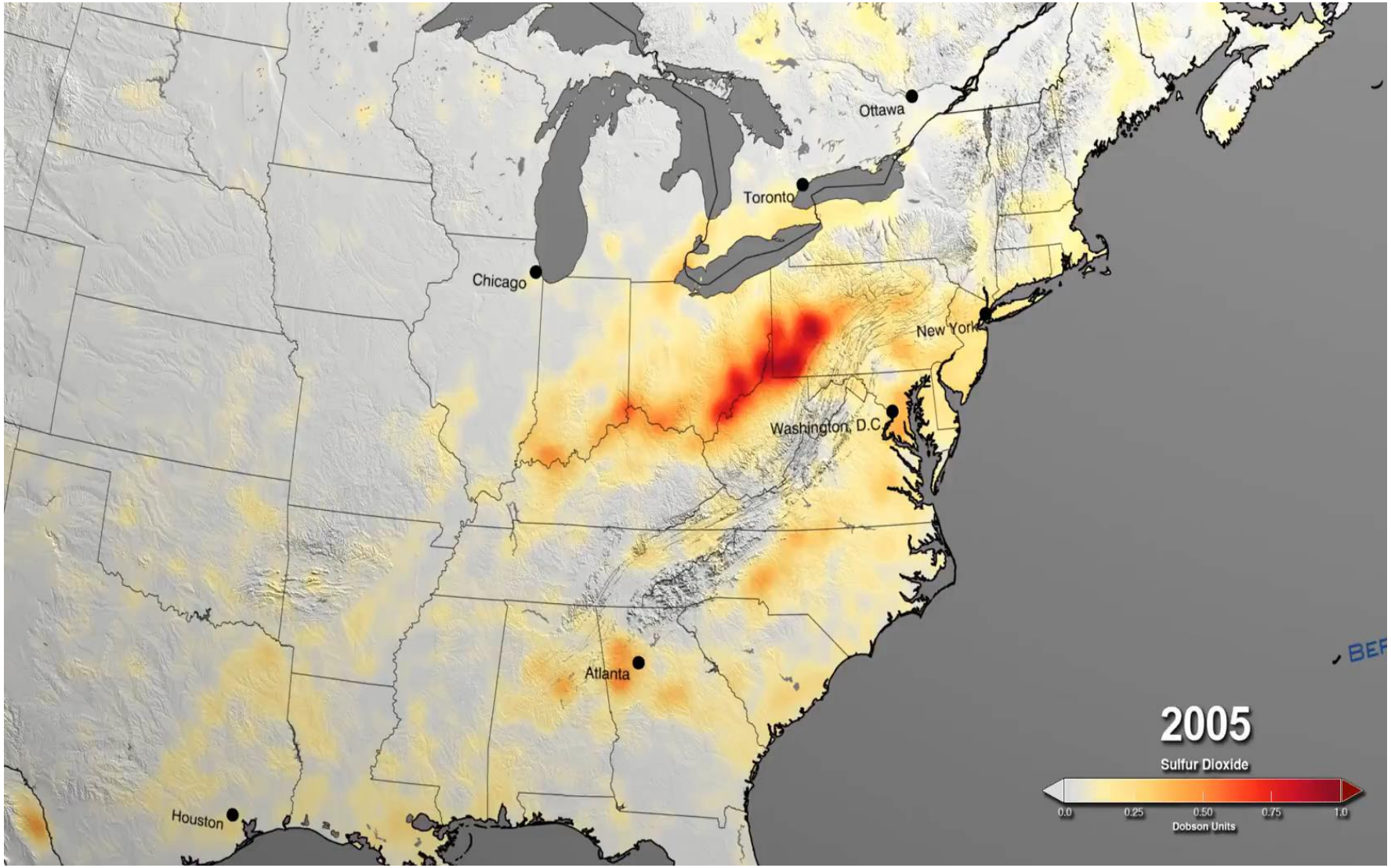
Nationally, concentrations of air pollutants have dropped significantly since 1990:

- Carbon Monoxide (CO) 8-Hour, ↓ 77%
- Lead (Pb) 3-Month Average, ↓ 80%
- Nitrogen Dioxide (NO_2) Annual, ↓ 56%
- Nitrogen Dioxide (NO_2) 1-Hour, ↓ 50%
- Ozone (O_3) 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 (SO_2) 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

SO2 Satellite Imagery



Air Quality Index

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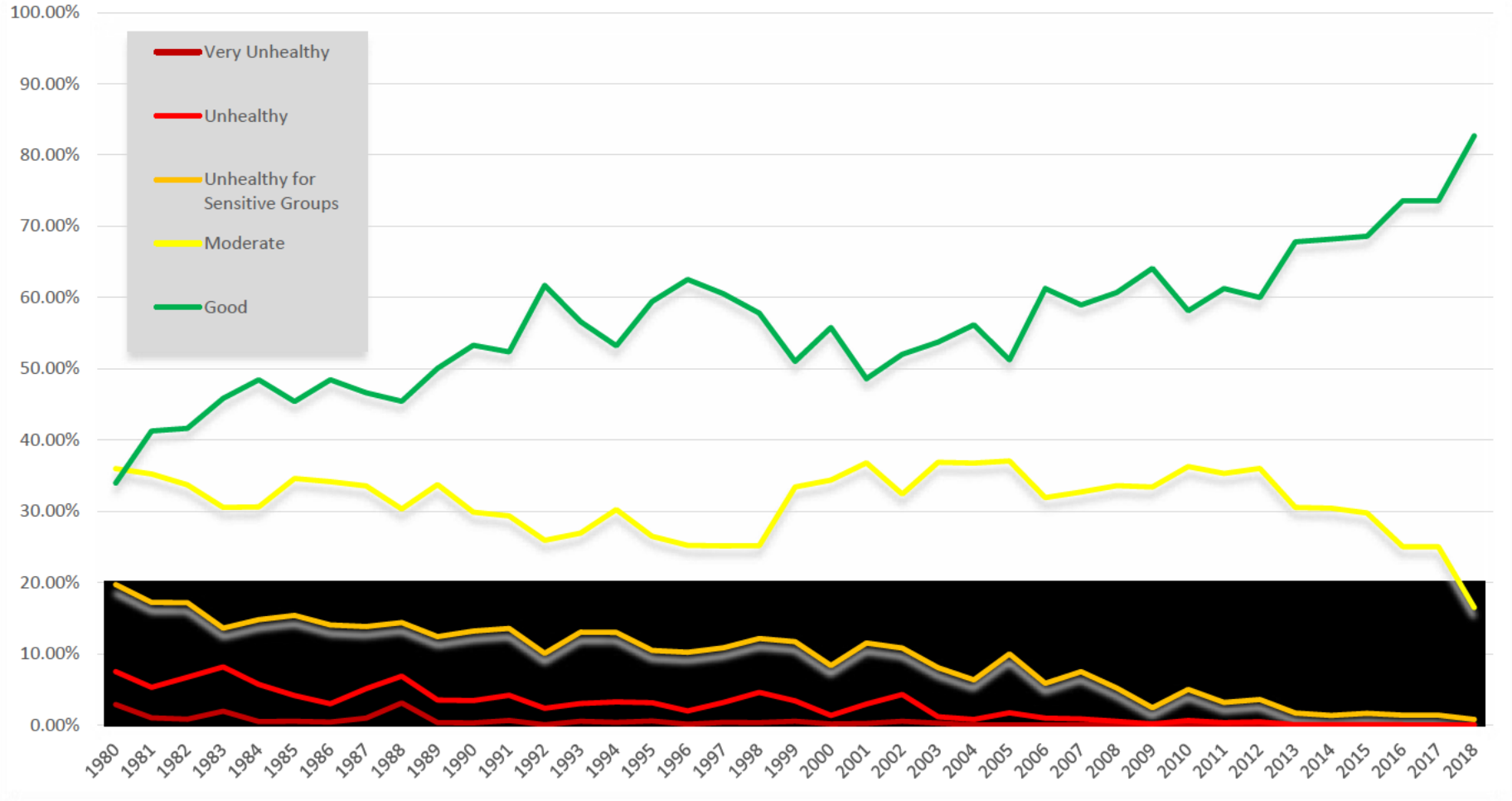
Historic AQI



Then and Now

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Corner of 5th and Liberty circa 1940

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

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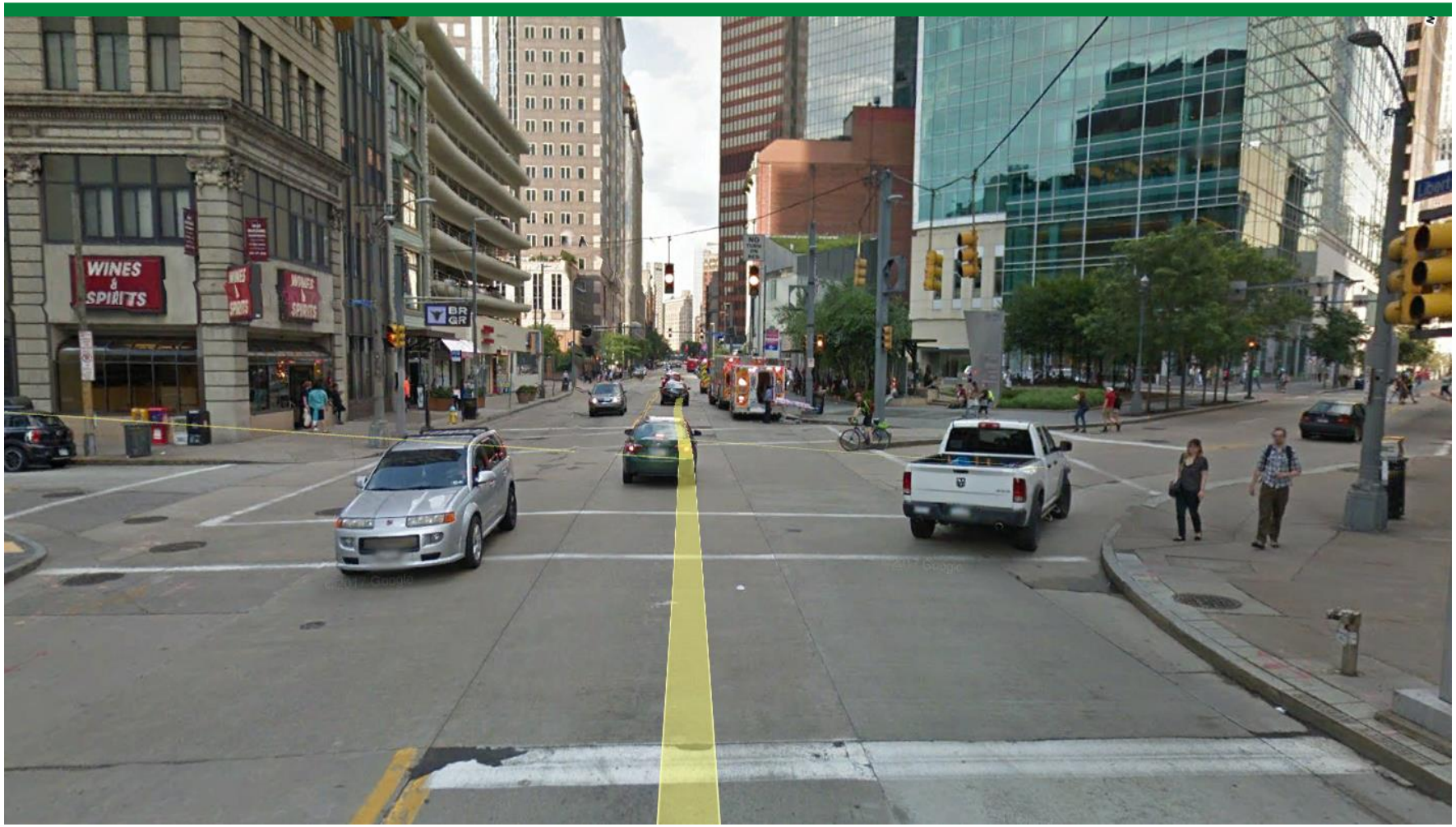
Corner of 5th and Liberty Today



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