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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Air Quality

Current State of Air Quality in PA

January 16, 2018

Citizens Advisory Council

Tom Wolf, Governor

Patrick McDonnell, Secretary

Agenda

- National Ambient Air Quality Standards
- DEP's Monitoring Network
- Air Quality Index and Air Quality Forecasting
- Ambient Air Quality Update for 2016
- Historical Air Quality (1980-2016)

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National Ambient Air Quality Standards (NAAQS)

- A series of standards promulgated by EPA under the Clean Air Act for pollutants considered harmful to public health and the environment.
- Primary standards provide public health protection.
- Secondary standards provide public welfare protection, i.e. damage to animals, vegetation, buildings and visibility.

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National Ambient Air Quality Standards

The six (6) criteria pollutants outlined in the Clean Air Act are as follows:

- Carbon Monoxide
- Lead
- Nitrogen Dioxide
- Ozone
- Particulate Matter ($PM_{2.5}$ and PM_{10})
- Sulfur Dioxide

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National Ambient Air Quality Standards

Pollutant		Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

DEP's Monitoring Network

- Pennsylvania's comprehensive ambient air monitoring network currently consists of:
  - 70 monitoring sites in 39 counties
  - 202 individual pieces of sampling equipment for all NAAQS related pollutants including 49 $PM_{2.5}$ samplers.
  - The Allegheny and Philadelphia County Health Departments operate air monitoring networks in their jurisdictions consisting of 20 and 10 monitoring sites, respectively.

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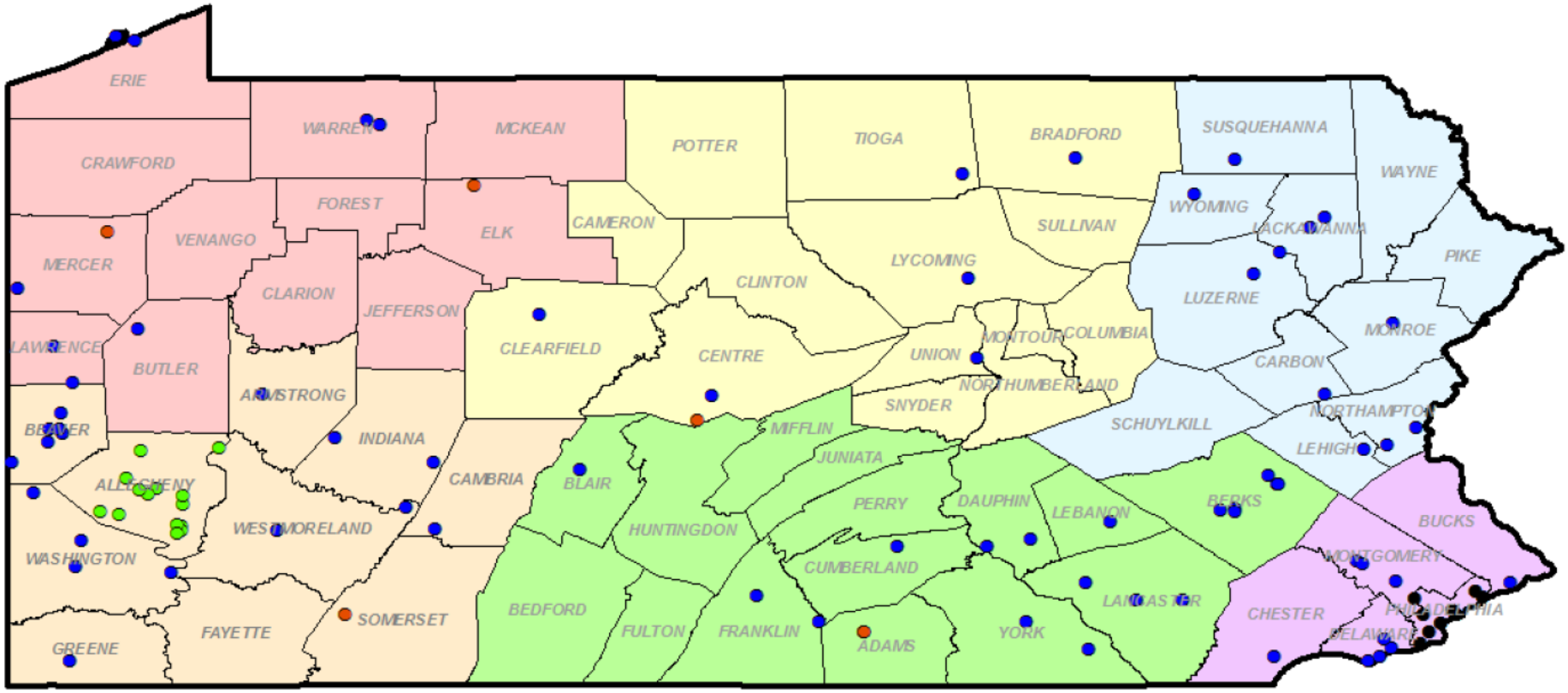
Background

PA Monitoring Network Sampling Parameters:

- Carbonyls: 4 Sites
- Carbon Monoxide: 5 Sites
- Hydrogen Sulfide: 2 Sites
- Mercury: One Site
- Nitrogen Dioxide: 13 Sites
- Ozone: 42 Sites
- Lead: 16 Sites
- Particulate Matter (PM_{10}): 9 Sites
- Particulate Matter ($PM_{2.5}$): 27 Sites
- Sulfur Dioxide: 21 Sites
- $PM_{2.5}$ Speciation: 9 Sites
- TSP/Metals: 8 Sites
- Volatile Organic Compounds: 19 Sites
- Acid Rain Samplers, 17 sites maintained by contract with Penn State University (PSU)
- Mercury Deposition Samplers, 13 sites maintained by PSU Contract

PA Ambient Air Monitoring Map



PA DEP Region

Northwest | Southwest | Northcentral | Southcentral | Northeast | Southeast

Primary QA Organization

ACHD | AMS | CASTNET | PADEP

The Air Quality Index Scale

- U.S. Environmental Protection Agency's Air Quality Index (AQI) provides daily air quality reports on five criteria pollutants
  - Carbon monoxide, nitrogen dioxide, particulate matter, ozone, sulfur dioxide.
- The AQI scale normalizes the concentrations of five criteria pollutants into one, easy-to-use scale
- The AQI is based on a color-coded system, outlining the severity of the health effects
  - The higher the AQI value, the greater the air pollution levels and health concerns.

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AQI Reporting

AQI Range	EPA Color Scale	EPA Descriptor	Health Advisory
0 to 50	Green	**Good**	The air quality is good and you can engage in outdoor physical activity without health concerns.
51 to 100	Yellow	**Moderate**	At this level the air is probably safe for most people. However, some people are unusually sensitive and react to ozone in this range, especially at the higher levels (in the 80s and 90s). People with heart and lung diseases such as asthma, and children, are especially susceptible. People in these categories, or people who develop symptoms when they exercise at "yellow" ozone levels, should consider avoiding prolonged outdoor exertion during the late afternoon or early evening when the ozone is at its highest.
101 to 150	Orange	**Unhealthy for Sensitive Groups**	In this range the outdoor air is more likely to be unhealthy for more people. Children, people who are sensitive to ozone, and people with heart or lung disease should limit prolonged outdoor exertion during the afternoon or early evening when ozone levels are highest.
151 to 200	Red	**Unhealthy**	In this range even more people will be affected by ozone. Most people should restrict their outdoor exertion to morning or late evening hours when the ozone is low, to avoid high ozone exposures.
201 to 300	Purple	**Very Unhealthy**	Increasingly more people will be affected by ozone. Most people should restrict their outdoor exertion to morning or late evening hours when the ozone is low, to avoid high ozone exposures.
Over 300	Black	**Hazardous**	Everyone should avoid all outdoor exertion.

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AQI Reporting

AQI Range	1hr Ozone (ppm)	8hr Ozone (ppm)	24hr PM-2.5 (µg/m³)	8hr Carbon Monoxide (ppm)	1hr Sulfur Dioxide (ppm)	24hr Sulfur Dioxide (ppm)	1hr Nitrogen Dioxide (ppm)	24hr PM-10 (µg/m³)
0 - 50	Not Defined	0 - 0.054	0 - 12.0	0 - 4.4	0 - 0.035	Not Defined	0 - 0.053	0 - 54
51 - 100	Not Defined	0.055 - 0.070	12.1 - 35.4	4.5 - 9.4	0.036 - 0.075	Not Defined	0.054 - 0.1	55 - 154
101 - 150	0.125 - 0.164	0.071 - 0.085	35.5 - 55.4	9.5 - 12.4	0.076 - 0.185	Not Defined	0.101 - 0.36	155 - 254
151 - 200	0.165 - 0.204	0.086 - 0.105	55.5 - 150.4	12.5 - 15.4	0.186 - 0.304	Not Defined	0.361 - 0.64	255 - 354
201 - 300	0.205 - 0.404	0.106 - 0.200	150.5 - 250.4	15.5 - 30.4	Not Defined	0.305 - 0.604	0.65 - 1.24	355 - 424
301 - 400	0.405 - 0.504	201 – Significant Harm Level	250.5 - 350.4	30.5 - 40.4	Not Defined	0.605 - 0.804	1.25 - 1.64	425 - 504
401 - 500	0.505 - 0.604		350.5 - 500.4	40.5 - 50.4	Not Defined	0.805 - 1.004	1.65 - 2.04	505 - 604
500+	Not Defined		500.5 - 999.9	Not Defined	Not Defined	Not Defined	Not Defined	605 - 4999

AQI Reporting

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Currently Forecast for Ozone and PM2.5

AQI Reporting

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Forecast Action Days when we feel conditions will reach Code ORANGE or higher

Air Quality Forecasting in PA

- DEP provides daily air quality forecasts for 28 areas across the commonwealth.
  - Year-round forecasting is provided for the following areas:
    - Lehigh Valley / Berks Area – Berks, Lehigh and Northampton counties.
    - Philadelphia Area – Bucks, Chester, Delaware and Montgomery counties.
    - Pittsburgh Area – Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland counties.
    - Susquehanna Valley area – Cumberland, Dauphin, Lancaster, Lebanon, and York counties.
- Forecasts for the Greater Philadelphia Area are completed by Pennsylvania State University.

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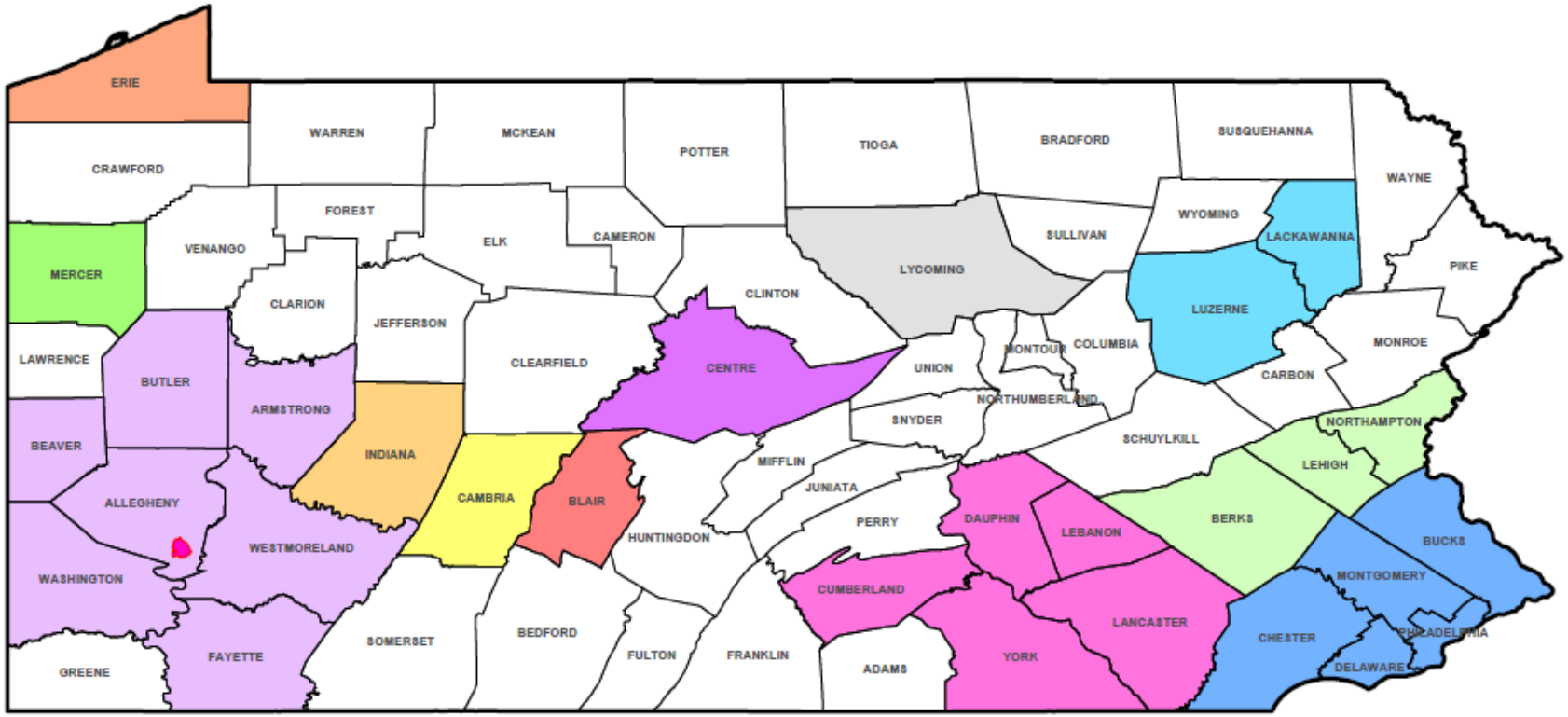
Air Quality Forecasting in PA

- DEP provides summer-only air quality forecasts for eight additional areas:
  - Altoona - Blair County
  - Erie – Erie County
  - Indiana County
  - Johnstown – Cambria County
  - Mercer County
  - Scranton / Wilkes-Barre – Lackawanna and Luzerne Counties
  - State College – Centre County
  - Williamsport – Lycoming County
- The forecasts are usually issued by 3:00 PM daily, giving insight about what weather factors cause the forecasted air quality conditions.
- Sign up for the forecast at http://www.enviroflash.info

PA Air Quality Forecast Map



Air Quality Forecast Areas

- Altoona
- Erie
- Indiana County
- Johnstown
- Lehigh Valley
- Mercer County
- Scranton / Wilkes-Barre
- Southeast (Philadelphia Area)
- Southwest (Pittsburgh Area)
- State College
- Susquehanna Valley
- Liberty-Clairton
- Williamsport

EnviroFlash Forecast

A(n) Air Quality Action Day has been declared for Susquehanna Valley, PA, on Saturday, Feb 8

Tomorrow's Forecast

Saturday, Feb 8:	110 AQI	Unhealthy for Sensitive Groups	Orange	Particle Pollution (2.5 microns)

Extended Forecast

Sunday, Feb 9:	100 AQI	Moderate	Yellow	Particle Pollution (2.5 microns)
Monday, Feb 10:	65 AQI	Moderate	Yellow	Particle Pollution (2.5 microns)
Tuesday, Feb 11:	75 AQI	Moderate	Yellow	Particle Pollution (2.5 microns)

Current Conditions as of 1 PM on Friday: Ample sunshine under blue skies is always a welcome sight, but temperatures once again remain several degrees below normal this afternoon. High pressure will continue to build and move overhead tonight and into the day on Saturday. A few weak disturbances will swing through the region over the course of the weekend, with little to no precipitation associated with them. *** Saturday's Forecast: Mostly clear skies into the overnight and early morning hours will allow temperatures to fall into at least the teens once again tonight. With high pressure continuing to build and shift to more overhead on Saturday, winds will become light to calm for a good portion of the day. There have been a few occasions in the past that I can remember where an icy surface on snow cover under high pressure with calm winds near the surface has allowed PM 2.5 levels to reach Code Orange levels. Conditions appear favorable for this to occur once again on Saturday. A weak disturbance passing through the region may create a brief period of snow showers. This system will not have much moisture to work with, so the less snow that develops the better the chance that PM 2.5 levels do not fall enough to avoid Code Orange for the day. Highs on Saturday will approach the 30 degree mark. *** Sunday's Forecast: Another weak disturbance will swing through the region during the overnight hours with little to no precipitation expected once again. Winds will remain light to calm through at least the early afternoon before becoming a southwesterly breeze as we move to the backside of the area of high pressure. PM 2.5 levels will remain elevated, but we will need to see if any of the weak disturbances do impact concentrations on Saturday before making a final call. Also, the southwesterly flow running over the icy snow cover may generate misty/foggy conditions as temperatures climb into the mid 30s. As a result of this uncertainty, this forecast will be updated Saturday afternoon with at least high moderate concentrations expected. *** Extended Forecast: As one area of high pressure moves out, another will develop from the west. Winds will shift from southwesterly Sunday afternoon to more northwesterly during the early hours of Monday. This northwesterly wind should become breezy enough to help increase vertical mixing around the region. PM 2.5 concentrations should fall back into the moderate range. Concentrations may begin to approach the high end of the moderate range to Code Orange on Tuesday and especially Wednesday next week. Winds will become light to calm once again as this next area of high pressure moves in overhead. Some warming aloft on Wednesday would produce favorable conditions for rising concentrations. The next potential storm system to impact the region may occur on Wednesday/Thursday, but there is much uncertainty at this time as to where it will track. --- Roble

Here are some Air Quality Action Day tips you can follow to help reduce pollution:

Days when ozone levels are expected to be high:

* Conserve electricity and set your air conditioner at a higher temperature.
* Choose a cleaner commute—share a ride to work or use public transportation. Bicycle or walk to errands when possible.
* Refuel cars and trucks after dusk.
* Combine errands and reduce trips.
* Limit engine idling.
* Use household, workshop, and garden chemicals in ways that keep evaporation to a minimum, or try to delay using them when poor air quality is forecast.

Days when particle pollution levels are expected to be high:

* Reduce or eliminate fireplace and wood stove use.
* Avoid using gas-powered lawn and garden equipment.
* Avoid burning leaves, trash and other materials.

This forecast is brought to you by the Pennsylvania Department of Environmental Protection (PA DEP) and the Air Quality Partnership of the Susquehanna Valley.

* For more information on the health effects of PM 2.5 and ozone, visit the EPA Airnow website.
* To see the current forecast and monitoring information for the Southwest PA Region, visit us online at the PA DEP Forecast and Monitoring Site.
* To find out more information about the Air Quality Partnership of the Susquehanna Valley, visit the AQP of SV Website.

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Ambient Air Quality Update for 2016

2016 – A year in review.

- Summary of Meteorological Conditions
- Summary of Air Quality Concentrations
  - Ozone
  - Fine Particulate Matter ($PM_{2.5}$)
  - Sulfur Dioxide (SO_2)
- Conclusions

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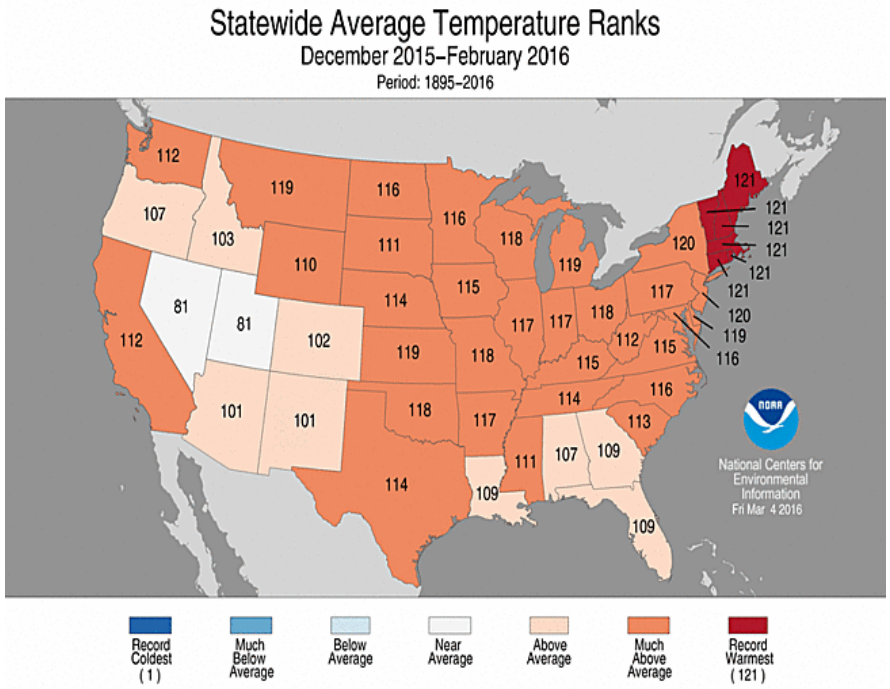
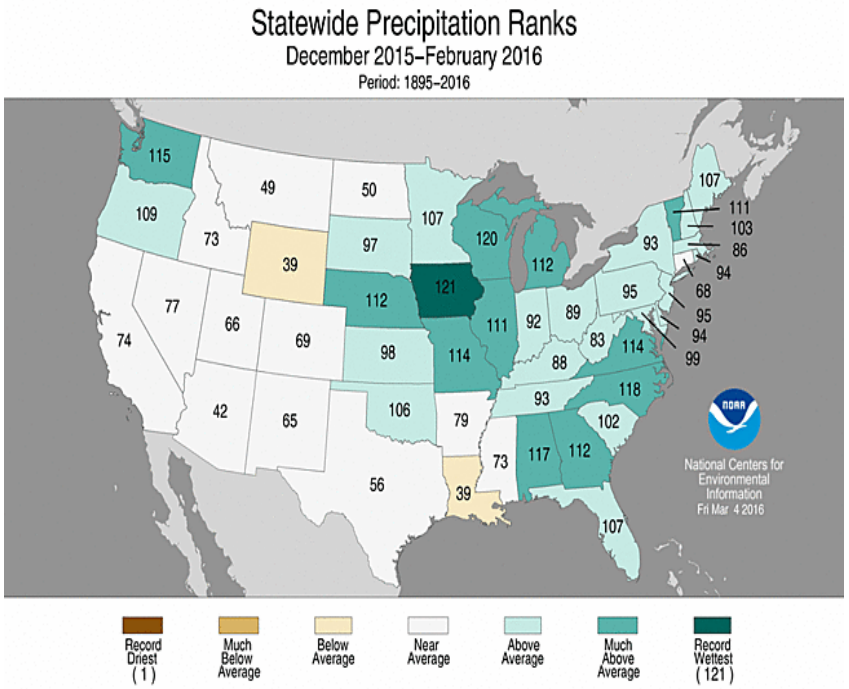
Meteorology - Winter 2016

Temperature



Precipitation



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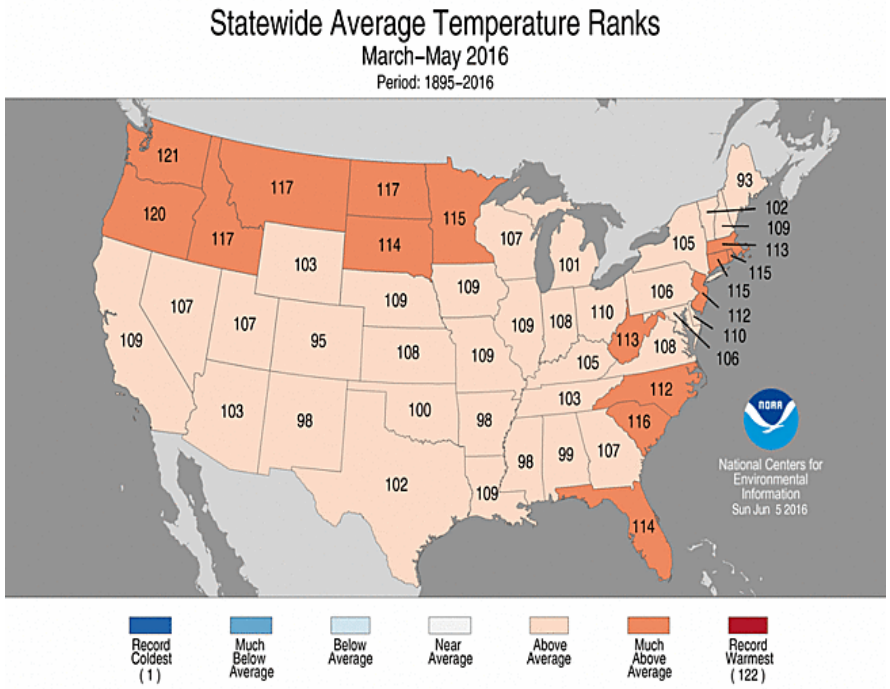
Meteorology - Spring 2016

Temperature



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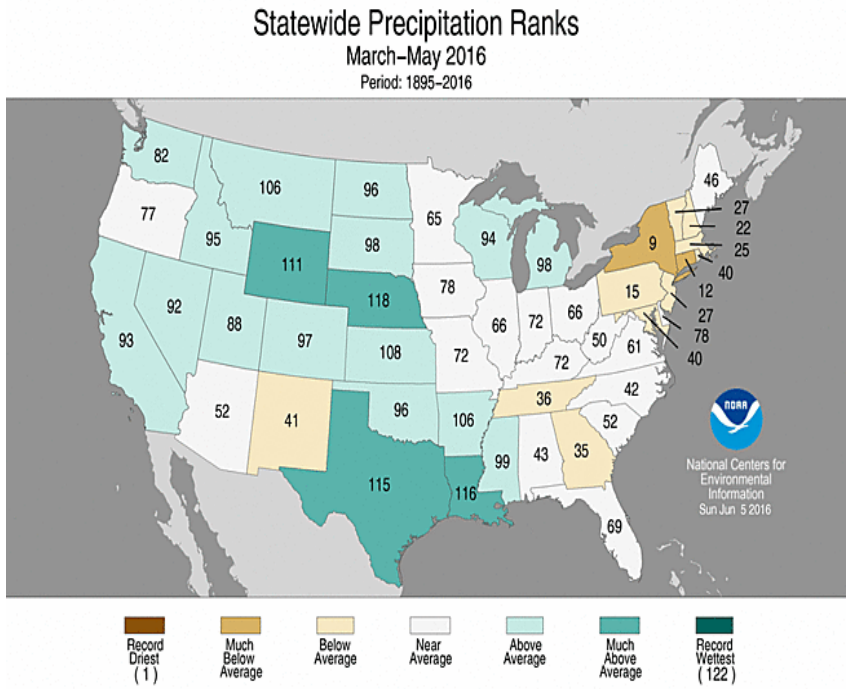

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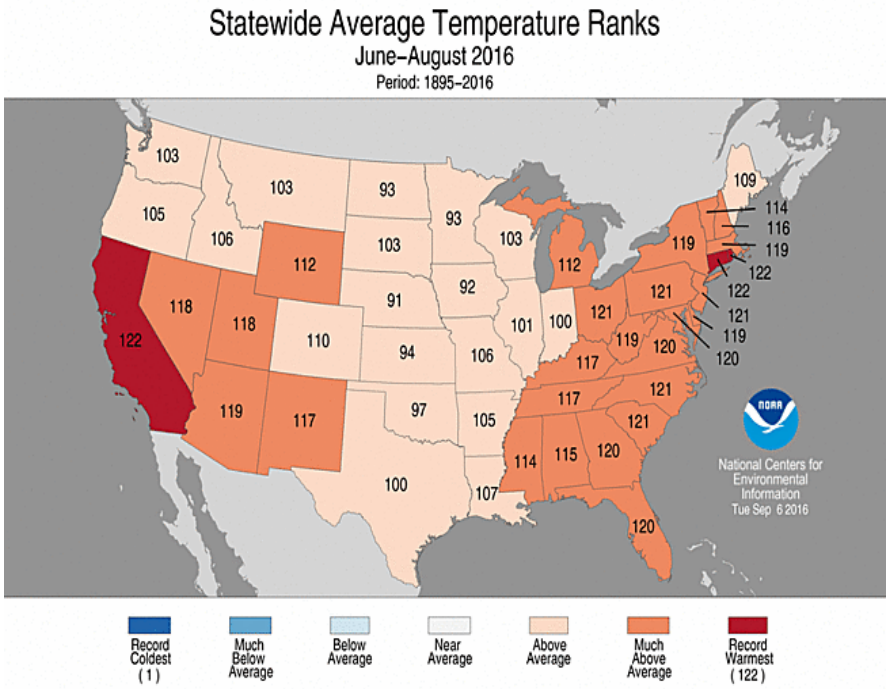
Meteorology - Summer 2016

Temperature



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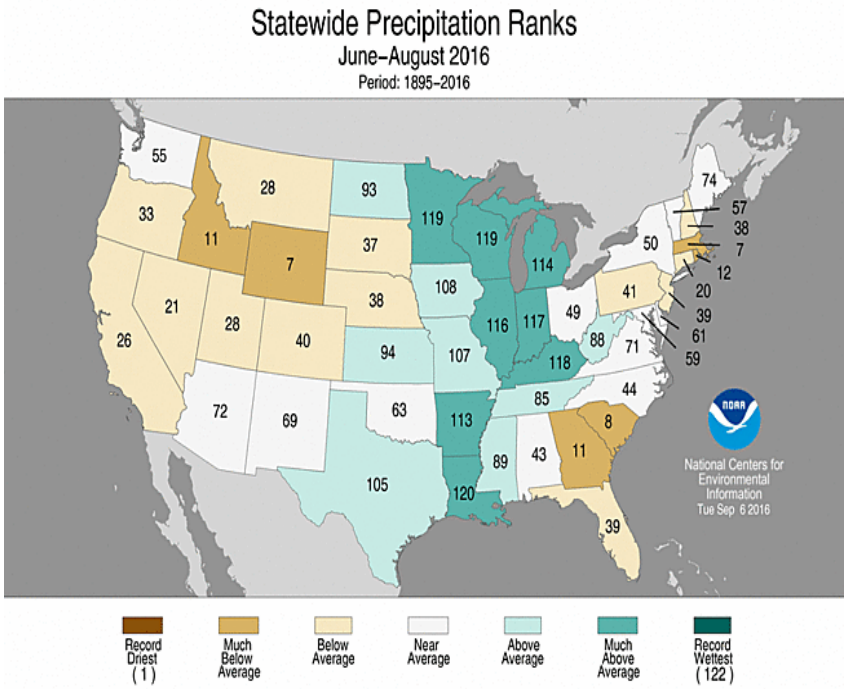

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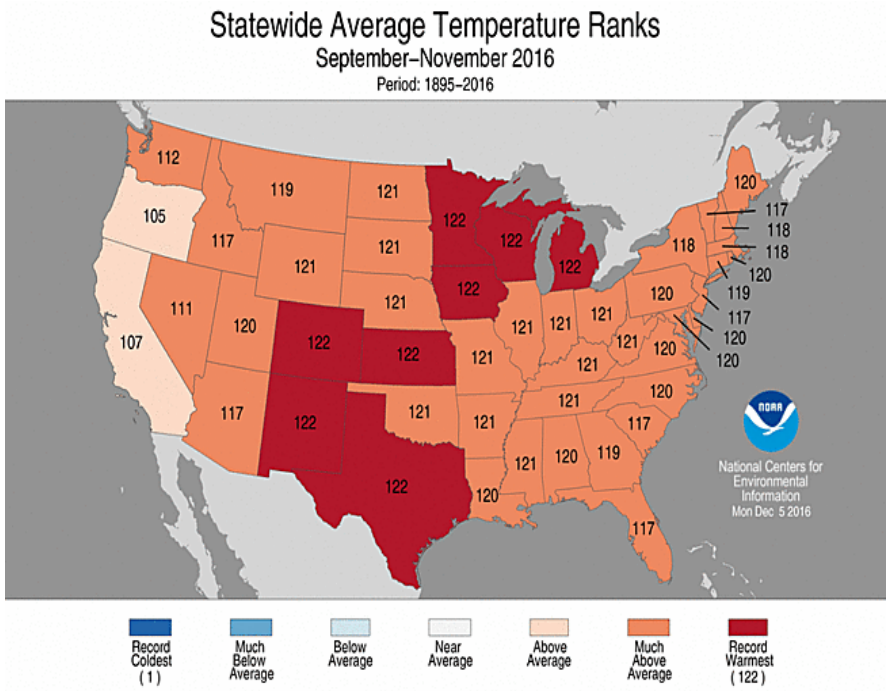
Meteorology – Fall 2016

Temperature



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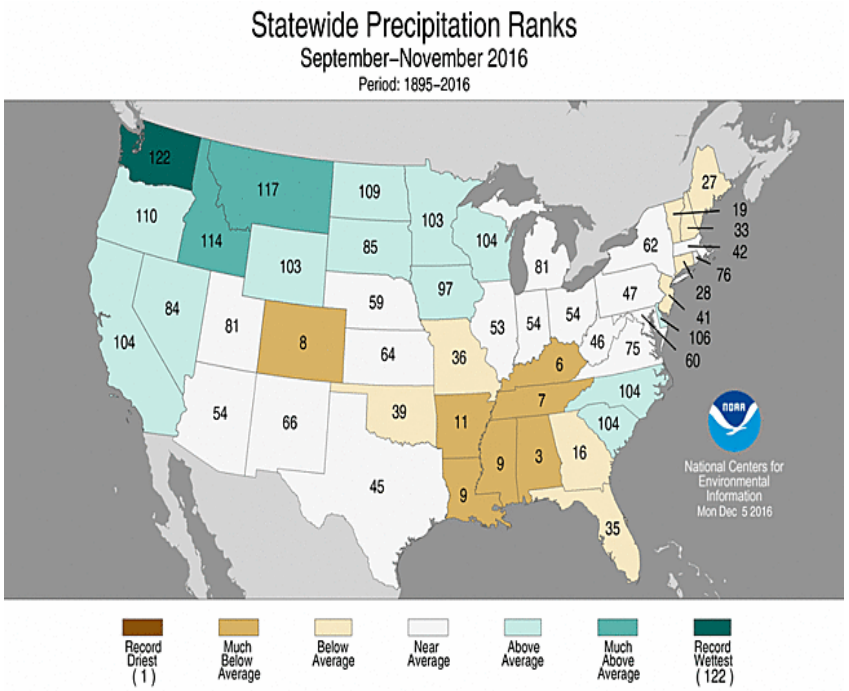

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2016 Ozone Monitoring Summary

- Ozone monitoring season – April to October (PA monitors ozone year-round).
- Overview of the projected 2016 design values (DV) for the 8-hour ozone national ambient air quality standard (NAAQS).
- 2016 DV calculation – 4th high from 2014, 2015, and 2016 averaged over a. 3-year period

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Number of 8-hour Ozone Exceedances

- Number of 8-hour ozone exceedance days (of 2015 ozone NAAQS of 70 parts per billion) and total number of exceedances per year within Pennsylvania's monitoring network (~50 ozone monitors):
  - 2014: 17 days | 66 total exceedances.
  - 2015: 34 days | 150 total exceedances.
  - 2016: 27 days | 167 total exceedances.

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2008 8-Hour Ozone NAAQS Attainment Status

- In 2015, zero samplers in the commonwealth monitored nonattainment of the 2008 8-hour ozone NAAQS (0.075 parts per million or 75 parts per billion).
- In 2016, two samplers (Bristol and Northeast Airport) in the commonwealth are monitoring nonattainment of the 2008 8-hour ozone NAAQS.

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2015 8-Hour Ozone NAAQS Attainment Status

- In 2015, eight samplers in the commonwealth monitored nonattainment of the 2015 8-hour ozone NAAQS (0.070 parts per million or 70 parts per billion).
- In 2016, seven samplers in the commonwealth are monitoring nonattainment of the 2015 8-hour ozone NAAQS.

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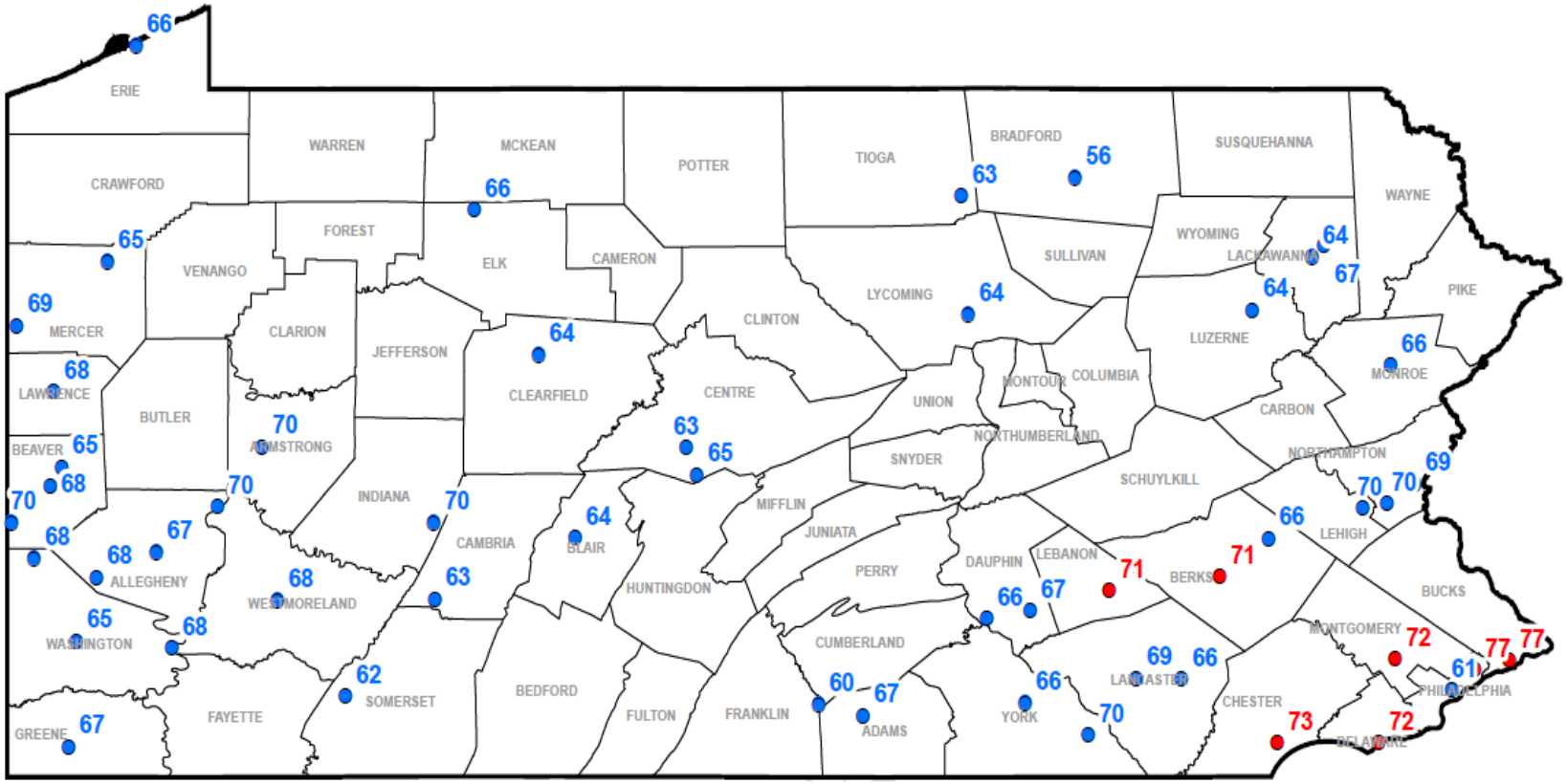
2016 8-Hour Ozone Design Values



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)

Historical 8-hour Ozone Concentrations in PA

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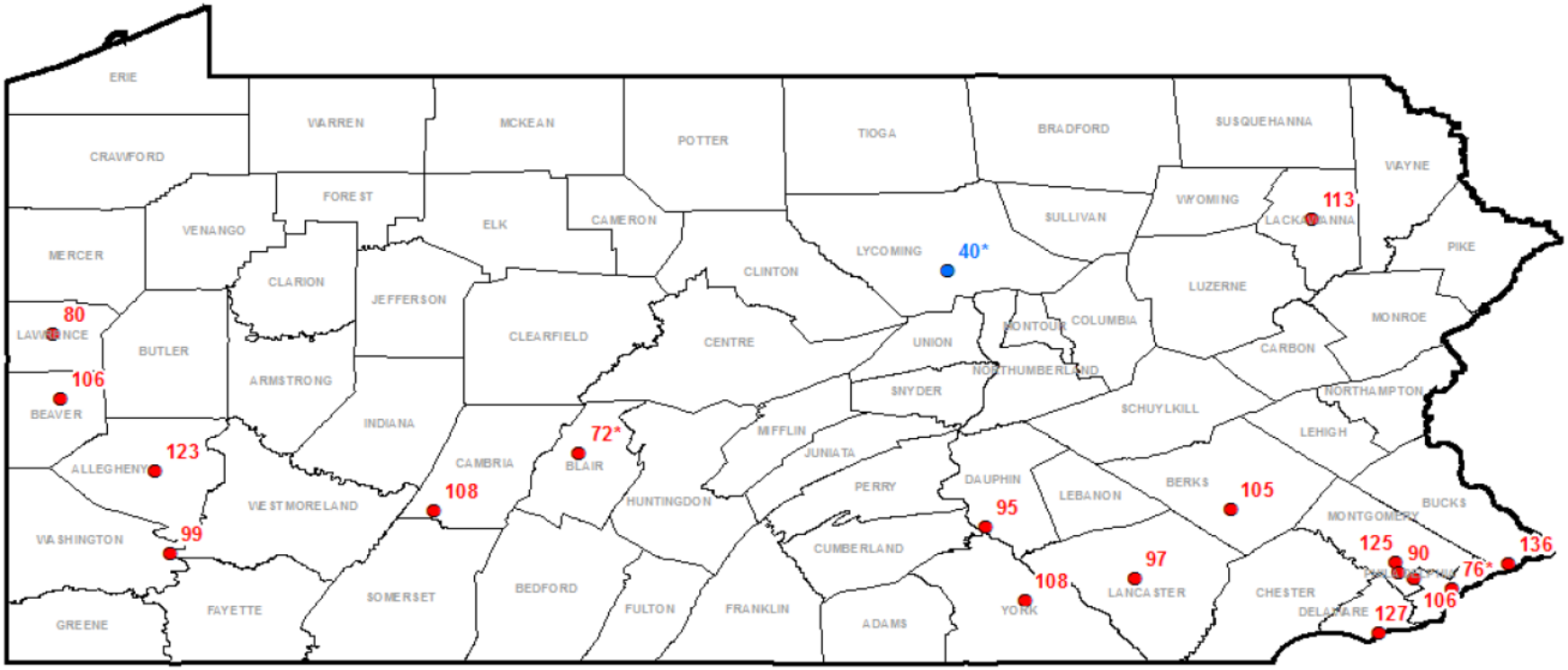
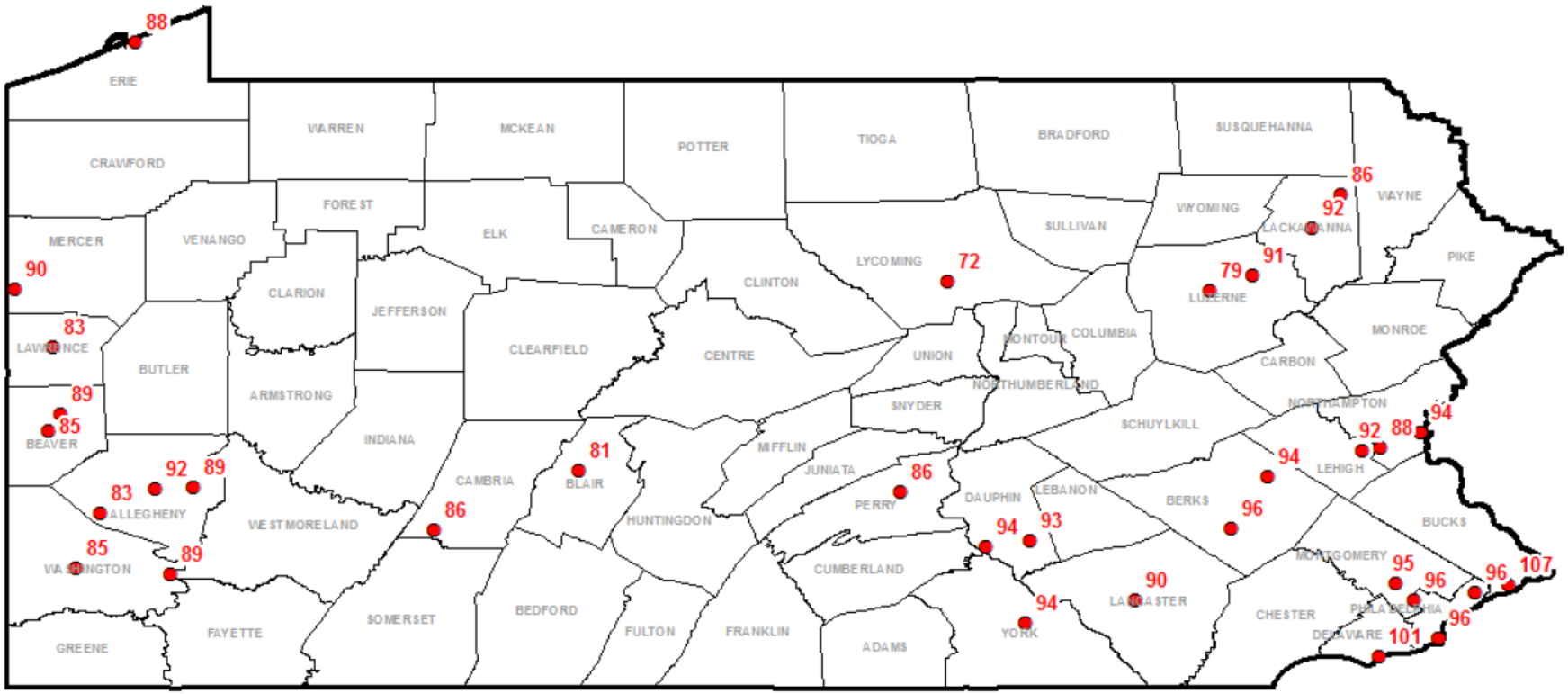
1980 8-Hour Ozone Design Values



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)

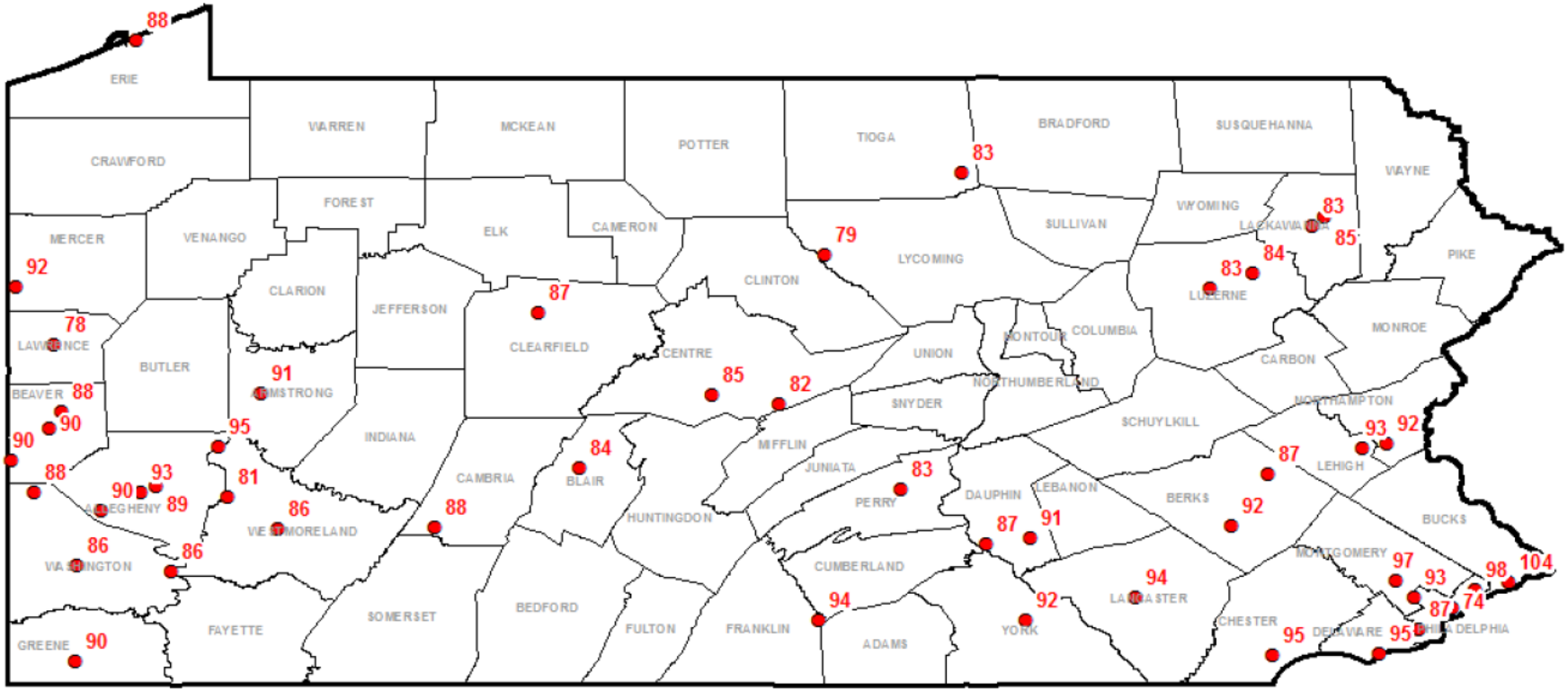
1991 8-Hour Ozone Design Values



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)

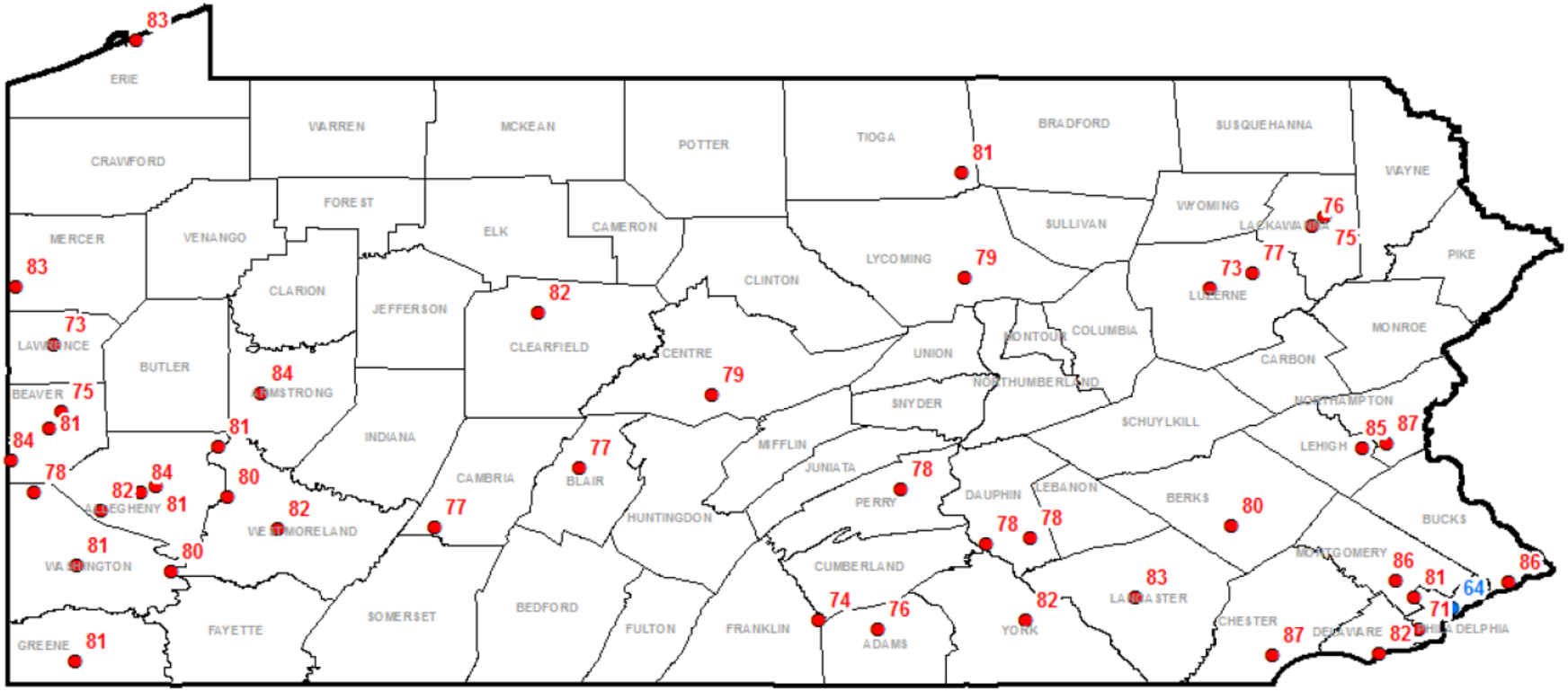
2002 8-Hour Ozone Design Values



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)

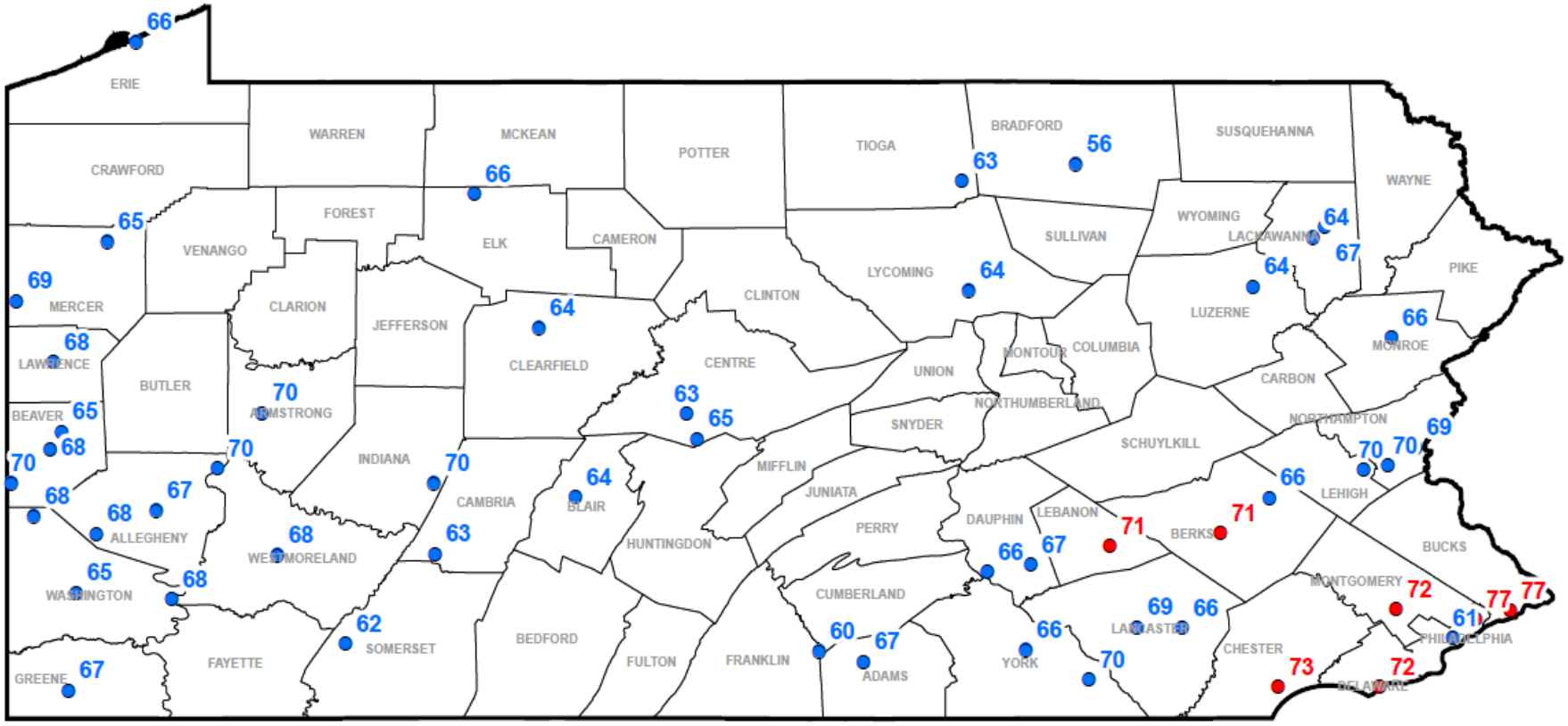
2005 8-Hour Ozone Design Values



Appearing in Red - 2005 8-Hour Ozone Design Value above 70 ppb (2015 Ozone Standard)

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)

Conclusions - Ozone

- As of 2016, there are seven samplers in Pennsylvania monitoring nonattainment of the 2015 ozone standard.
- Meteorologically, a wetter than normal Ohio Valley/Great Lakes region along with warmer than normal temperatures led to normal number of exceedance/exceedance days in 2016.
- Overall, the trend in ozone concentrations over the last five years has been downward. Lower ozone concentrations has led to an improvement in air quality across the commonwealth, especially across western PA.

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2016 $PM_{2.5}$ Monitoring Summary

- $PM_{2.5}$ monitoring season – Year-round.
- Overview of the 2016 design value (DV) for the 24-hour $PM_{2.5}$ national ambient air quality standard (NAAQS) continuous monitors.
- 2016 DV calculation – 98th percentile value from 2014, 2015, and 2016 averaged over a 3-year period.

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Number of 24-hour $PM_{2.5}$ Exceedances

- Number of $PM_{2.5}$ exceedance days and total number of exceedances per year within Pennsylvania's $PM_{2.5}$ monitoring network (49 total monitors):
  - 2014: 19 days | 42 total exceedances
  - 2015: 20 days | 36 total exceedances
  - 2016: 16 days | 24 total exceedances

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2006 24-hour $PM_{2.5}$ NAAQS Attainment Status

- In 2015, there were no $PM_{2.5}$ samplers in the Commonwealth monitoring nonattainment of the 2006 24-hour $PM_{2.5}$ standard (35 µg/m^3).
- In 2016, one $PM_{2.5}$ sampler (Liberty) in Allegheny County was monitoring nonattainment of the 2006 24-hour $PM_{2.5}$ standard (35 µg/m^3) in Pennsylvania.

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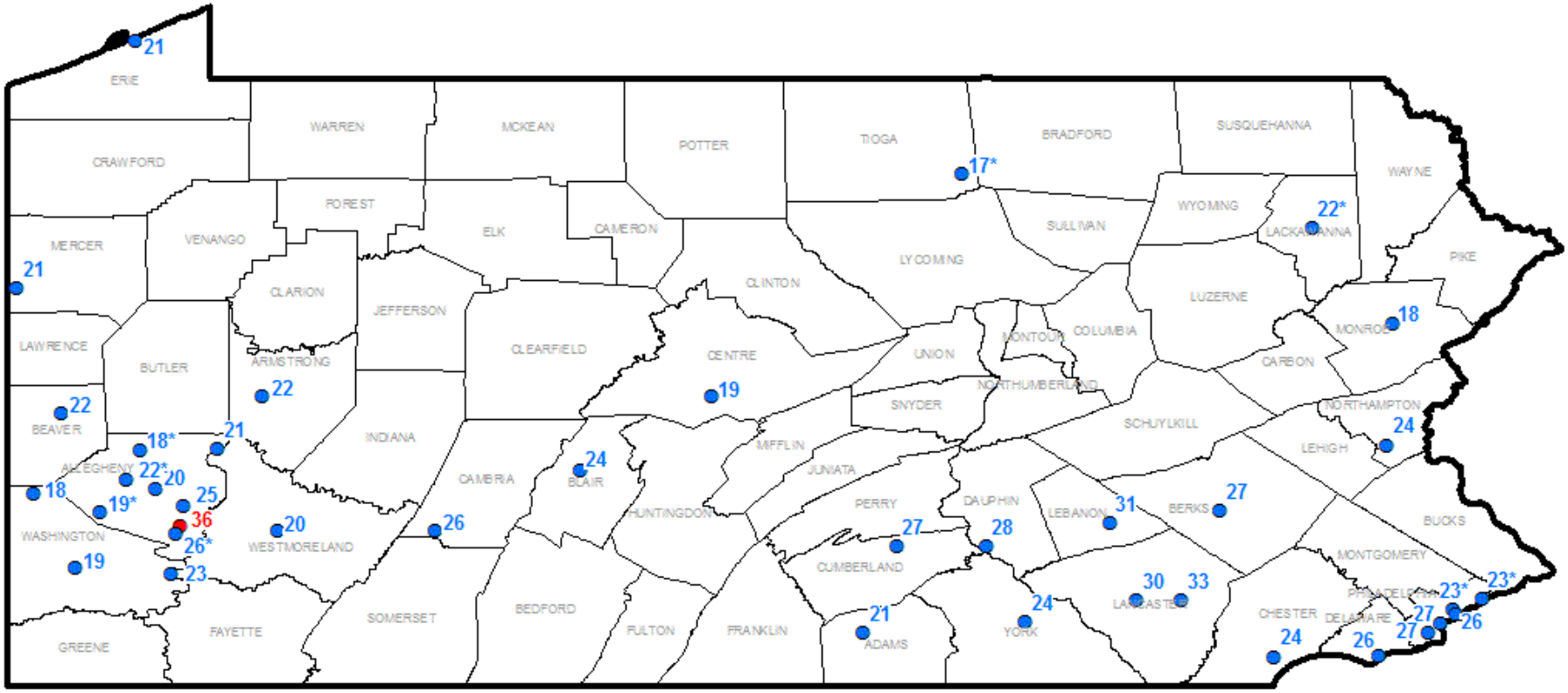
2016 24-hour $PM_{2.5}$ Design Values



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

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

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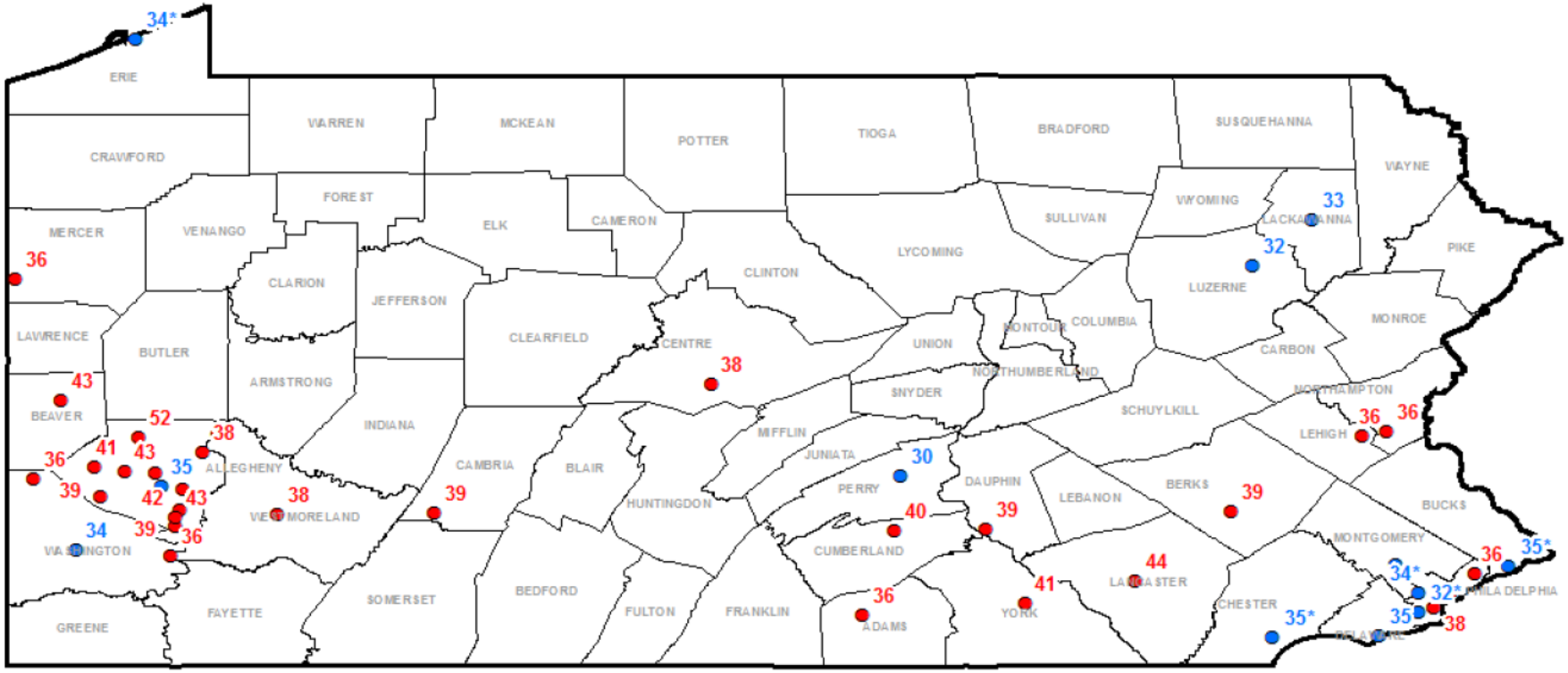
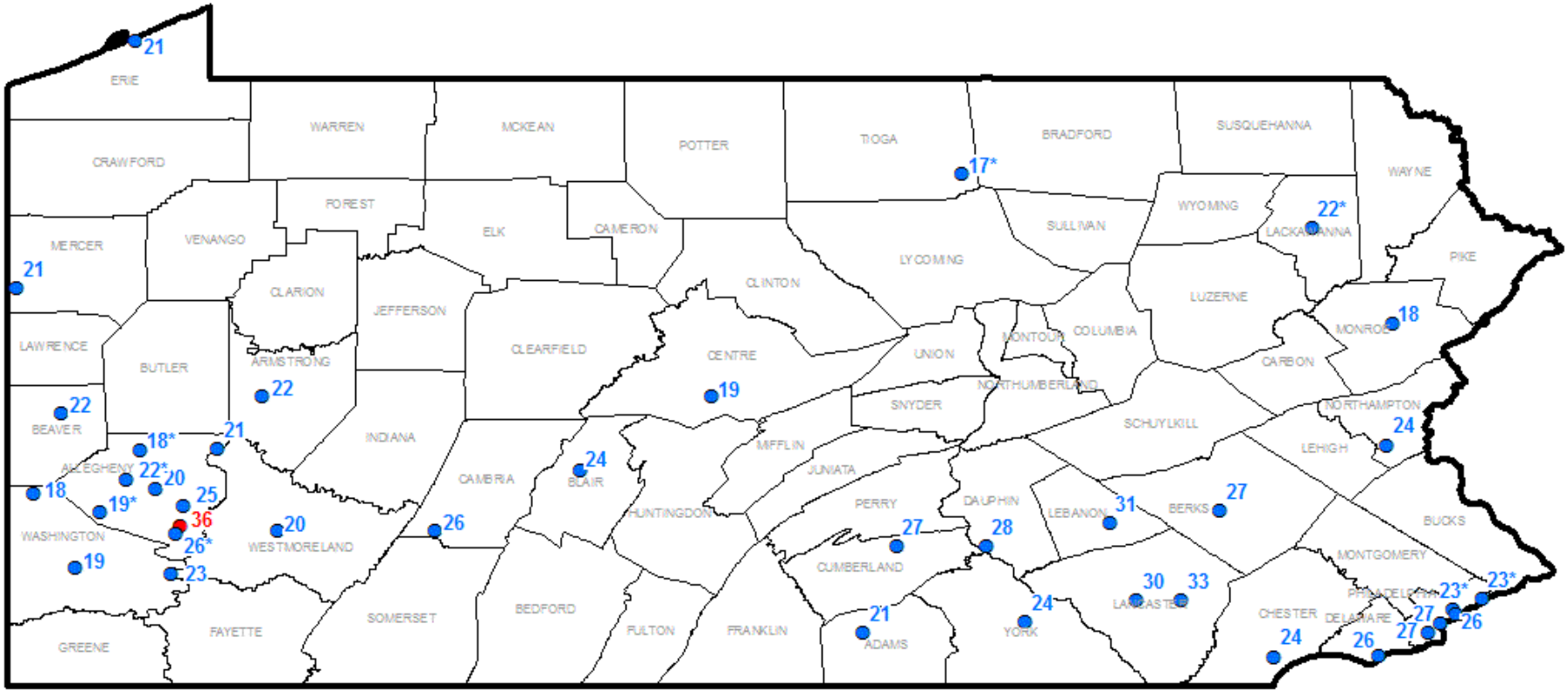
2005 24-hour $PM_{2.5}$ Design Values



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

2012 Annual $PM_{2.5}$ NAAQS Attainment Status

- In 2015, there were no $PM_{2.5}$ samplers in the Commonwealth monitoring nonattainment of the 2012 Annual $PM_{2.5}$ standard (12 µg/m^3).
- In 2016, two $PM_{2.5}$ samplers (Liberty and Lancaster Downwind) were monitoring nonattainment of the 2012 Annual $PM_{2.5}$ standard (12 µg/m^3) in Pennsylvania.

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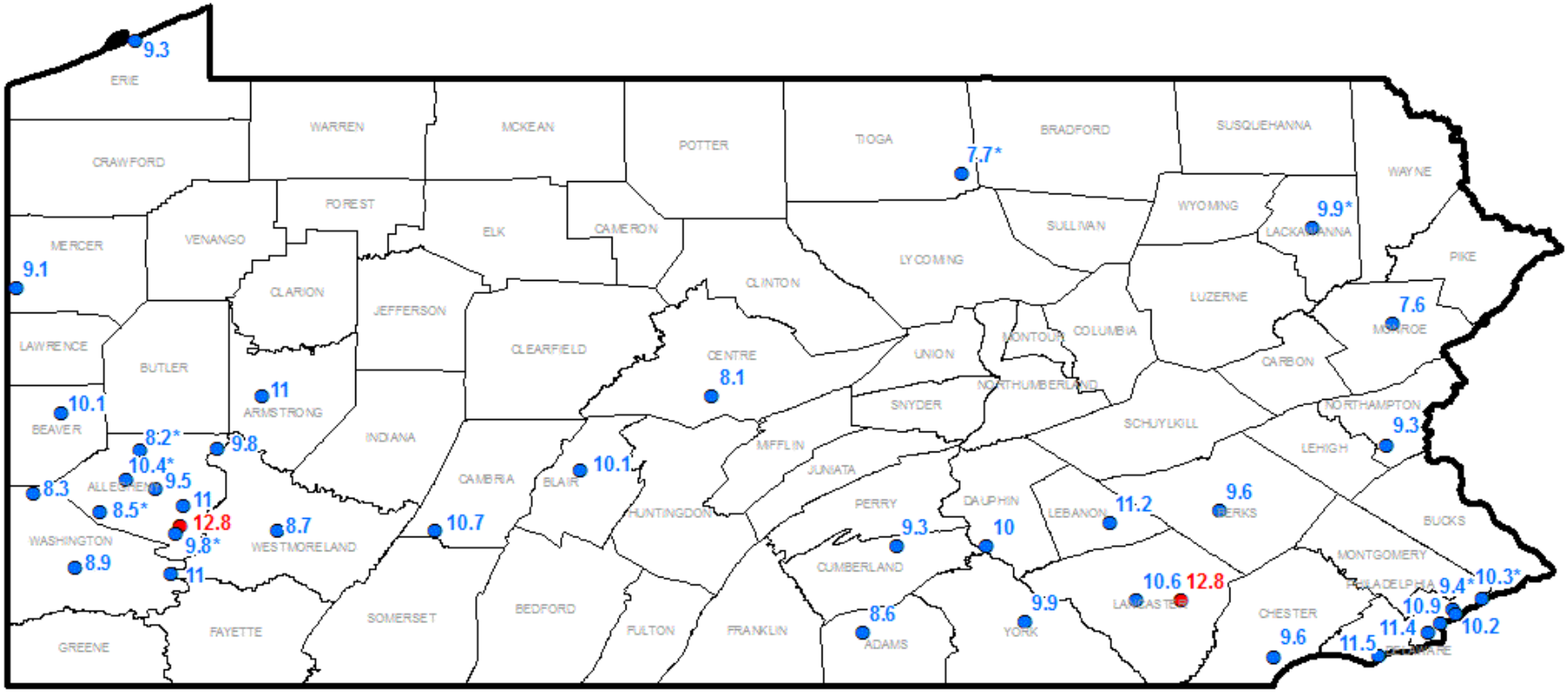
2016 Annual $PM_{2.5}$ Design Values



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 Annual $PM_{2.5}$ Concentrations in PA

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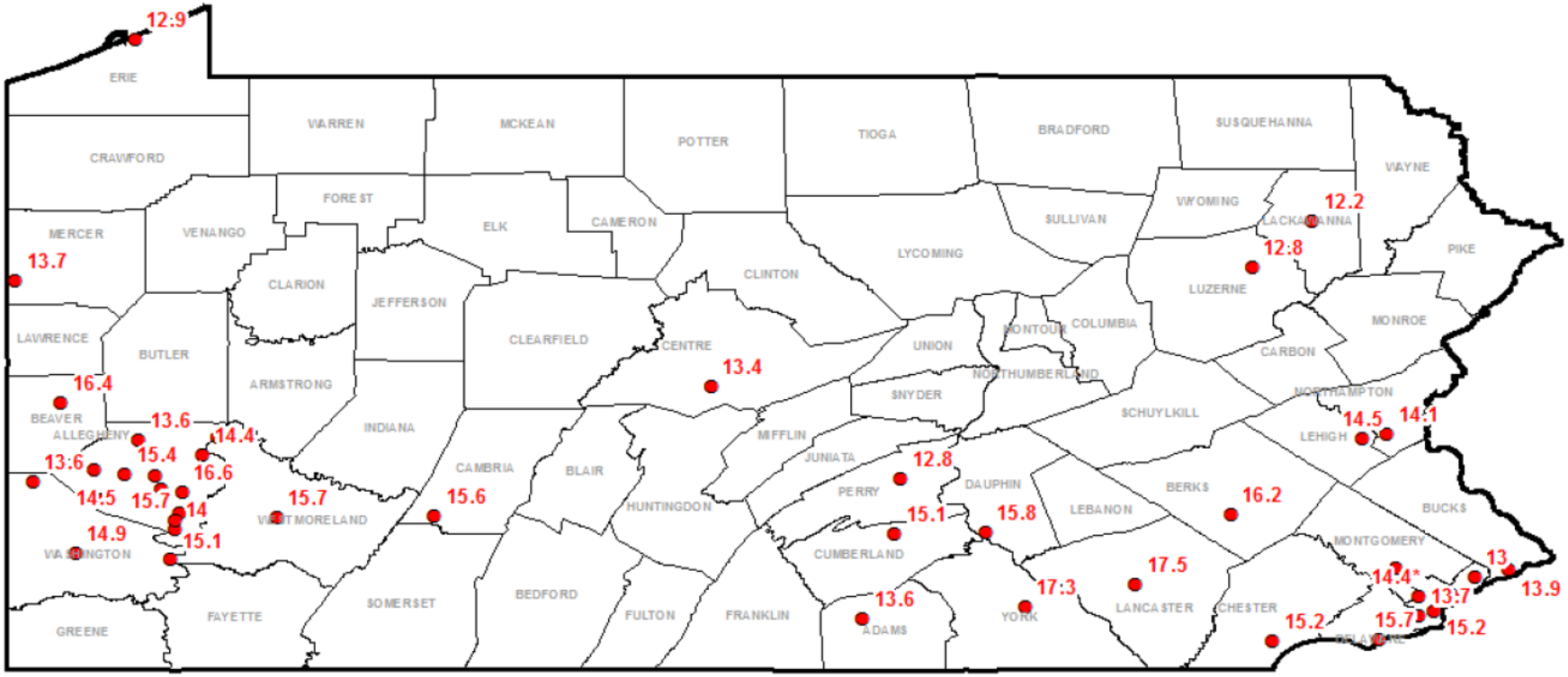
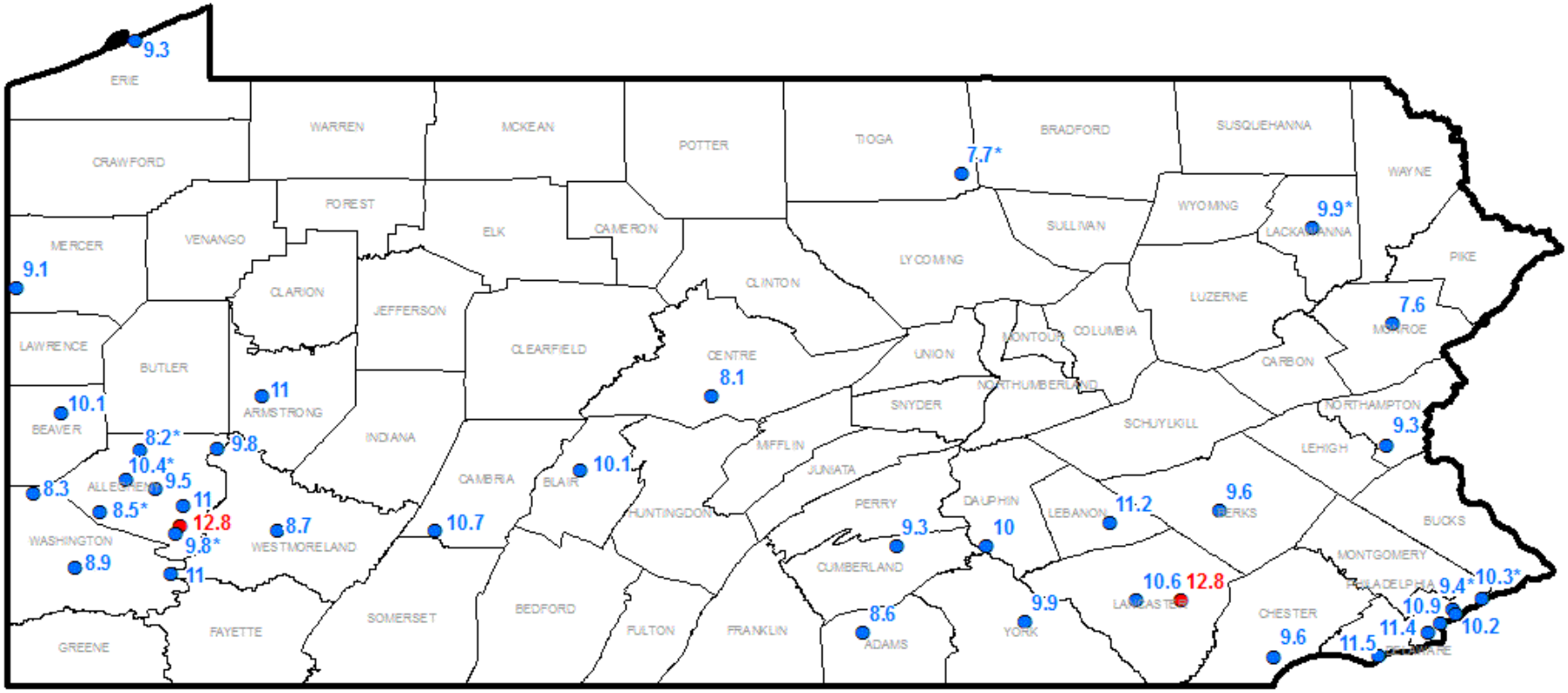
2005 Annual $PM_{2.5}$ Design Values



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

Conclusions - $PM_{2.5}$

- As of 2016, there are two samplers in Pennsylvania monitoring nonattainment of the 2012 annual $PM_{2.5}$ standard and one sampler in Pennsylvania monitoring nonattainment of the 2006 24-hour $PM_{2.5}$ standard.
- Higher concentrations at Lancaster Downwind due to more stable conditions (i.e. colder temperatures, more snowpack) during the 2014 winter, which lead to higher 1st quarter $PM_{2.5}$ average concentrations that year.
- The trend in $PM_{2.5}$ concentrations over the last five years has been downward. Lower overall $PM_{2.5}$ concentrations has increased the number of monitored attainment areas in PA.

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2016 SO_2 Monitoring Summary

- SO_2 monitoring season – Year-round.
- Overview of the 2016 design values (DV) for the 1-hour SO_2 national ambient air quality standard (NAAQS) of 75 parts per billion.
- 2016 DV calculation – 99^{th} percentile from 2014, 2015, and 2016 averaged over a 3-year period.

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Number of 1-hour SO_2 Exceedances

- Number of SO_2 exceedance days and total number of exceedances per year within Pennsylvania's SO_2 monitoring network (~25 total monitors):
  - 2014: 31 days | 33 total exceedances
  - 2015: 22 days | 26 total exceedances
  - 2016: 1 day | 1 total exceedance

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2010 1-hour SO_2 NAAQS Attainment Status

- In 2015, two SO_2 samplers in the commonwealth (Liberty and Warren Overlook) were monitoring nonattainment of the 2010 1-hour SO_2 standard (75 parts per billion).
- In 2016, two SO_2 samplers in Pennsylvania (Liberty and Warren Overlook) are monitoring nonattainment of the 2010 1-hour SO_2 NAAQS.

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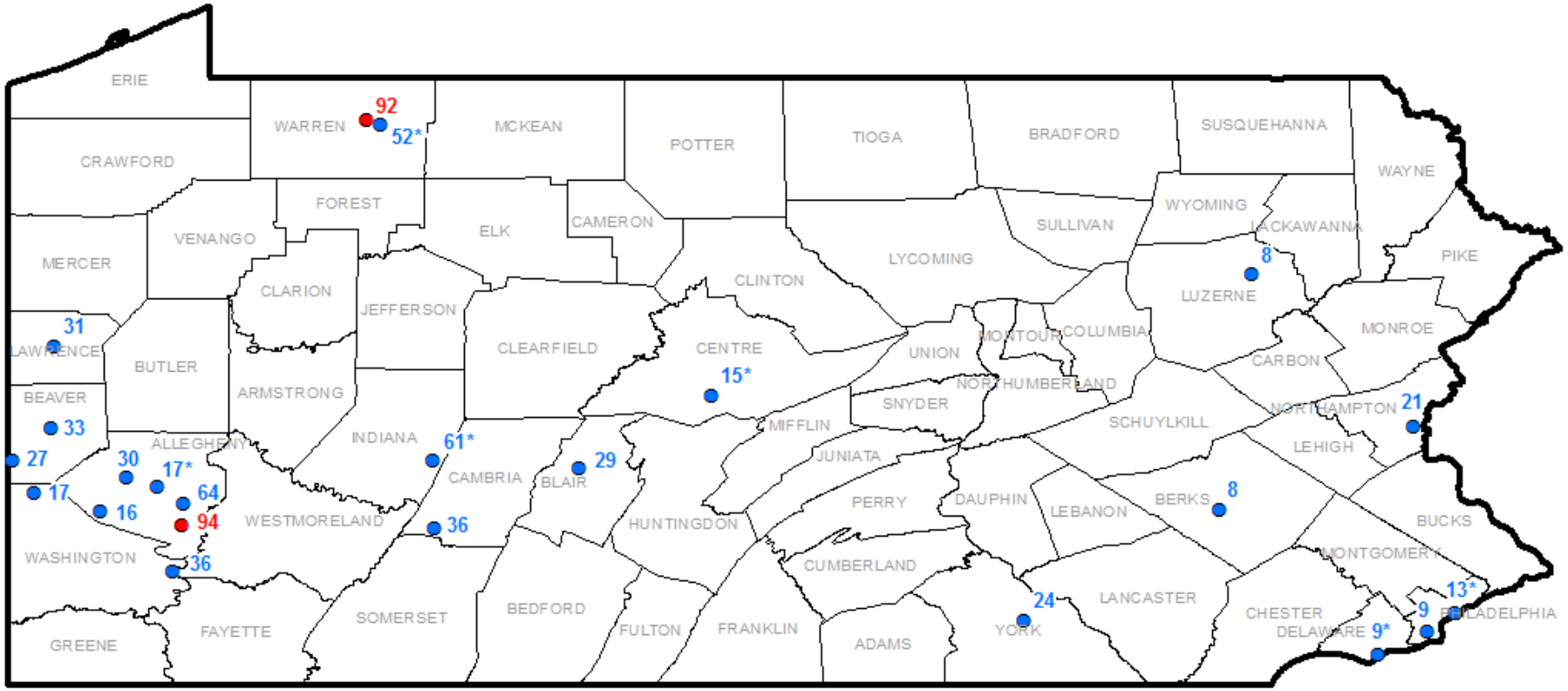
2016 1-hour SO_2 Design Values



Appearing in Red - 2016 1-Hour SO_2 Design Value above 75 ppb (2010 SO_2 Standard)

Appearing in Blue - 2016 1-Hour SO_2 Design Value at or below 75 ppb (2010 SO_2 Standard)

Historical 1-hour SO_2 Concentrations in PA

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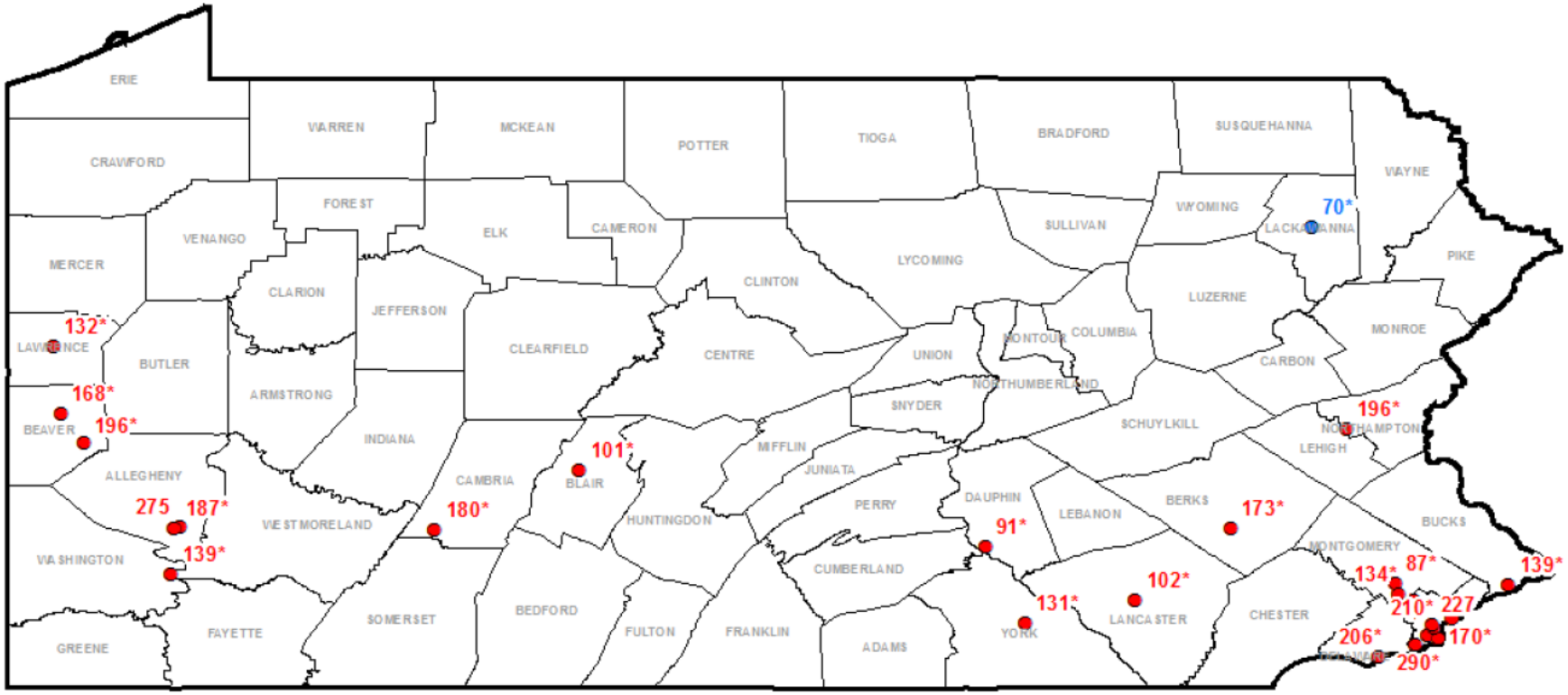
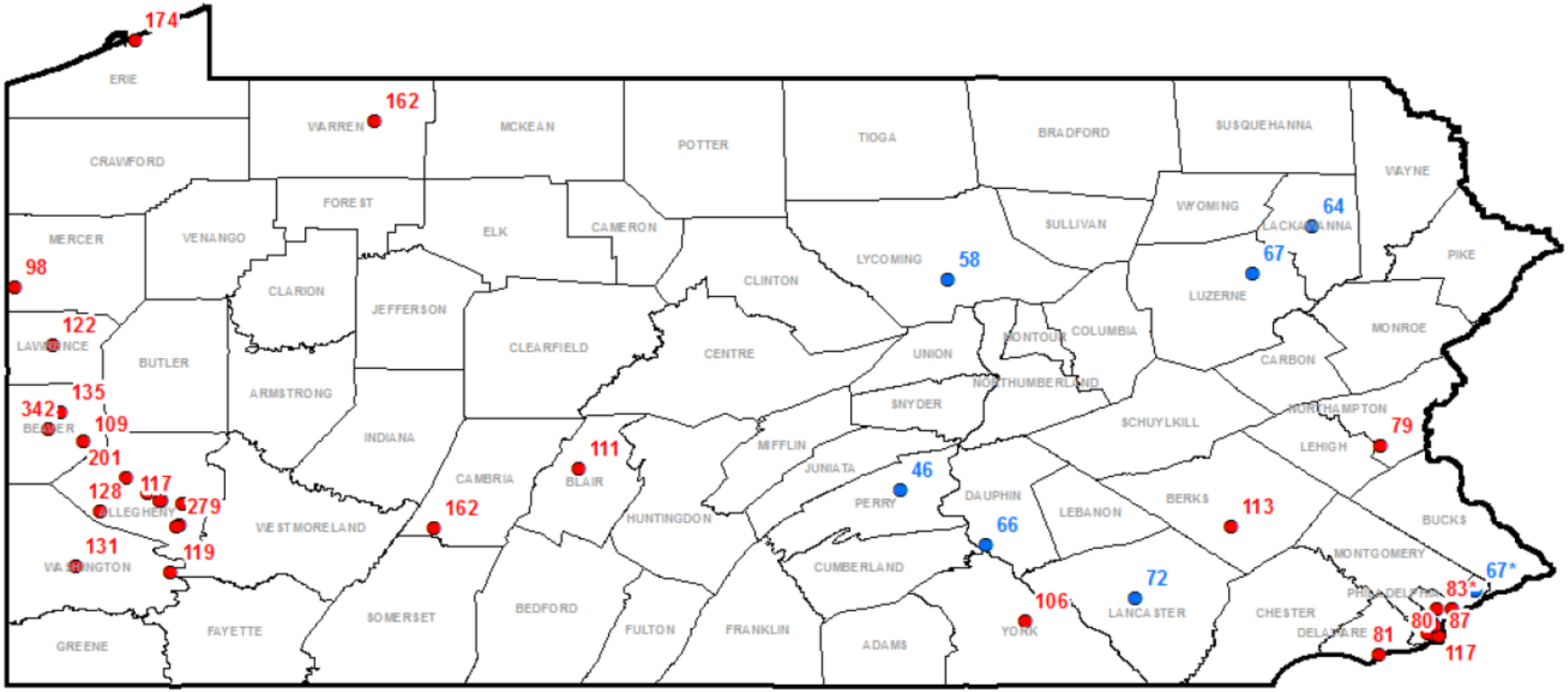
1980 1-hour SO_2 Design Values



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)

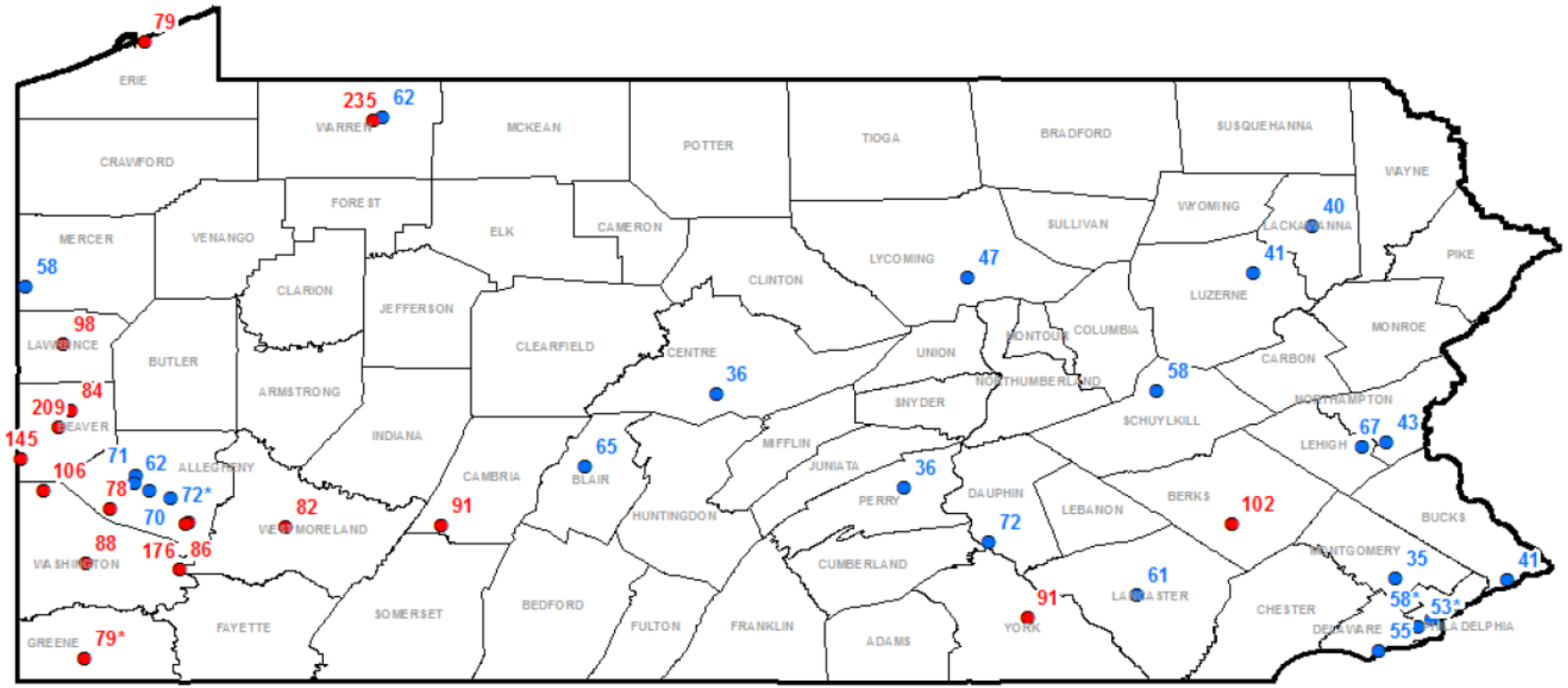
1991 1-hour SO_2 Design Values



Appearing in Red - 1991 1-Hour SO2 Design Value above 75 ppb (2010 SO2 Standard)

Appearing in Blue - 1991 1-Hour SO2 Design Value at or below 75 ppb (2015 SO2 Standard)

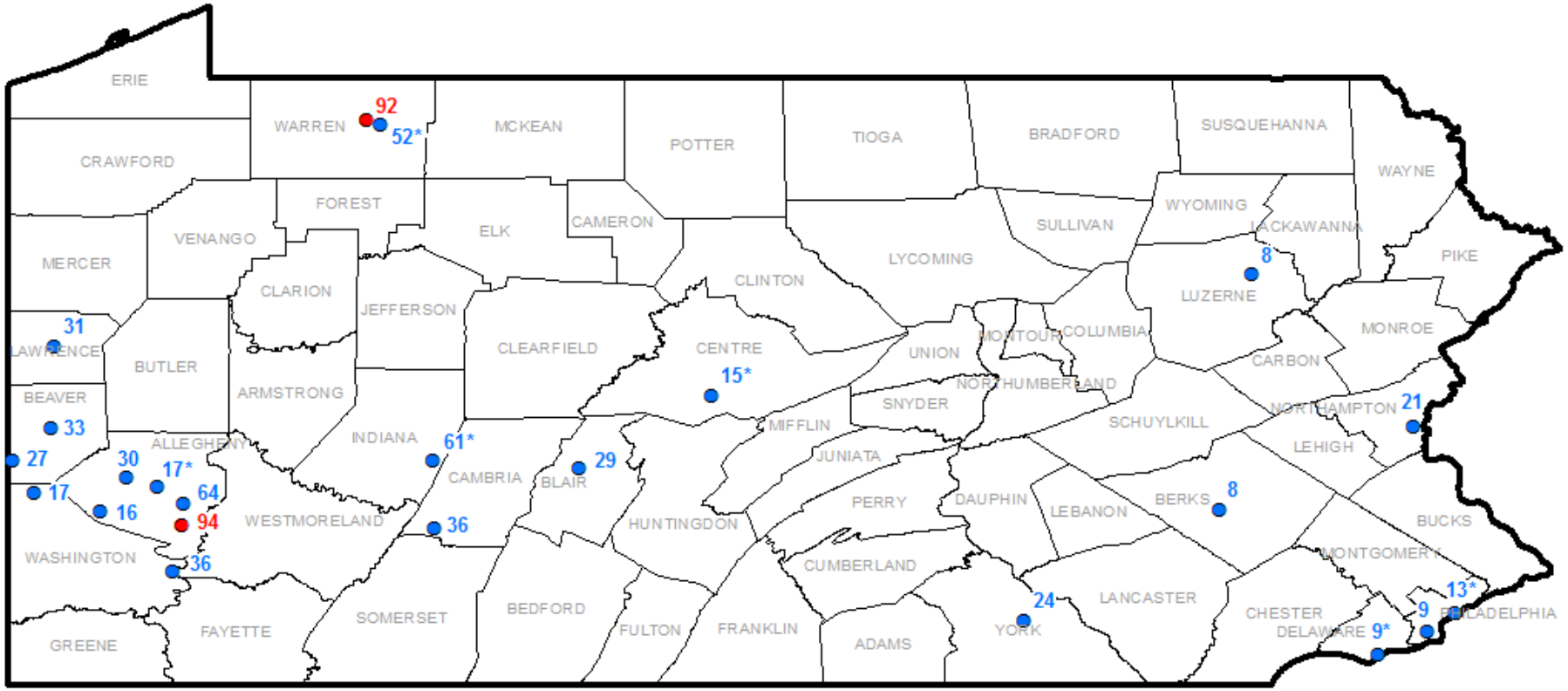
2005 1-hour SO_2 Design Values



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 SO_2 Design Values



Appearing in Red - 2016 1-Hour SO_2 Design Value above 75 ppb (2010 SO_2 Standard)

Appearing in Blue - 2016 1-Hour SO_2 Design Value at or below 75 ppb (2010 SO_2 Standard)

Conclusions - SO_2

- As of 2016, there are two SO_2 samplers in PA monitoring nonattainment for the 2010 1-hour SO_2 standard.
- For the most part, ambient SO_2 concentrations have been on the decline over the past five years.
- Those monitors directly impacted from nearby SO_2 sources see the greatest variability in concentrations.
- In the case of the monitors in Beaver, Indiana, and Warren counties, the closure of a nearby SO_2 source and overall emission reductions has led to a decline in SO_2 concentrations over the last three years.

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