

2025 Ozone Year in Review

Bureau of Air Quality
February 5, 2026



Agenda

- Understanding Ozone Basics

- Ozone Formation
- When is the Ozone Season?
- PA Ozone Monitoring Locations

- Review of the 2025 Weather and Ozone Concentrations

- Weather features, including analysis of temperature and precipitation
- Ozone Concentration Data
- Ozone Episode Data

- Forecasting Air Quality

- Air Quality forecasting in PA
- What is the Air Quality Index?
- How are ozone exceedances shared with the public?



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Understanding Ozone Basics



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Ozone Formation

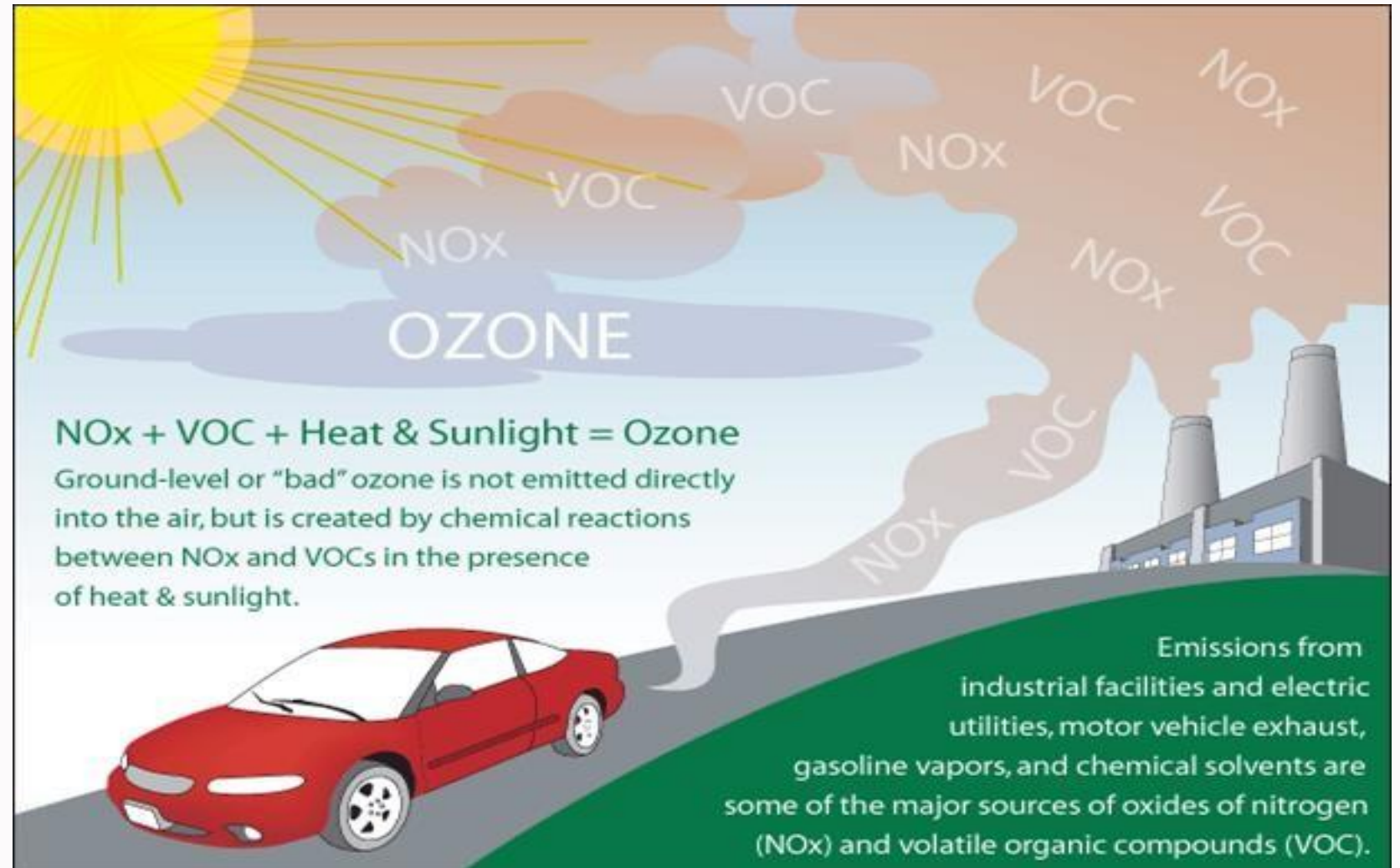


Photo: Ground level ozone formation, <https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics#formation>.

When is ozone season?

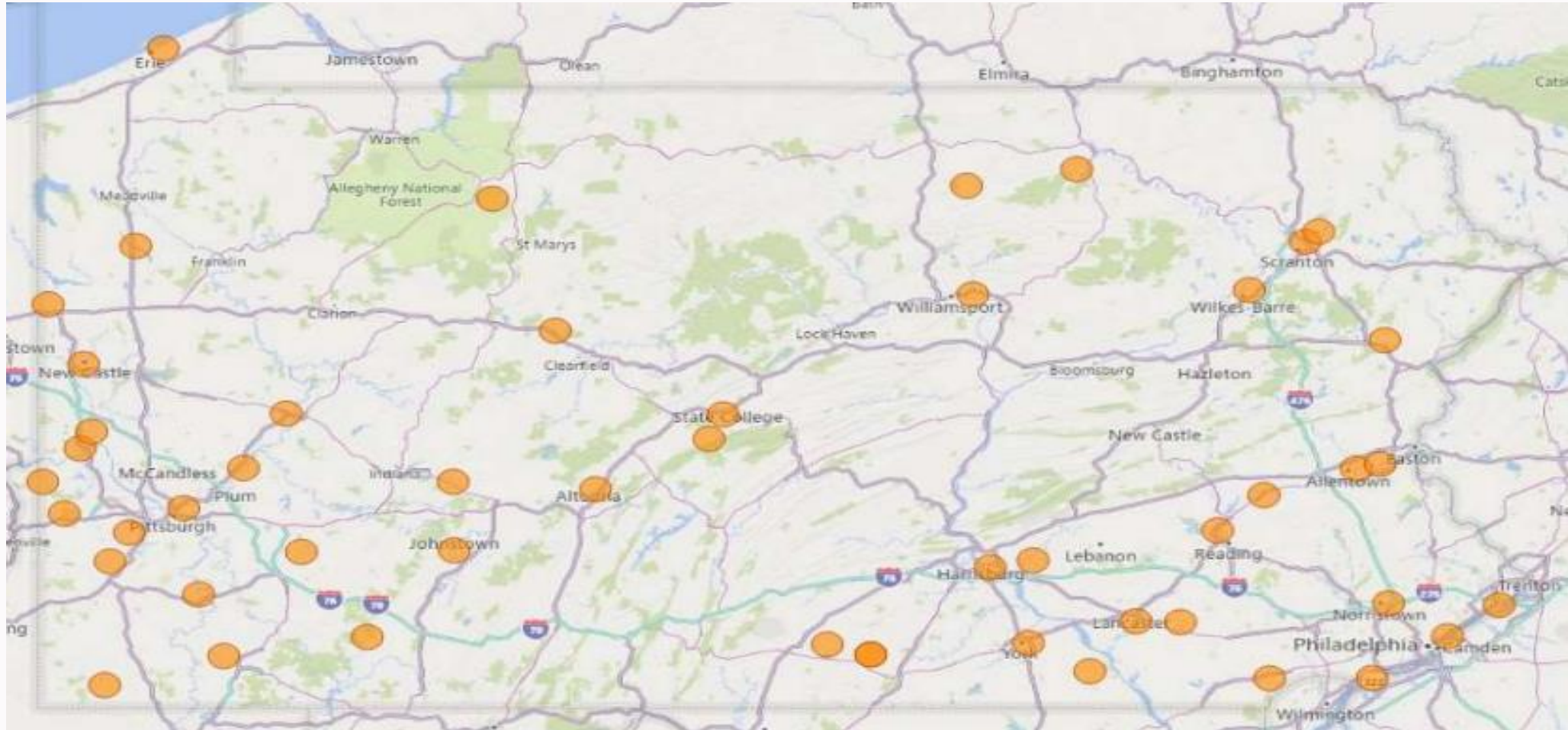
SUN	MON	TUE	WED	THU	FRI	SAT
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2

- DEP is required to monitor for ozone from March 1 to October 31 of each year
- DEP actually monitors for ozone year-round



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PA Ozone Monitoring Locations





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Review of 2025 Weather and Ozone Concentrations

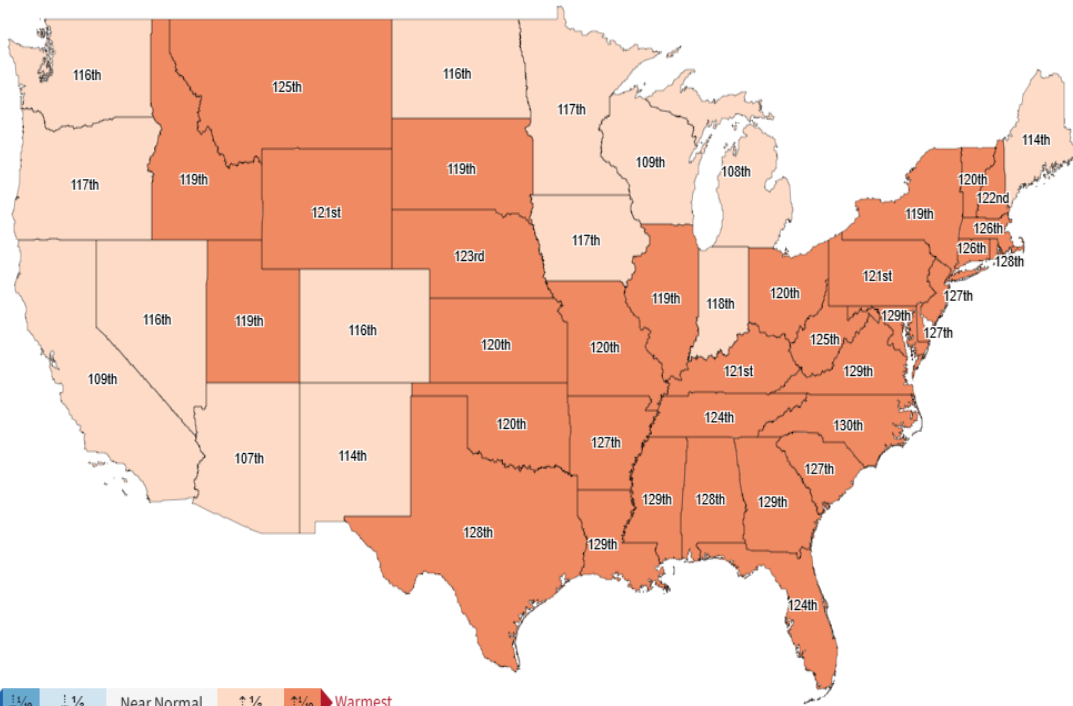


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Meteorology – Spring 2025

Statewide Average Temperature Rank (131 years)

March - May 2025



Coldest $\downarrow \frac{1}{10}$ $\downarrow \frac{1}{5}$ Near Normal $\uparrow \frac{1}{5}$ $\uparrow \frac{1}{10}$ Warmest

Contiguous U.S. (Hover over a State)

Temp : 54.07°F

Anomaly: 3.16°F

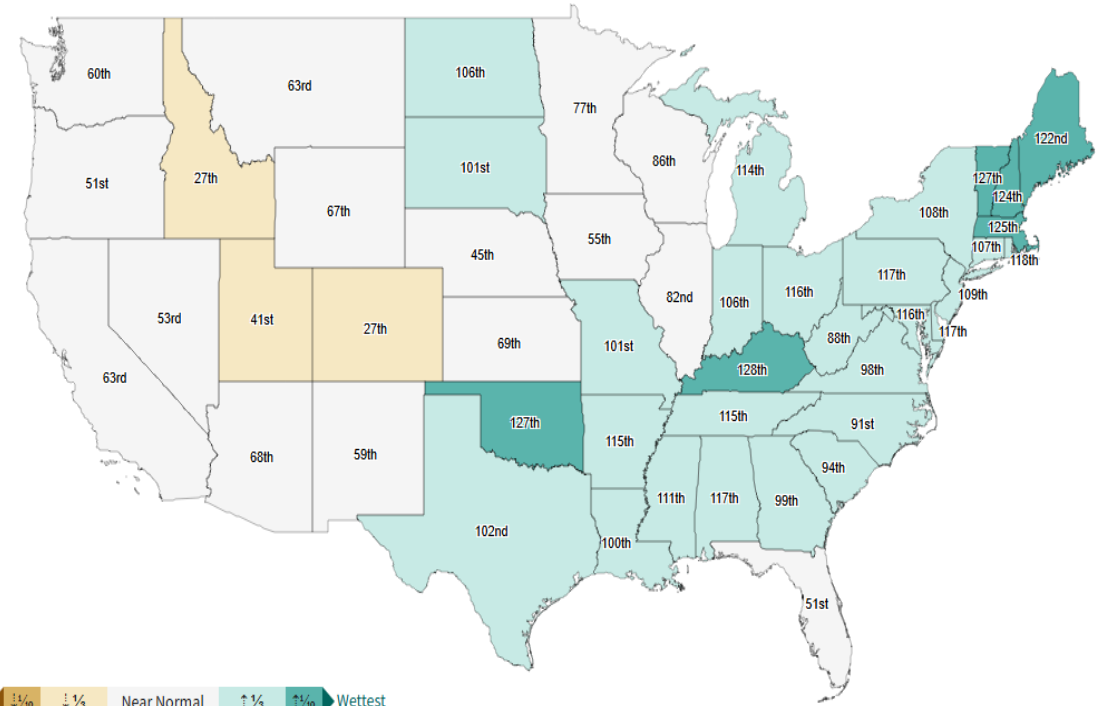
Rank: 2nd Warmest

Mean: 50.91°F



Statewide Precipitation Rank (131 years)

March - May 2025



Driest $\downarrow \frac{1}{10}$ $\downarrow \frac{1}{5}$ Near Normal $\uparrow \frac{1}{5}$ $\uparrow \frac{1}{10}$ Wettest

Contiguous U.S. (Hover over a State)

Precip : 8.95in

Anomaly: 1.02in

Rank: 24th Wettest

Mean: 7.93in



NOAA National Centers for Environmental information, Climate at a Glance: Statewide Mapping, published December 2025, retrieved on December 10, 2025
from <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/mapping>

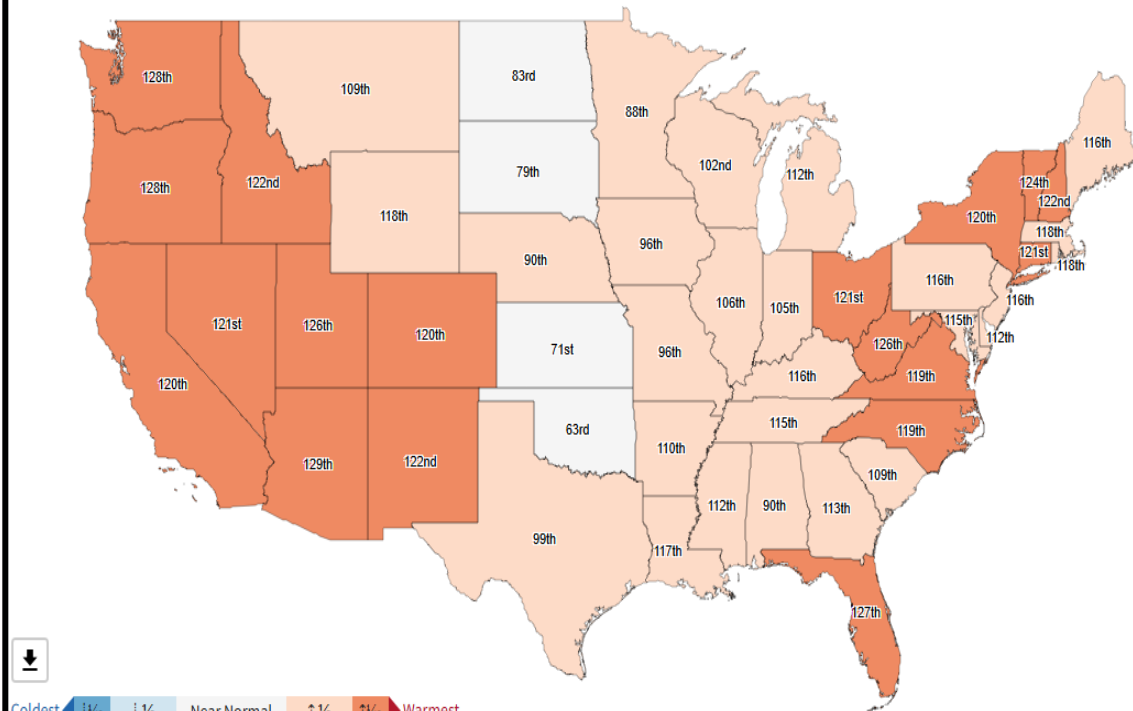


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Meteorology – Summer 2025

Statewide Average Temperature Rank (131 years)

June - August 2025



Coldest $\downarrow \frac{1}{10}$ $\downarrow \frac{1}{2}$ Near Normal $\uparrow \frac{1}{10}$ $\uparrow \frac{1}{2}$ Warmest

Contiguous U.S. (Hover over a State)

Temp : 73.34°F

Anomaly: 1.96°F

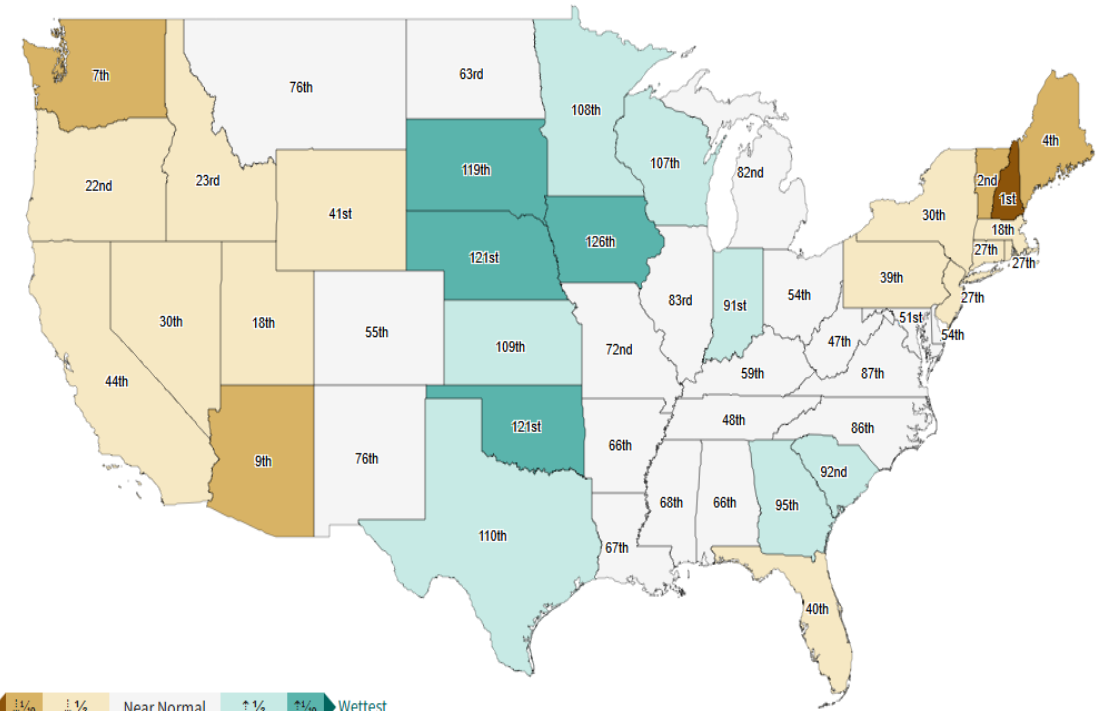
Rank: 12th Warmest

Mean: 71.38°F



Statewide Precipitation Rank (131 years)

June - August 2025



Driest $\downarrow \frac{1}{10}$ $\downarrow \frac{1}{2}$ Near Normal $\uparrow \frac{1}{10}$ $\uparrow \frac{1}{2}$ Wettest

Contiguous U.S. (Hover over a State)

Precip : 8.72in

Anomaly: 0.40in

Rank: 43rd Wettest

Mean: 8.32in



NOAA National Centers for Environmental information, Climate at a Glance: Statewide Mapping, published December 2025, retrieved on December 10, 2025
from <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/mapping>

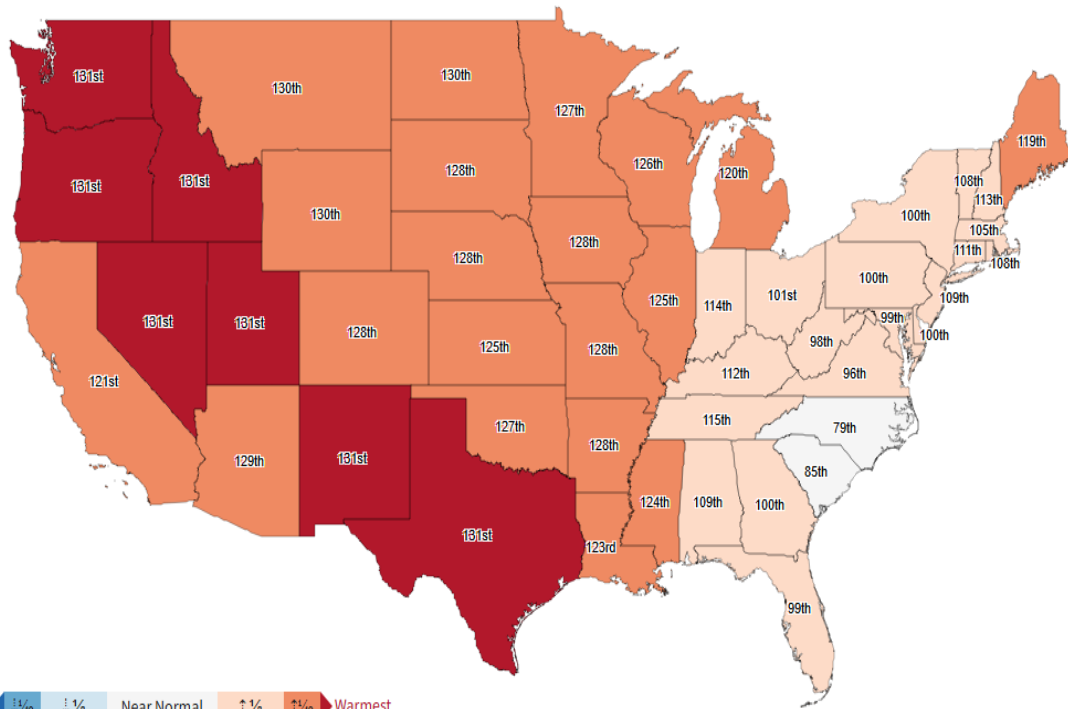


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Meteorology – Fall 2025

Statewide Average Temperature Rank (131 years)

September - November 2025



Coldest (1/10) 1/2 Near Normal 1/2 Warmest (1/10)

Contiguous U.S. (Hover over a State)

Temp : 57.24°F

Anomaly: 3.69°F

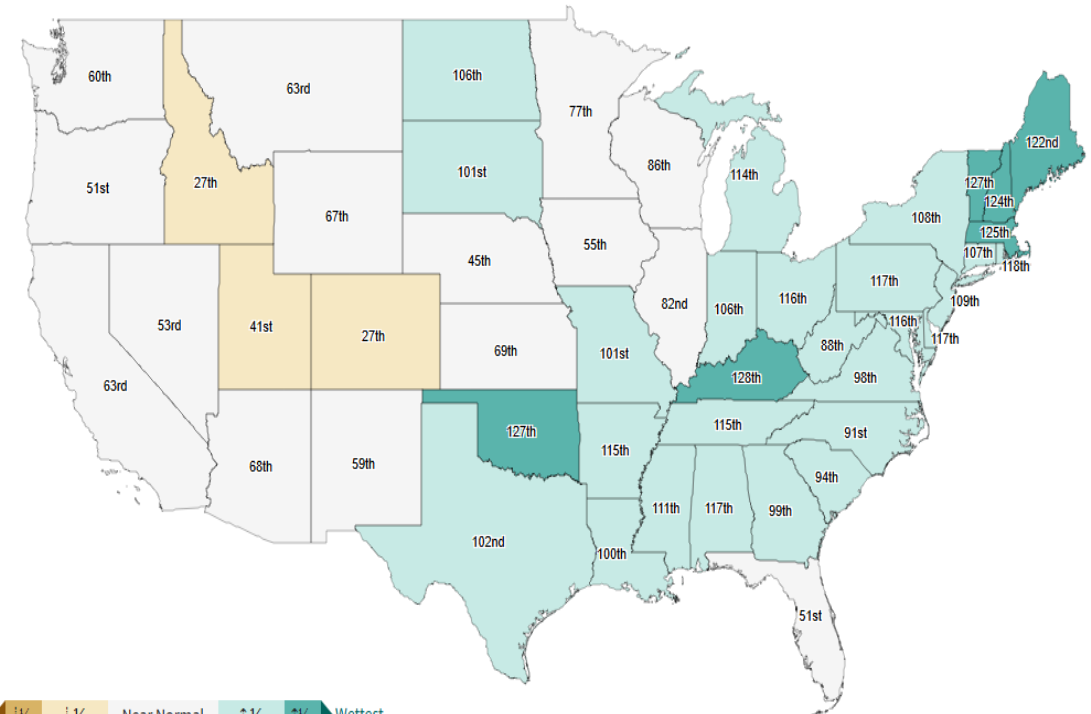
Rank: 3rd Warmest

Mean: 53.54°F



Statewide Precipitation Rank (131 years)

March - May 2025



Driest (1/10) 1/2 Near Normal 1/2 Wettest (1/10)

Contiguous U.S. (Hover over a State)

Precip : 8.95in

Anomaly: 1.02in

Rank: 24th Wettest

Mean: 7.93in



NOAA National Centers for Environmental information, Climate at a Glance: Statewide Mapping, published December 2025, retrieved on December 10, 2025
from <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/mapping>



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2025 Ozone Monitoring Summary

- Overview of the projected 2025 design values (DV)* for the 8-hour ozone national ambient air quality standard (NAAQS).
- 2025 DV calculation – Calculate daily maximum 8-hour ozone concentration. Determine 4th high from 2023, 2024 and 2025 averaged over a 3-year period.

*Please note that 2025 ozone data has not been fully QA/QC'd.



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Number of 8-hour Ozone Exceedances

Number of 8-hour ozone exceedance days of 2015 ozone NAAQS (0.070 parts per million or 70 parts per billion) and total number of ozone exceedances per year within Pennsylvania.

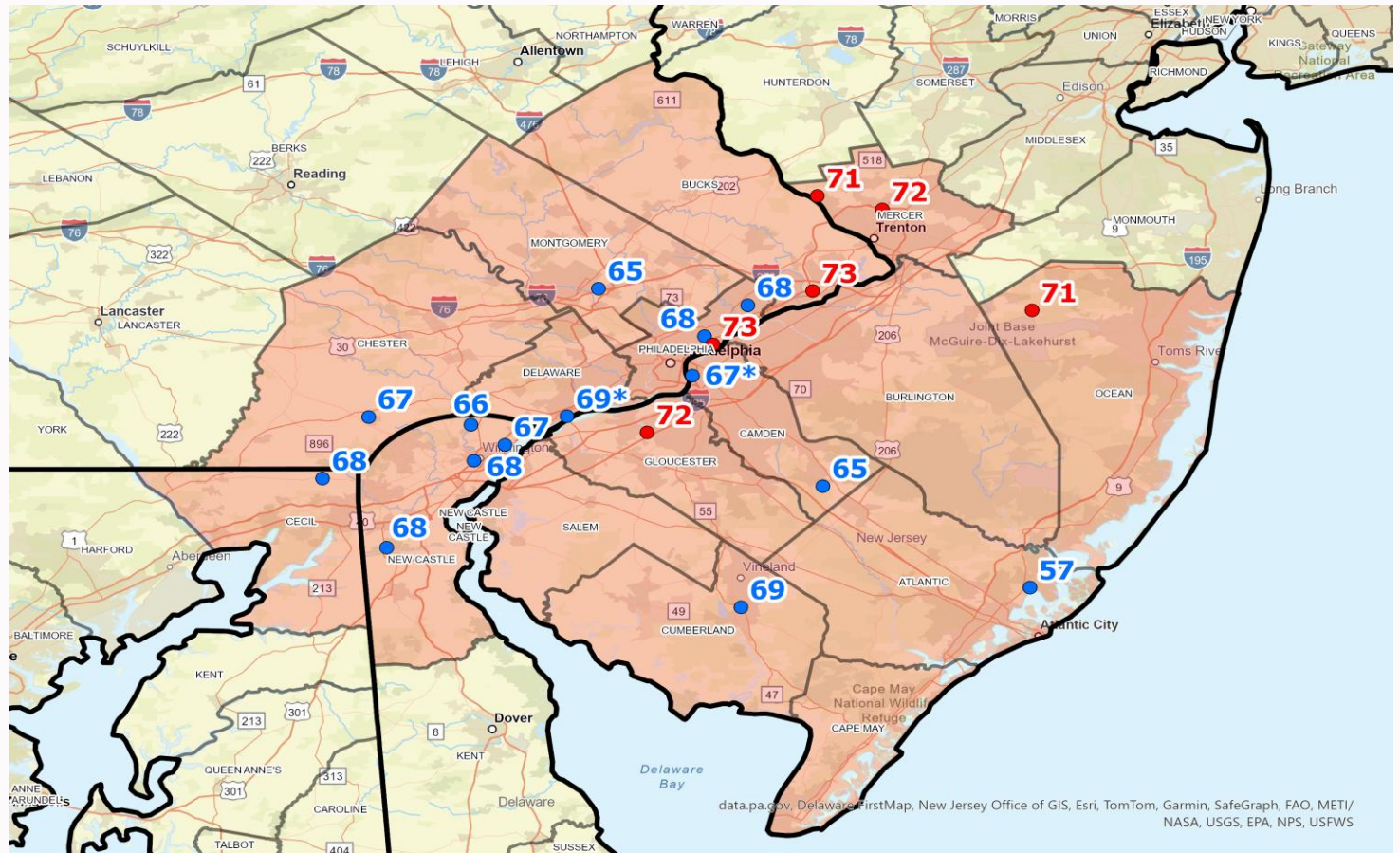
- 2025: 11 days | 45 total exceedances*
- 2024: 21 days | 58 total exceedances
- 2023: 18 days | 115 total exceedances

*2025 ozone data has not been fully QA/QC'd



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2025 Preliminary Ozone Design Values



Preliminary 2025 Ozone Design Values

- NOT in Compliance with 2015 Ozone Standard
- In Compliance with 2015 Ozone Standard

2015 Ozone Standard Nonattainment Area Boundary

Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE

Caveat: 2025 ozone data not fully QA/QC'd.



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2025 Ozone Episode Data

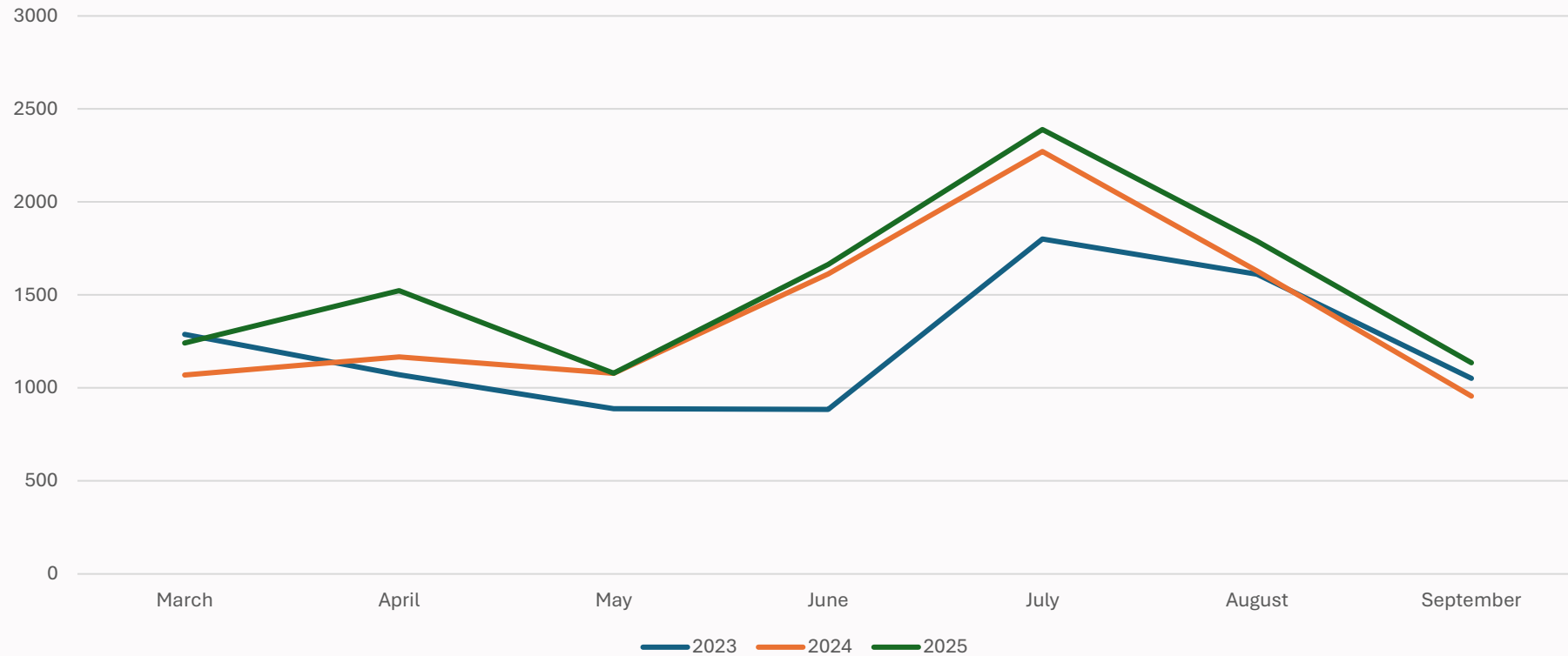
- 2025 had half the number of days with ozone exceedances compared to 2024.
- 2025 did not see a large frequency of days impacted from smoke associated with wildfires, compared to 2023 or 2016.

*Please note that 2025 ozone data has not been fully QA/QC'd.



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EPA Clean Air Markets Program Data



Since 2023, Pennsylvania's stationary source NOx emissions have shown an increase in most months during the ozone season.



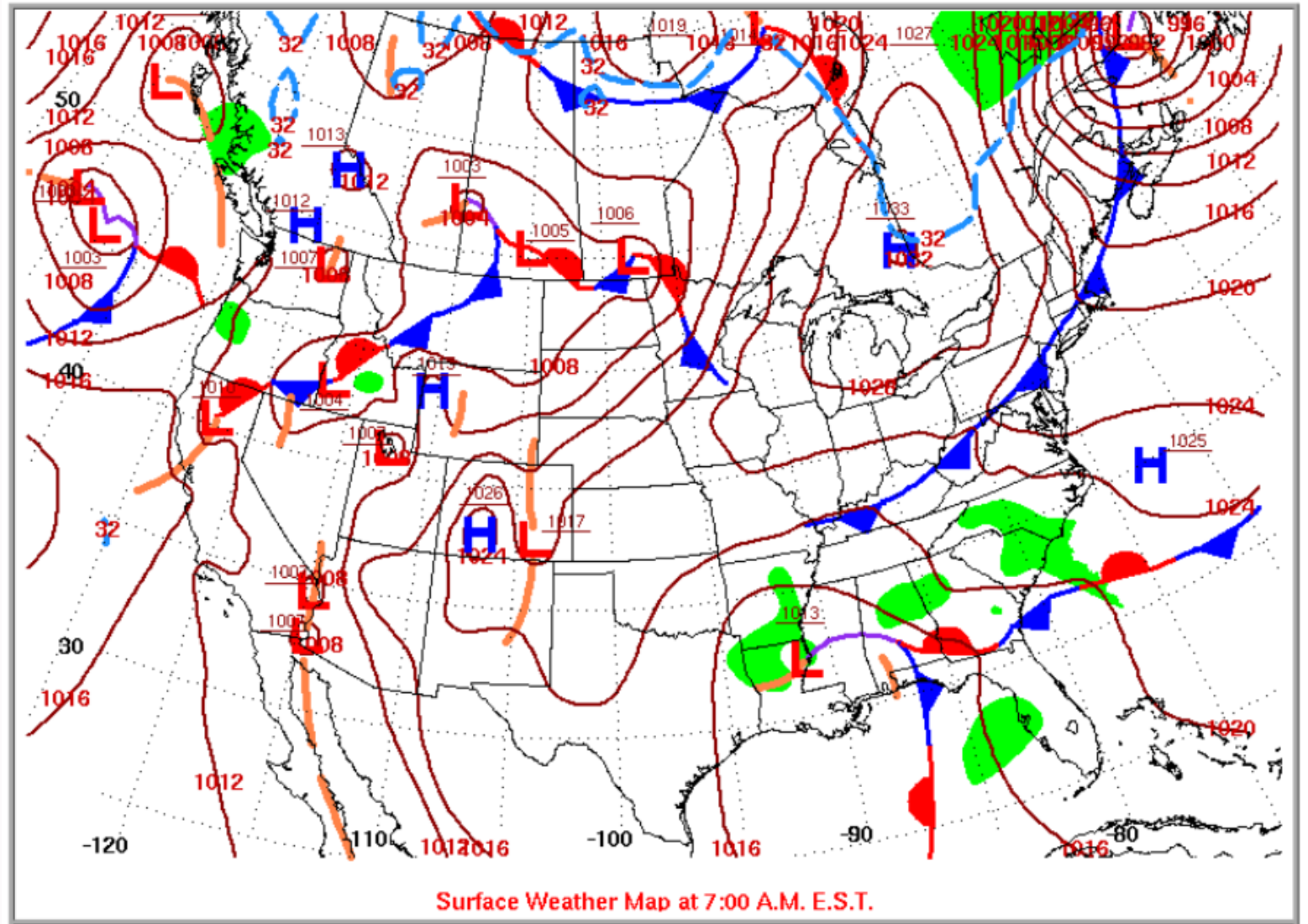
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Review of 2025 Ozone Episodes



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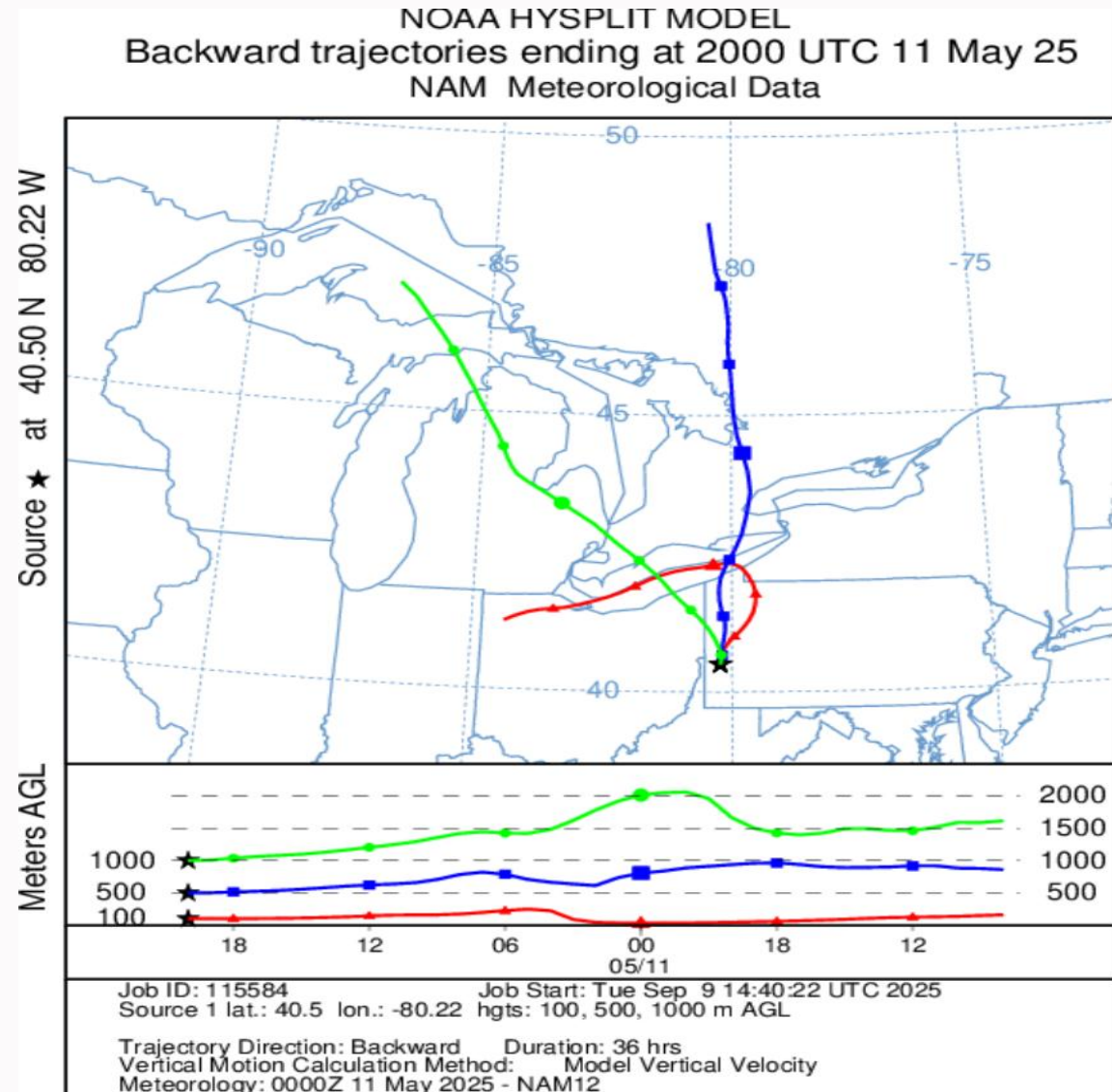
Ozone Episode – May 11, 2025 (Surface Map)





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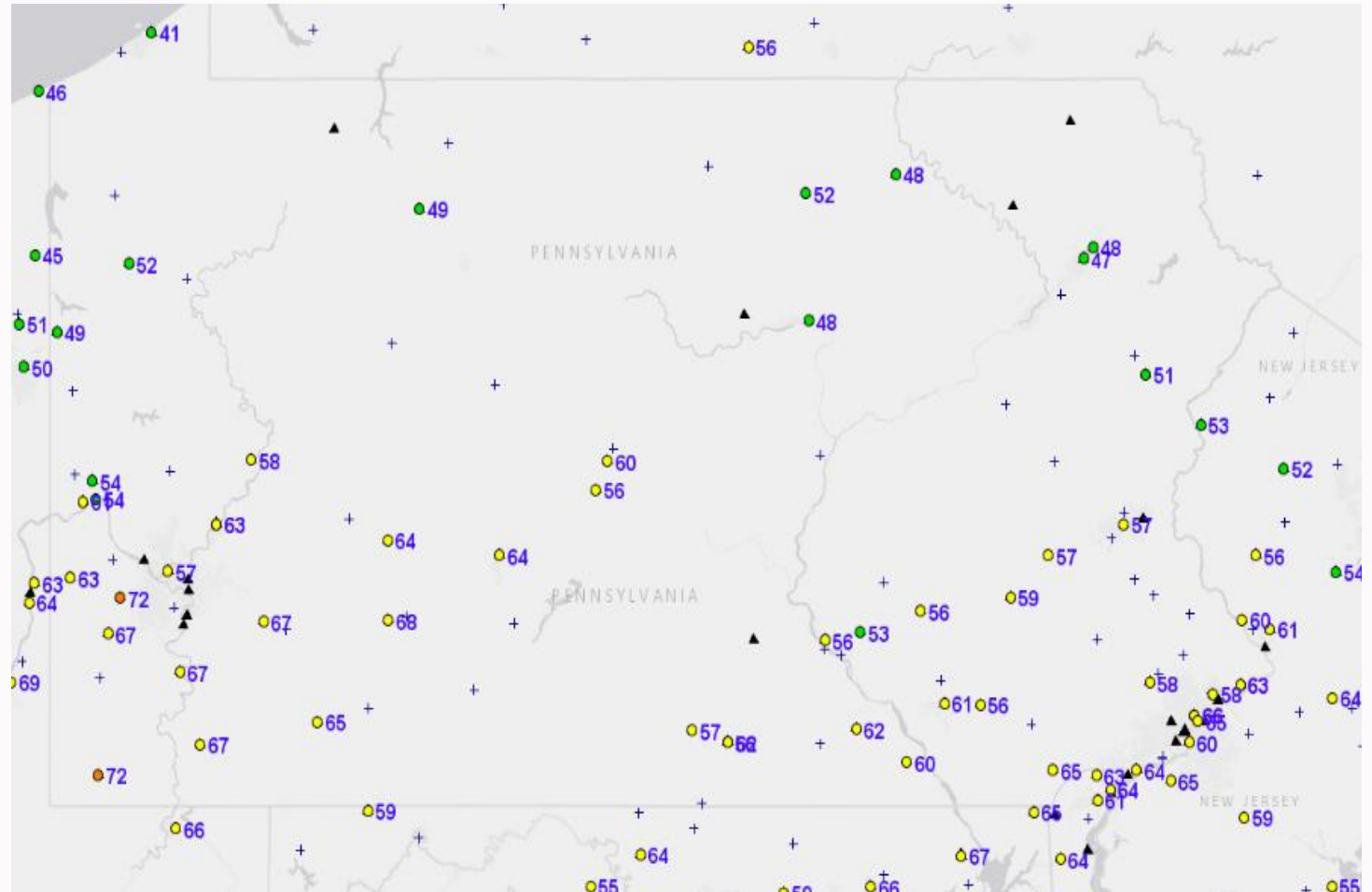
Ozone Episode – May 11, 2025 (Back Trajectory)





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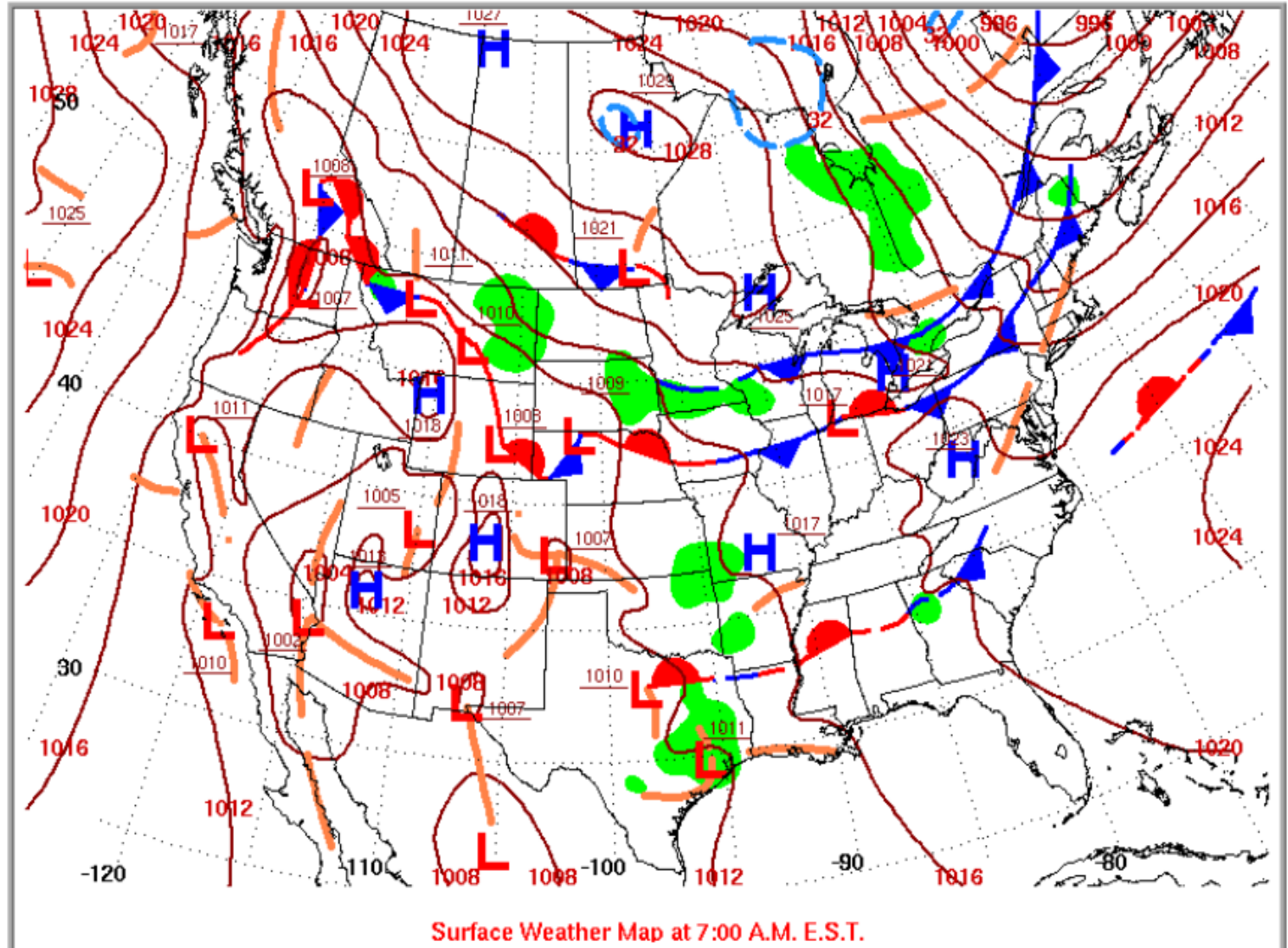
Ozone Episode – May 11, 2025 (8-hr Ozone Maximums)





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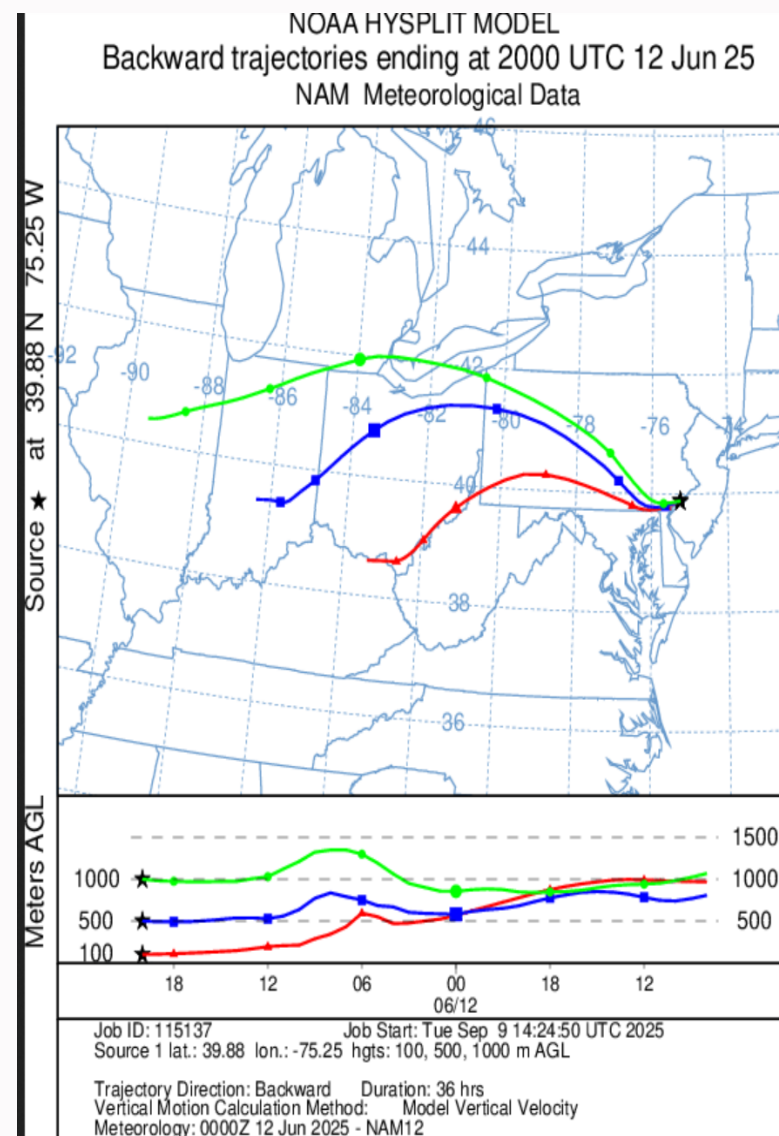
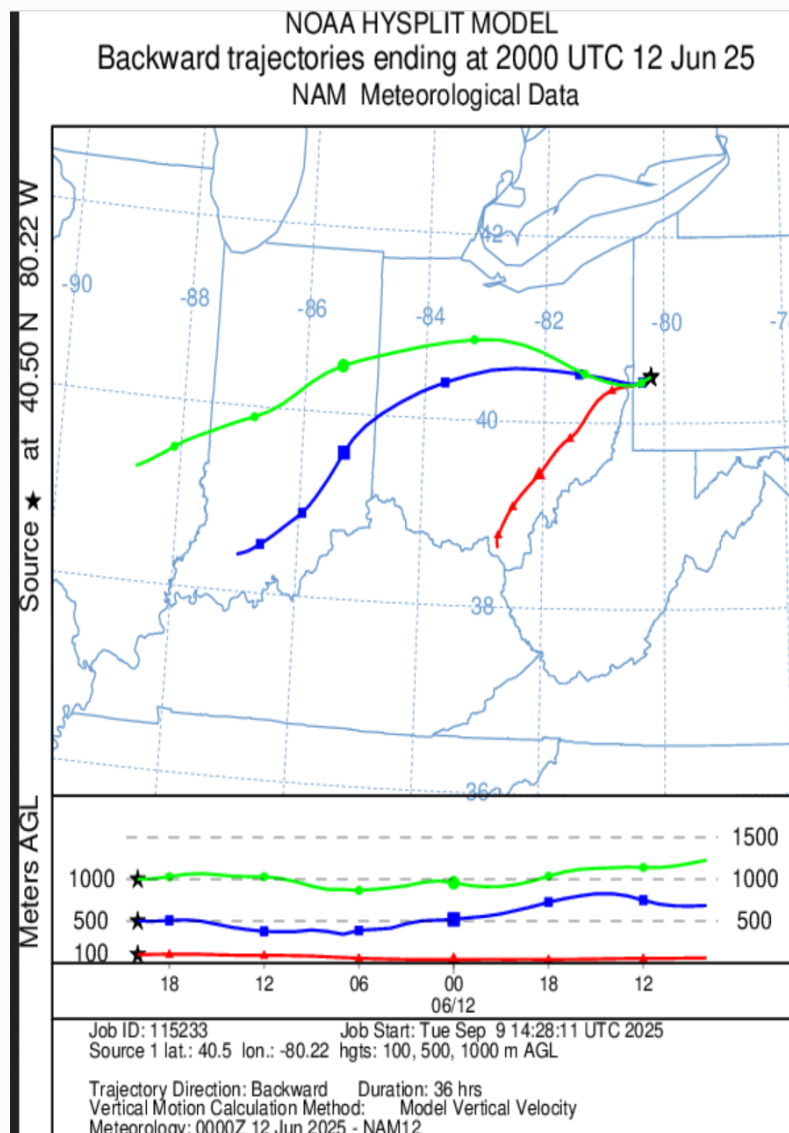
Ozone Episode – June 12, 2025 (Surface Map)





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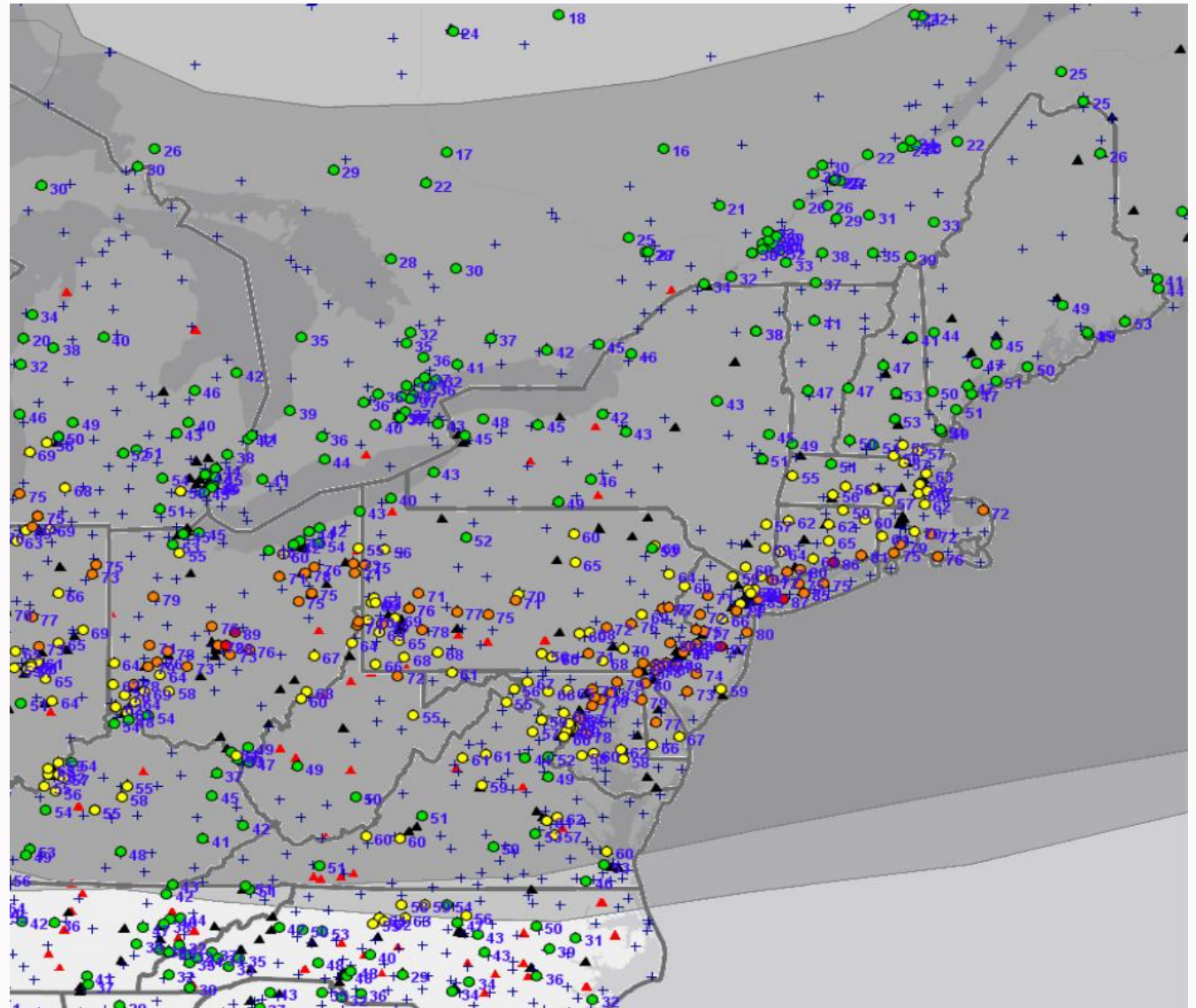
Ozone Episode – June 12, 2025 (Back Trajectory)





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Ozone Episode – June 12, 2025 (8-hr Ozone Maximums)





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Forecasting Air Quality



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Forecasting Air Quality



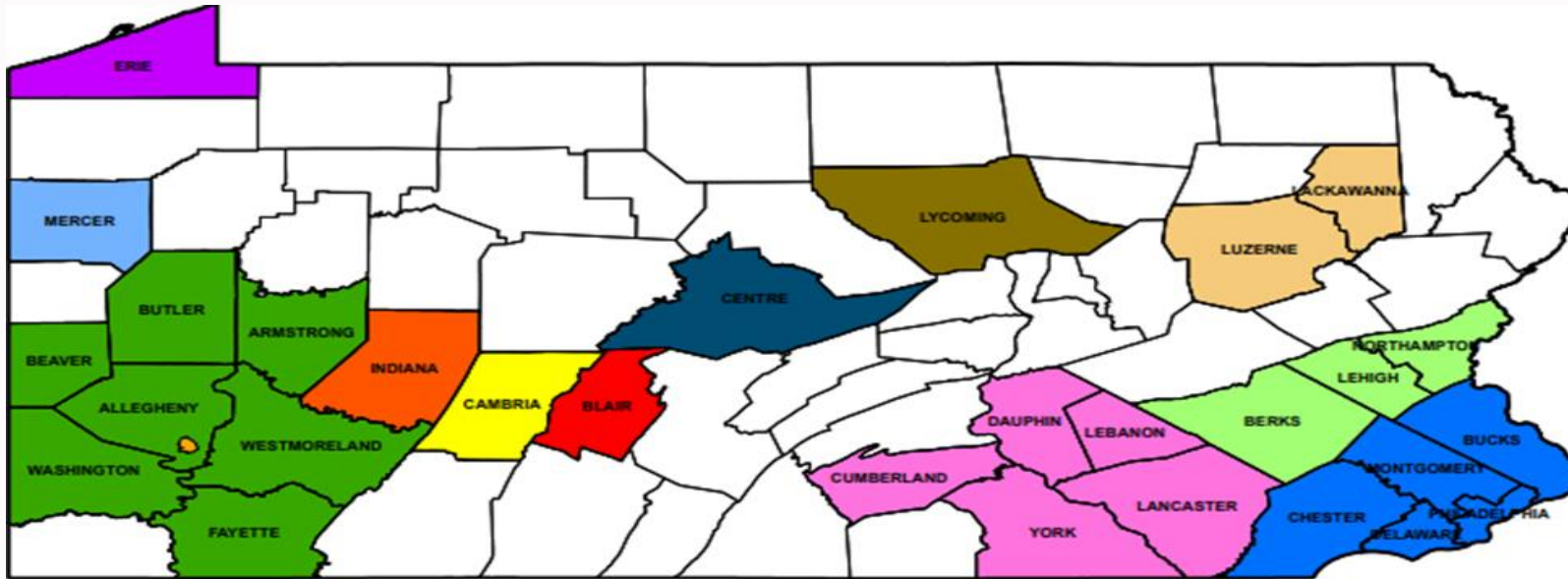
Photo: Donora, Pennsylvania,
<https://www.nationalgeographic.com/history/article/decades-ago-donora-smog-disaster-exposed-perils-dirty-air>

- To inform the public of potential poor air quality.
- Forecasts are generated for year-round for fine particulate and ozone between mid-April and mid-September.



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Where does PADEP forecast?



13 regions across
the Commonwealth

Daily Forecasts for PM-2.5 Year Round / Ozone From Mid-April to Mid-September

Lehigh Valley-Berks Area Philadelphia Area Pittsburgh Area Susquehanna Valley Area

Daily Forecasts for Ozone From Mid-April to Mid-September / AQAD for PM-2.5 Year Round

Altoona Area Indiana County Mercer County State College Area
Erie Area Johnstown Area Scranton / Wilkes-Barre Area Williamsport Area

Daily Forecast for PM-2.5 Year Round / No Ozone

Liberty-Clairton Area



What is the Air Quality Index?

AQI Basics for Ozone and Particle Pollution			
Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 - 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 - 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 - 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 - 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 - 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

An Air Quality Action Day is issued if the Air Quality Index (AQI) for particle pollution (or ozone) is forecasted to be 101 or greater.



What is the Air Quality Index?

AQI Range	1hr Ozone (ppm)	8hr Ozone (ppm)	24hr PM-2.5 ($\mu\text{g}/\text{m}^3$)	8hr Carbon Monoxide (ppm)	1hr Sulfur Dioxide (ppm)	24hr Sulfur Dioxide (ppm)	1hr Nitrogen Dioxide (ppm)	24hr PM-10 ($\mu\text{g}/\text{m}^3$)
0 - 50	Not Defined	0 - 0.054	0 - 9.0	0 - 4.4	0 - 0.035	Not Defined	0 - 0.053	0 - 54
51 - 100	Not Defined	0.055 - 0.070	9.1 - 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 - 125.4	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	125.5 - 225.4	15.5 - 30.4	Not Defined	0.305 - 0.604	0.65 - 1.24	355 - 424
301 - 400	0.405 - 0.504	0.201 to SHL*	225.5 - 350.4	30.5 - 40.4	Not Defined	0.605 - 0.804	1.25 - 1.64	425 - 504
401 - 500	0.505 - 0.604	Not Defined	350.5 - 500.4	40.5 - 50.4	Not Defined	0.805 - 1.004	1.65 - 2.04	505 - 604
500+	Not Defined	Not Defined	500.5 - 999.9	Not Defined	Not Defined	Not Defined	Not Defined	605 - 4999

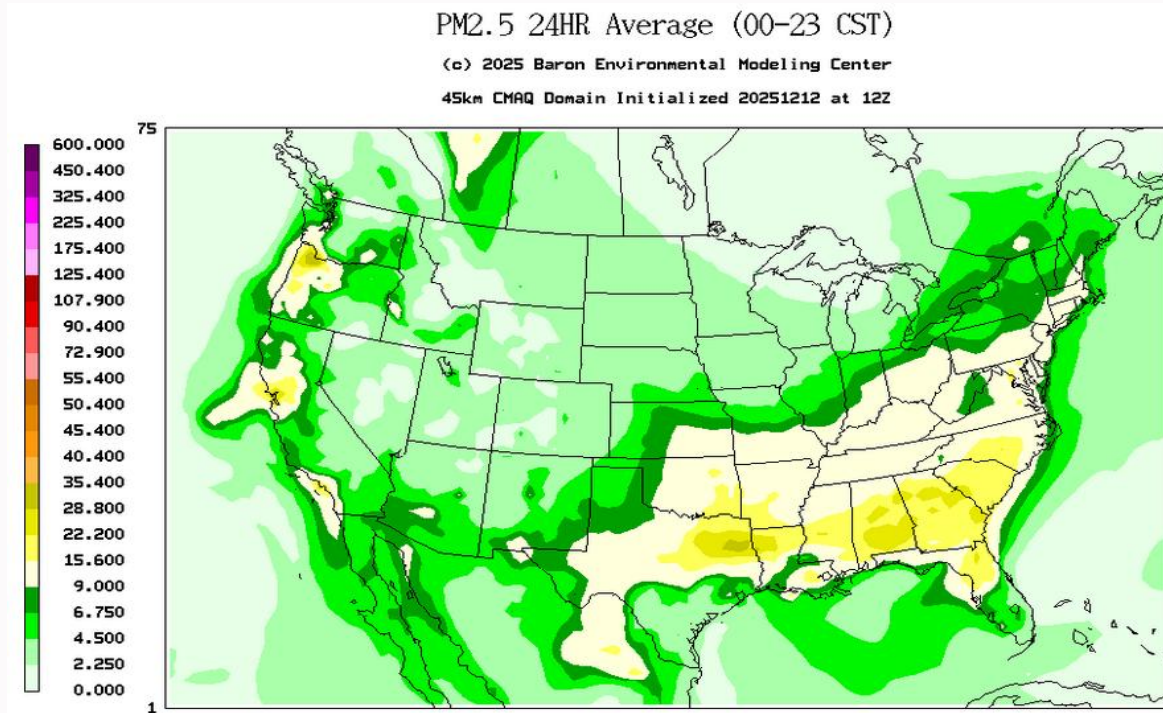
Forecast
Action Days
when we feel
conditions
will reach
Code
ORANGE or
higher

*The SHL (Significant Harm Level) for ozone is 600 ppb, two-hour average

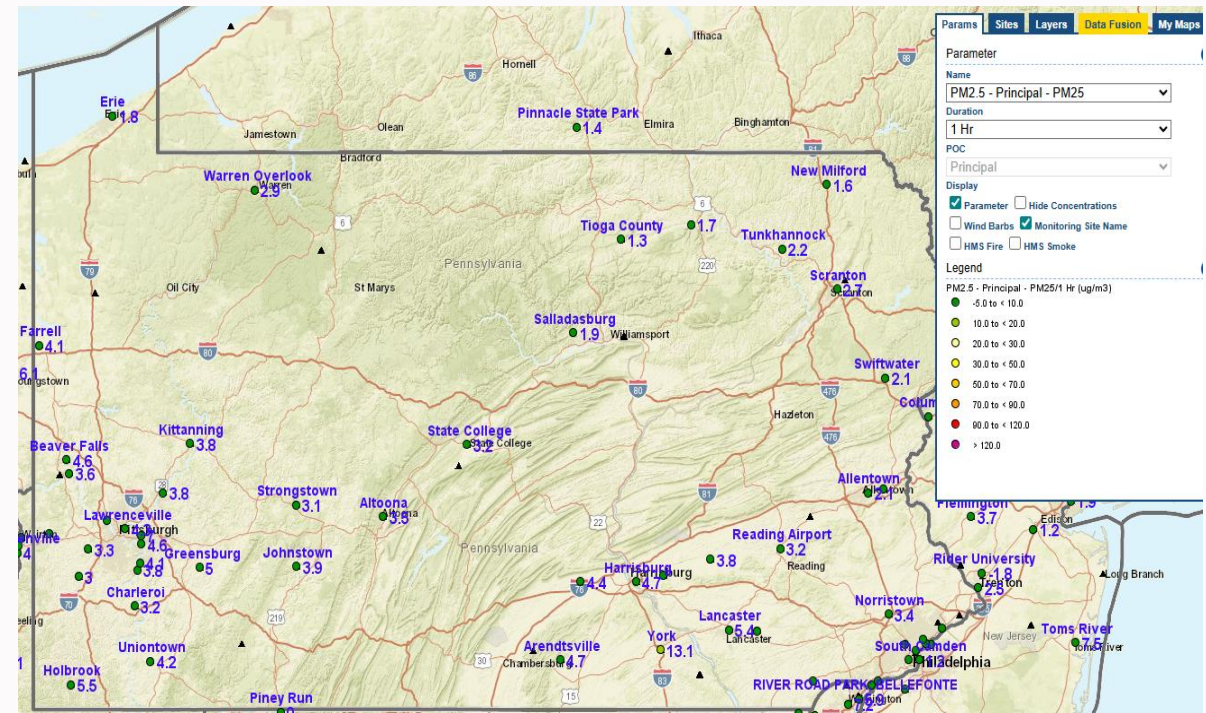
Currently Forecast for Ozone and PM2.5

How is a forecast assembled?

Forecasts look at **meteorological**, **emissions inventory**, and **real-time monitoring data**.



Forecast model of PM2.5 concentration



Real-time hourly PM2.5 data



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Ways to get your air quality forecast?

www.airnow.gov



<https://www.enviroflash.info>

AirNow

Air Quality Notifications

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Welcome to EnviroFlash! Air quality affects how you live and breathe. Like the weather, it can change from day to day, or even hour to hour. Up-to-date information allows you to make decisions based on air quality forecasts. EnviroFlash comes to you through a partnership between the US EPA and your state or local air quality agency - notifying you about air quality so you don't have to go searching for it.

United States

Today's Forecast

- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy
- Hazardous



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Daily Maximum Ozone Summary Reports

Monitoring Site Name	County	Max 1-Hour (ppb)	Hour (EST)	Max 8-Hour (ppb)	AQI	Hour (EST)
PA DEP Monitors						
<i>Southeastern Pennsylvania</i>						
Bristol	Bucks	66	13	63	77	10
New Garden (Airport)	Chester	68	11	65	84	10
Chester	Delaware	68	14	64	80	10
Norristown	Montgomery	62	12	58	61	10
<i>Northeastern Pennsylvania</i>						
Peckville	Lackawanna	51	13	48	44	11
Scranton	Lackawanna	52	14	47	44	11
Allentown	Lehigh	63	11	57	58	9
Swiftwater	Monroe	55	8	51	47	7
Freemansburg	Northampton					
<i>Southcentral Pennsylvania</i>						
Arendtsville	Adams	62	13	56	54	9
Kutztown	Berks	63	11	57	58	9
Reading Airport	Berks	63	11	59	64	10
Altoona	Blair	66	12	64	80	10
Harrisburg	Dauphin	59	13	56	54	9
Hershey	Dauphin	56	12	53	49	9
Methodist Hill	Franklin	59	14	57	58	10
Lancaster	Lancaster	65	13	61	71	9
Lancaster DW	Lancaster	61	14	56	54	9
Lebanon	Lebanon	59	11	56	54	9
York	York	64	12	62	74	9
York DW	York	63	10	60	67	9
<i>Northcentral Pennsylvania</i>						
Towanda	Bradford	55	16	48	44	11
State College	Centre	62	11	60	67	9
Montoursville	Lycoming	56	16	48	44	12
Tioga County	Tioga	60	3	52	48	12
<i>Southwestern Pennsylvania</i>						
Beaver Falls	Beaver	58	14	54	50	10
Brighton Twp	Beaver	65	15	61	71	10
Fort McIntosh	Beaver	59	14	54	50	11
Uniontown	Fayette	72	17	67	90	11
Johnstown	Cambria	73	14	68	93	10
Holbrook	Greene	76	18	72	105	14
Charlroi	Washington	74	14	67	90	11
Florence	Washington	66	14	63	77	10
Houston	Washington	72	15	67	90	11
Greensburg	Westmoreland	72	15	67	90	11
<i>Northwestern Pennsylvania</i>						
Kittanning	Armstrong	61	12	58	61	10
Erie	Erie	44	18	41	38	13
Strongstown	Indiana	67	12	64	80	10
Farrell	Mercer	54	16	49	45	11
Allegheny County Monitors						
Lawrenceville		59	16	57	58	11
Harrison Twp		66	14	63	77	11
South Fayette		78	14	72	105	11
Philadelphia County Monitors						
NE Airport (Northeast Phila)		62	13	58	61	9
NE Waste (Eastcentral Phila)		69	13	65	84	10
AMS Lab (Eastcentral Phila)		69	13	66	87	10



Annual 8-Hour Ozone Reports

Monitoring Site Information Site NameCounty		Totals		5/11/2025 Max	Hour	6/3/2025 Max	Hour	6/4/2025 Max	Hour	6/12/2025 Max	Hour
		2015 8-Hr NAAQS >70	2008 8-Hr NAAQS >75								
PA DEP Monitors											
Southeastern Pennsylvania											
Bristol	Bucks	4	2							80	10
New Garden (Airport)	Chester	1	1							80	12
Chester	Delaware	1	1							76	12
Norristown	Montgomery	1	1							80	11
Northeastern Pennsylvania											
Peckville	Lackawanna	0	0								
Scranton	Lackawanna	0	0								
Allentown	Lehigh	1	0							75	11
Swiftwater	Monroe	0	0								
Freemansburg	Northampton	2	1							77	10
Southcentral Pennsylvania											
Arendtsville	Adams	0	0								
Kutztown	Berks	2	0					71	11		
Reading Airport	Berks	3	3					77	11	76	10
Altoona	Blair	1	0							75	10
Harrisburg	Dauphin	1	0								
Hershey	Dauphin	0	0								
Methodist Hill	Franklin	0	0								
Lancaster	Lancaster	1	1					76	11		
Lancaster DW	Lancaster	0	0								
Lebanon	Lebanon	2	0					73	11	72	11
York	York	1	0							71	10
York DW	York	0	0								
Northcentral Pennsylvania											
Towanda	Bradford	0	0								
State College	Centre	0	0								
Montoursville	Lycoming	1	0					72	13		
Tioga County	Tioga	0	0								
Southwestern Pennsylvania											
Beaver Falls	Beaver	0	0								
Brighton Twp	Beaver	0	0								
Fort McIntosh	Beaver	0	0								
Uniontown	Fayette	0	0								
Johnstown	Cambria	1	0							75	10
Holbrook	Greene	1	0	72	14						
Charleroi	Washington	0	0								
Florence	Washington	0	0								
Houston	Washington	0	0								
Greensburg	Westmoreland	1	1							78	11
Northwestern Pennsylvania											
Kittanning	Armstrong	0	0								
Erie	Erie	0	0								
Strongstown	Indiana	1	1							77	11
Farrell	Mercer	1	0							75	9
Warren Overlook	Warren	0	0								
Allegheny County Monitors											
Lawrenceville		0	0								
Harrison Twp		1	1							76	11
South Fayette		4	1	72	11					79	10
Philadelphia County Monitors											
NE Airport (Northeast Phila)		3	1							72	11
NE Waste (Eastcentral Phila)		5	2			72	11	71	11	84	11
AMS Lab (Eastcentral Phila)		3	2							79	11
CASTNET Sites											
Arendtsville (ARE128)	Adams	0	0								
Penn State (PSU106)	Centre	1	0							71	10
Kane Exp. Forest (KEF112)	Elk	0	0								
M.K. Goddard (MKG113)	Mercer	1	0			74	12				
Laurel Hill (LRL117)	Somerset	0	0								
		45	19								



Get In Touch

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The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water resources and to provide for the health and safety of its residents and visitors, consistent with the rights and duties established under the Environmental Rights Amendment (Article 1, Section 27 of the Pennsylvania Constitution).