Ozone National Ambient Air Quality Standard Health Exceedances on July 22, 23, & 24, 2022

Exceedance Locations and Levels

On Friday, July 22, 2022, there was one (1) exceedance, on Saturday, July 23, 2022, there were three (3) exceedances, and on Sunday, July 24, 2022, there were no exceedances in New Jersey of the National Ambient Air Quality Standard (NAAQS) for ozone (daily maximum 8-hour average of 70 ppb). See Table 1.

Table 1. New Jersey Ozone Concentrations on 7/22/2022 – 7/24/2022

STATION	Daily Maximum 8-Hr Average (ppb) 7/22/2022	Daily Maximum 8-Hr Average (ppb) 7/23/2022	Daily Maximum 8-Hr Average (ppb) 7/24/2022
Ancora State Hospital	60	60	53
Bayonne	59	72	63
Brigantine	55	65	55
Camden Spruce St	62	69	57
Chester	59	61	60
Clarksboro	69	75	62
Colliers Mills	71	69	61
Columbia	49	51	58
Flemington	60	62	62
Leonia	59	63	61
Millville	59	62	54
Monmouth University	70	73	56
Newark Firehouse	58	62	62
Ramapo	51	54	52
Rider University	62	63	66
Rutgers University	59	61	65
Washington Crossing*	59	59	60
TOTAL EXCEEDANCES	1	3	0

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clean Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone nonattainment areas, there were four (4) exceedances of the ozone NAAQS on Friday, July 22, 2022, there were seven (7) exceedances of the ozone NAAQS on Saturday, July 23, 2022, and four (4) exceedances of the ozone NAAQS on Sunday, July 24, 2022. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Nonattainment Areas on 7/22/2022

STATE	STATION	Daily Maximum 8-Hr Average (ppb) 7/22/2022	Daily Maximum 8-Hr Average (ppb) 7/23/2022	Daily Maximum 8-Hr Average (ppb) 7/24/2022
CT	Danbury	55	62	64
CT	Greenwich	74	73	64
CT	Madison-Beach Road	65	65	77
CT	Middletown-CVH-Shed	70	67	71
CT	New Haven	69	68	42
CT	Stratford	76	71	74
CT	Westport	73	74	73
DE	BCSP (New Castle Co.)	64	60	55
DE	BELLFNT2 (New Castle Co.)	65	65	55
DE	KILLENS (Kent Co.)	56	57	47
DE	LEWES (Sussex Co.)	61	62	49
DE	LUMS 2 (New Castle Co.)	46	65	53
DE	MLK (New Castle Co.)	65	65	56
DE	SEAFORD (Sussex Co.)	62	59	49
MD	Fair Hill	62	61	55
NY	Babylon	74	80	65
NY	Bronx - IS52	61	68	61
NY	CCNY	59	67	61
NY	Flax Pond	69	67	70
NY	Fresh Kills	59	65	63
NY	Holtsville	66	77	64
NY	Pfizer Lab	63	67	62
NY	Queens	68	78	63
NY	Riverhead	66	69	69
NY	Rockland Cty	50	48	55
NY	White Plains	58	61	60
PA	BRIS (Bucks Co.)	66	69	67
PA	CHES (Delaware Co.)	63	66	58
PA	NEWG (Chester Co.)	57	52	48
PA	NORR (Montgomery Co.)	61	59	57
PA	LAB (Philadelphia Co.)	59	59	59
PA	NEA (Philadelphia Co.)	65	65	67
PA	NEW (Philadelphia Co.)	66	72	65
	TOTAL EXCEEDANCES	4	7	4

The number of days in 2022 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone nonattainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Nonattainment Areas in 2022

STATE	# of Days NAAQS was Exceeded January 1 – July 24, 2022 NAAQS = 70 ppb
Connecticut	13
Delaware	0
Maryland	1
New Jersey	7
New York	6
Pennsylvania	3

Figure 1. Ozone Air Quality Index for July 22, 2022

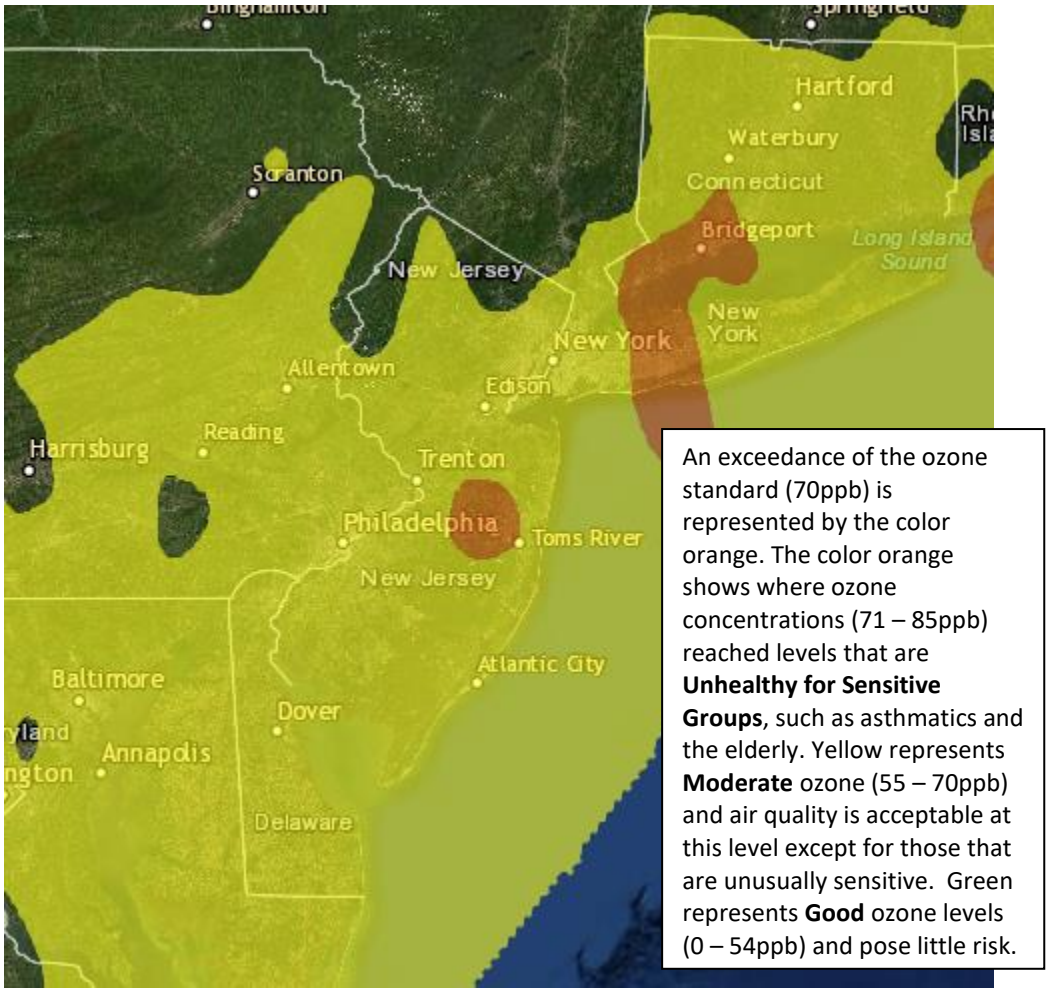


Figure 2. Ozone Air Quality Index for July 23, 2022

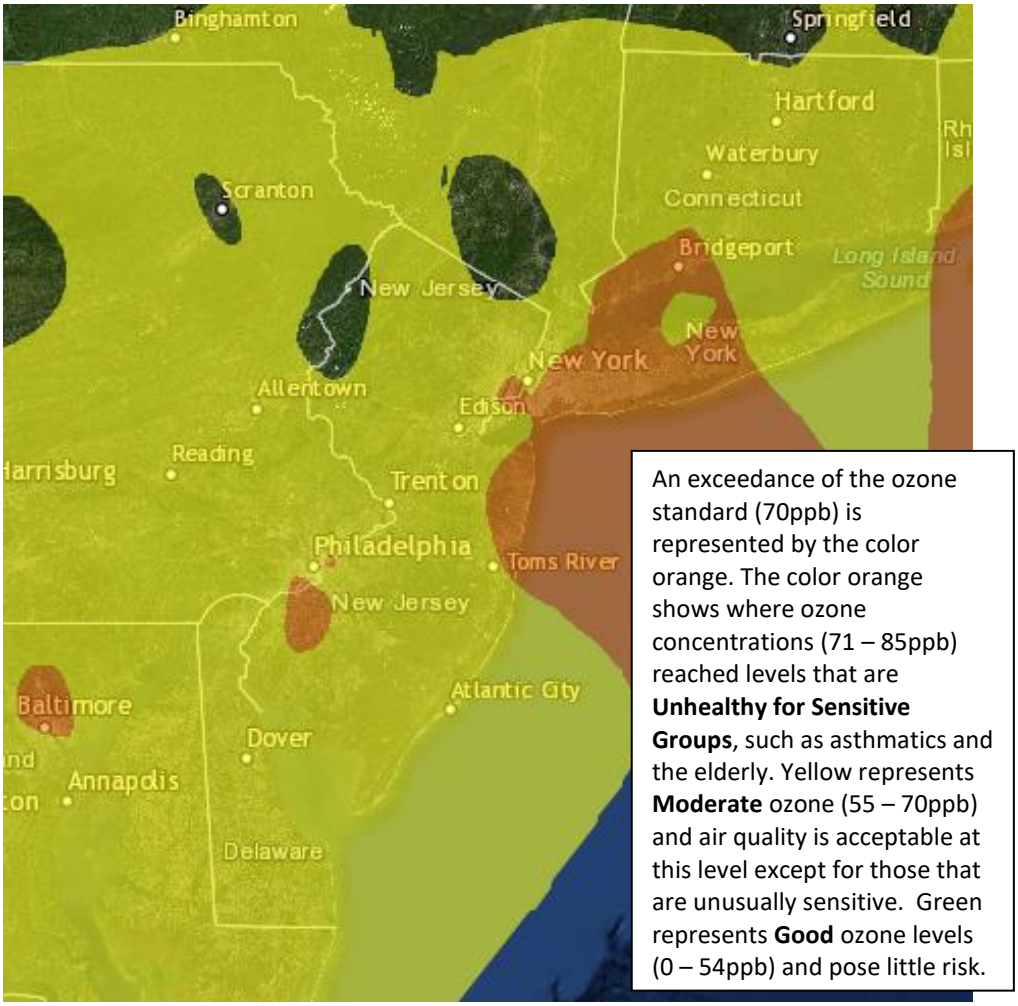
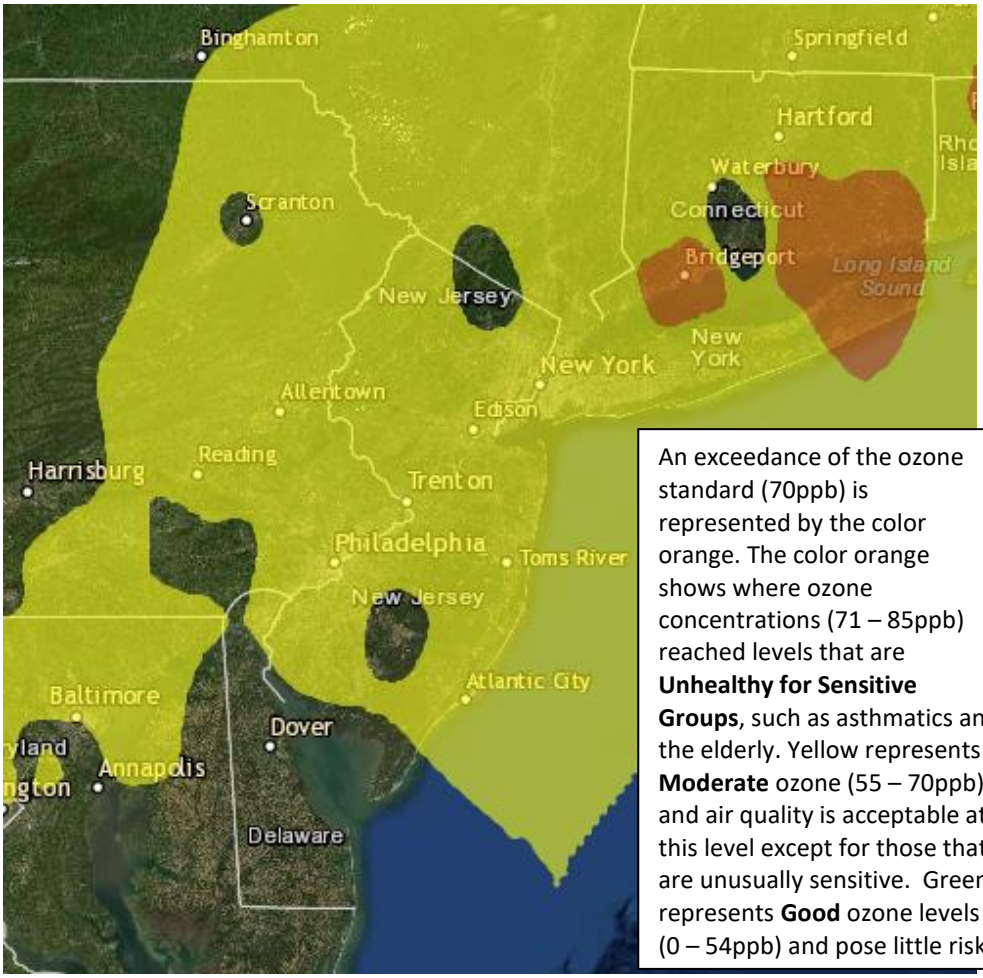


Figure 3. Ozone Air Quality Index for July 24, 2022



Source: www.airnow.gov

For ozone terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: http://nj.gov/dep/baqp/glossary.html

Weather

A complex weather pattern from July 22nd through 24th led to multiple days of abundant sunshine and excessive heat across the region. These conditions in combination with the transport of local/regional emissions and previously polluted air supported a multi-day exceedance event for the nonattainment area.

On Friday July 22nd, a cold front pushed offshore in the early morning hours as a weak high pressure built over the nonattainment area. This atmospheric setup allowed for mostly sunny skies and hot temperatures across the region. Winds tended from the southwest, supporting a rise in ozone levels throughout the nonattainment area. Looking further, an early afternoon seabreeze along the coast as well as evening thunderstorms across portions of the northern nonattainment area allowed for the further enhancement of ozone throughout the region, leading to exceedances over central New Jersey, Long Island, and the Connecticut coastline on this day.

As the previously mentioned cold front, that pushed offshore on Friday, moved back onshore on Saturday July 23rd, it meandered over the nonattainment area throughout the course of the day. As this front was weak in nature, clouds were limited across the region, leading to another day of favorable conditions for ozone formation. Additionally, the wind pattern varied as it was associated with the location of the front. Locations east of the boundary tended to observe more southerly winds while locations west, saw a more west or northwest flow. This variable wind pattern allowed for the transport of not only local/regional emissions but previously polluted air, which led to the enhancement of ozone levels throughout the nonattainment area and several exceedances on this day.

Finally, high pressure then built over the Mid-Atlantic region on Sunday July 24th as the previously mentioned frontal boundary significantly weakened to a surface trough. Persistent sunshine and hot temperatures dominated for a third day while winds continued to remain variable across the nonattainment area. Breezy southwesterly winds along coastal locations allowed for the transport of previously polluted air northward, enhancing ozone levels in portions of the northern nonattainment area, and leading to exceedances over coastal and central Connecticut.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 4, 5, and 6 show the back trajectories of different wind heights for the monitored exceedance(s) during this exceedance event. The figures illustrate where the air came from during the 24-96 hours preceding the 8-hour ozone standard exceedances. A transport analysis is provided with each figure shown below along with a map of the National Air Quality Index for the previous days (Figures 7, 8, and 9). The monitoring station(s) that were chosen to model back trajectories are listed in Table 4.

Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that were selected to Run 96-hr Back Trajectories

STATE	STATION	DATE	Daily Maximum 8-Hr Average (ppb)
CT	Stratford	7/22, 7/23, 7/24	76, 71, 74
CT	Greenwich	7/22, 7/23	74, 73
CT	Westport	7/22, 7/23, 7/24	73, 74, 73
NY	Babylon	7/22, 7/23	74, 80
NY	Queens	7/23	78
NJ	Colliers Mills	7/22	71
NJ	Clarksboro	7/23	75
NJ	Monmouth	7/23	73

Figure 4. 96-hour Back Trajectories for July 24, 2022 at 10 meters

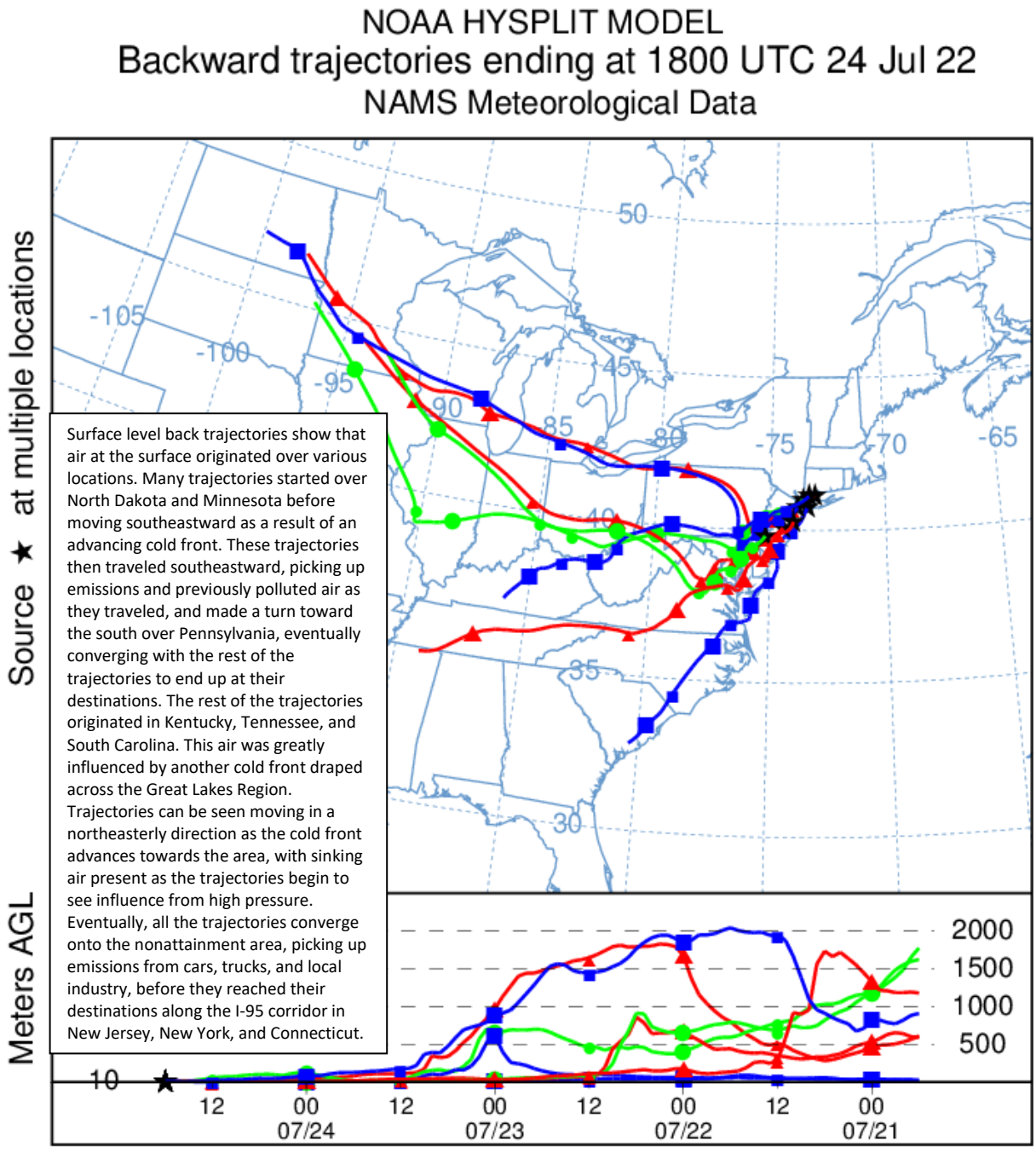


Figure 5. 96-hour Back Trajectories for July 24, 2022 at 500 meters

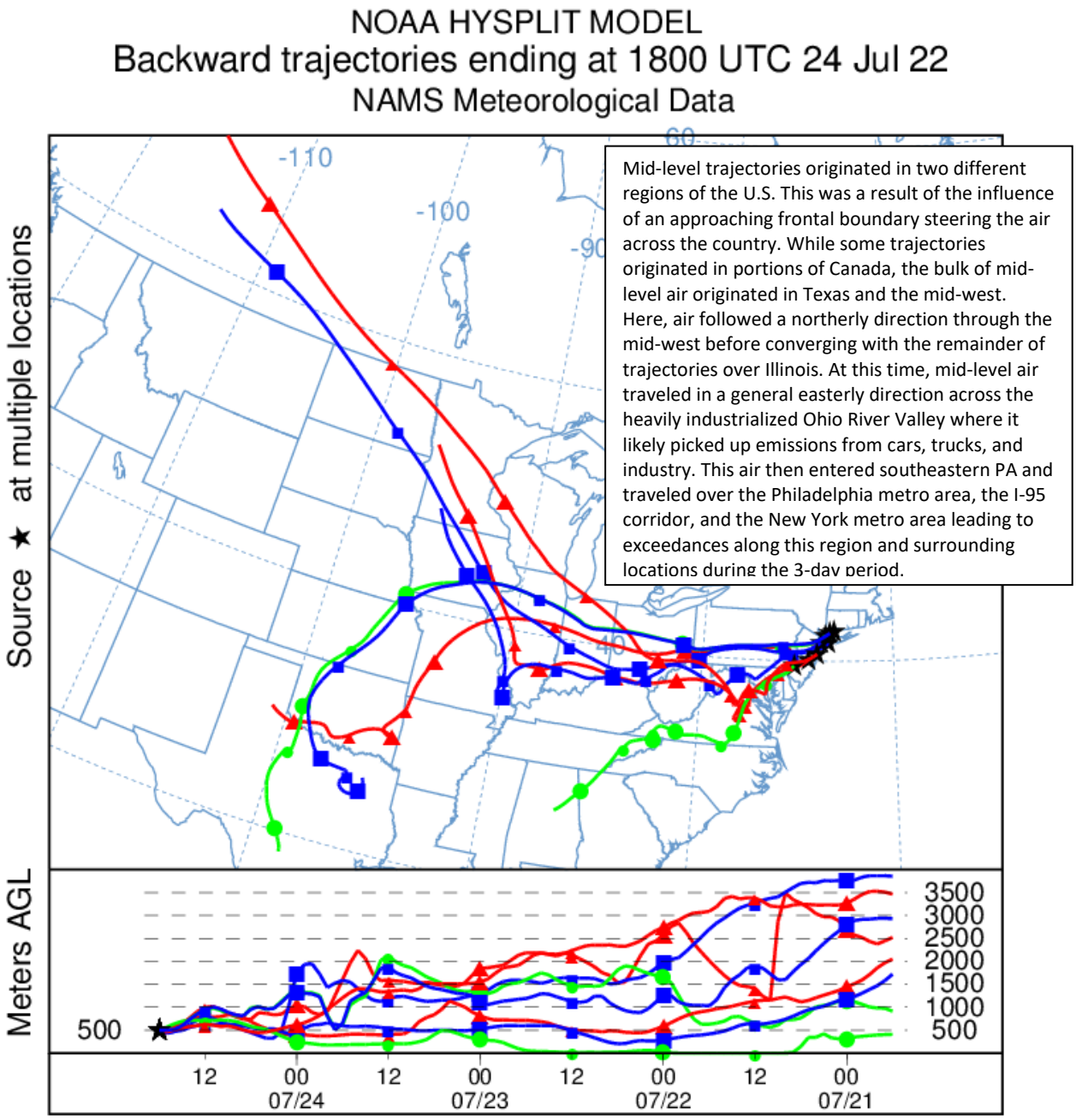


Figure 6. 96-hour Back Trajectories for July 24, 2022 at 1500 meters

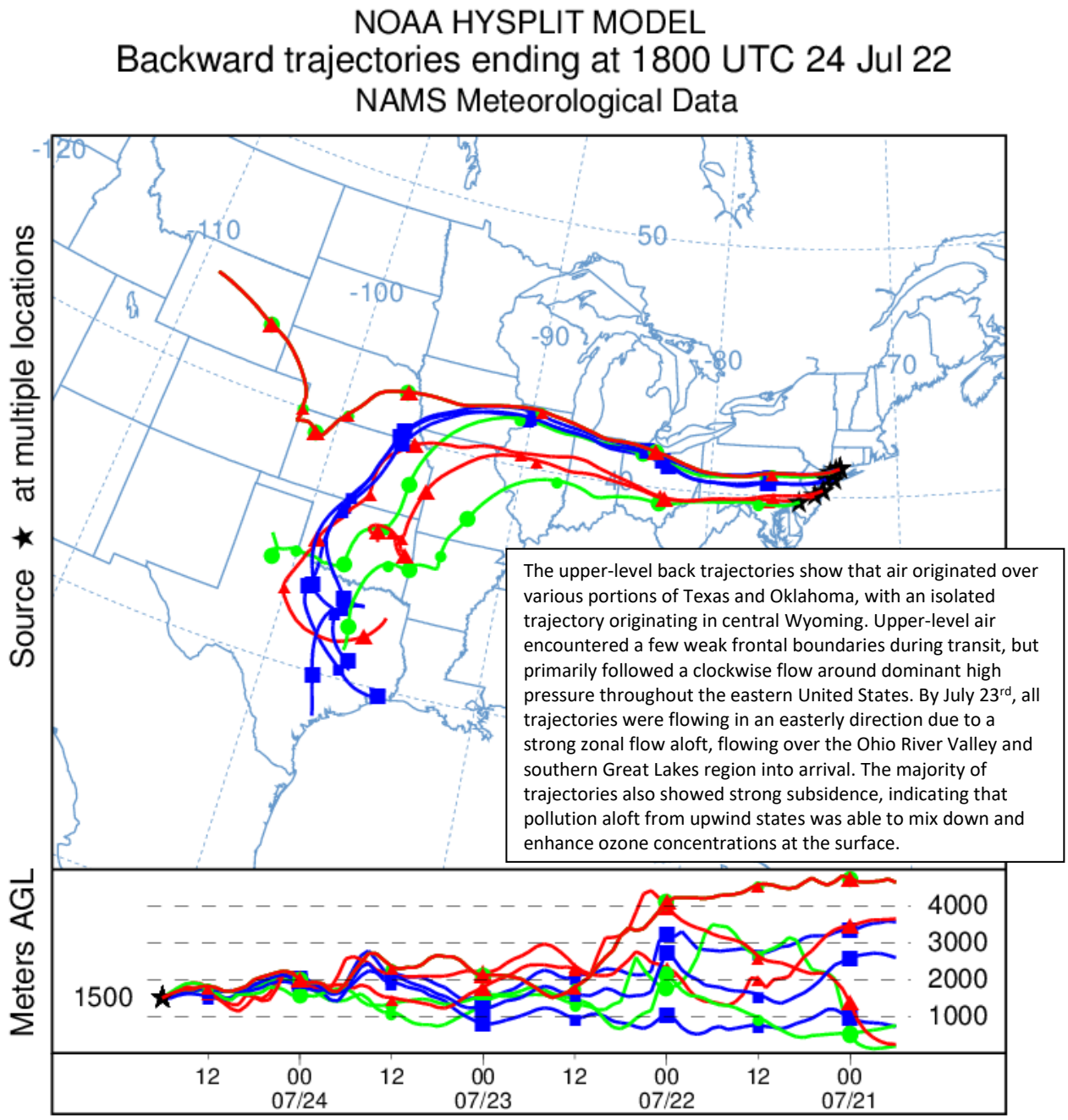


Figure 7. Air Quality Index for the United States on July 21, 2022

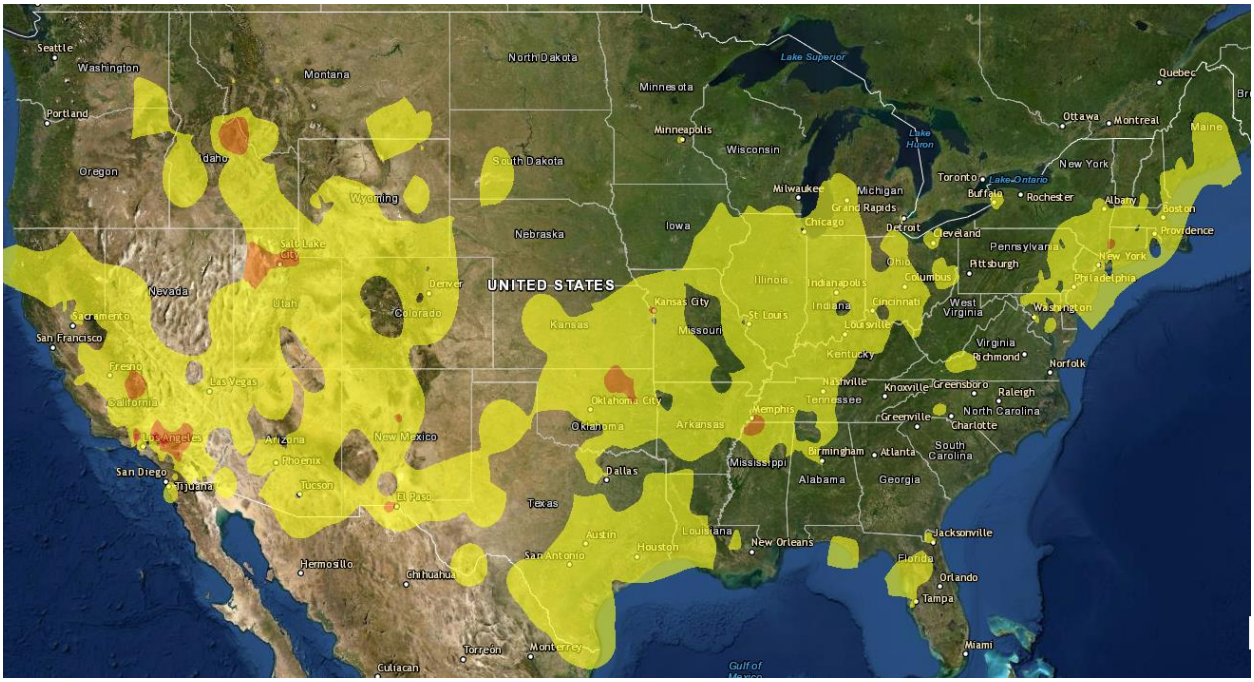


Figure 8. Air Quality Index for the United States on July 22, 2022

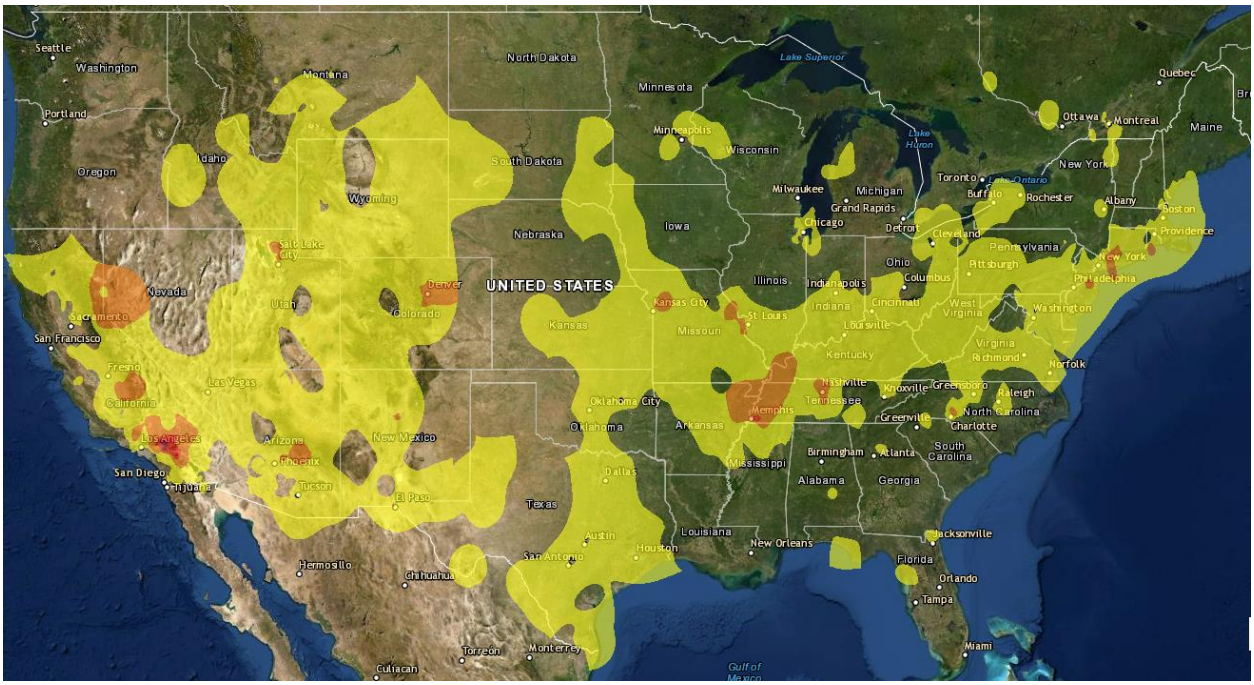
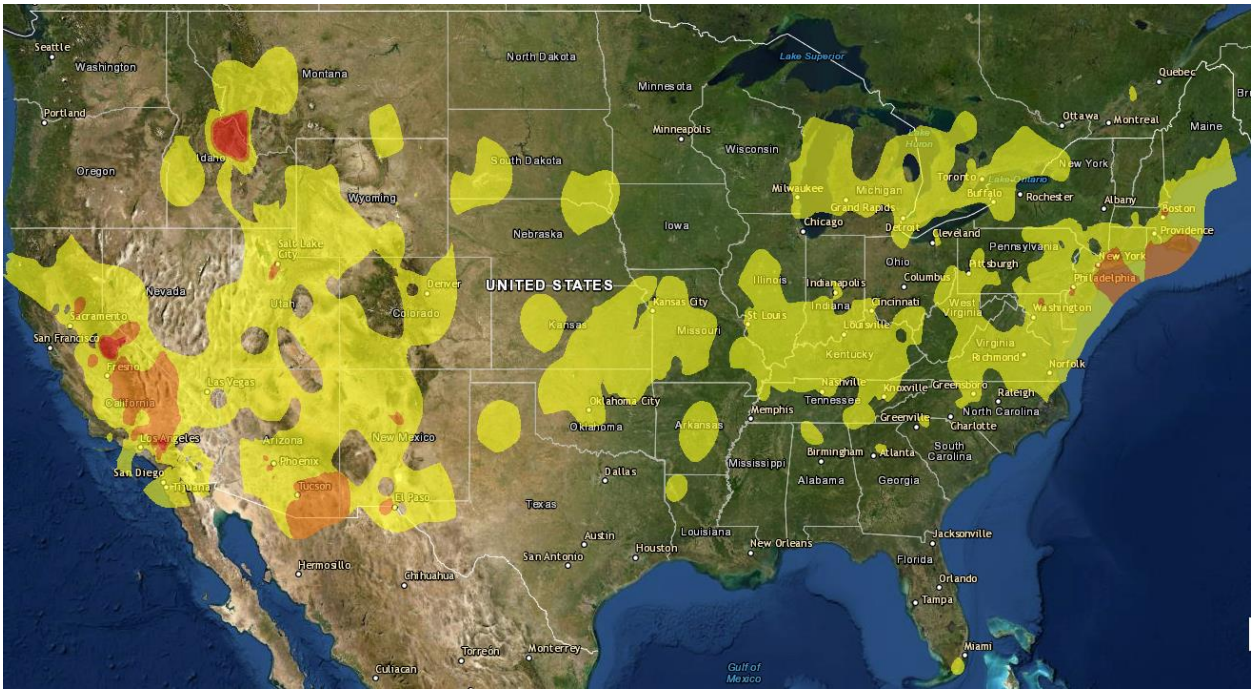


Figure 9. Air Quality Index for the United States on July 23, 2022



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause several health effects and negatively impact air quality and the environment in New Jersey. Ozone is formed when oxides of nitrogen (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone can irritate any person's lungs, but the effect may be more pronounced for those with existing lung-related deficiencies, and therefore, one should take extra precautions on bad ozone days.

Find Out About Air Quality Every Day

Learn more about your local ozone air quality forecast by visiting the "What's Your Air Quality Today?" page at https://www.nj.gov/dep/baqp/aqitoday.html .