Ozone National Ambient Air Quality Standard Health Exceedances on August 21, 2023

Exceedance Locations and Levels

On Monday, August 21, 2023, there was one (1) exceedance 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 8/21/2023

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	66
Bayonne	48
Brigantine	49
Camden Spruce St	56
Chester	45
Clarksboro	73
Colliers Mills	60
Columbia	30
Flemington	53
Leonia	44
Millville	63
Monmouth University	64
Ramapo	45
Rider University	54
Rutgers University	57
Washington Crossing*	49
TOTAL EXCEEDANCES	1

*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 two (2) exceedances of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Nonattainment Areas on 8/21/2023

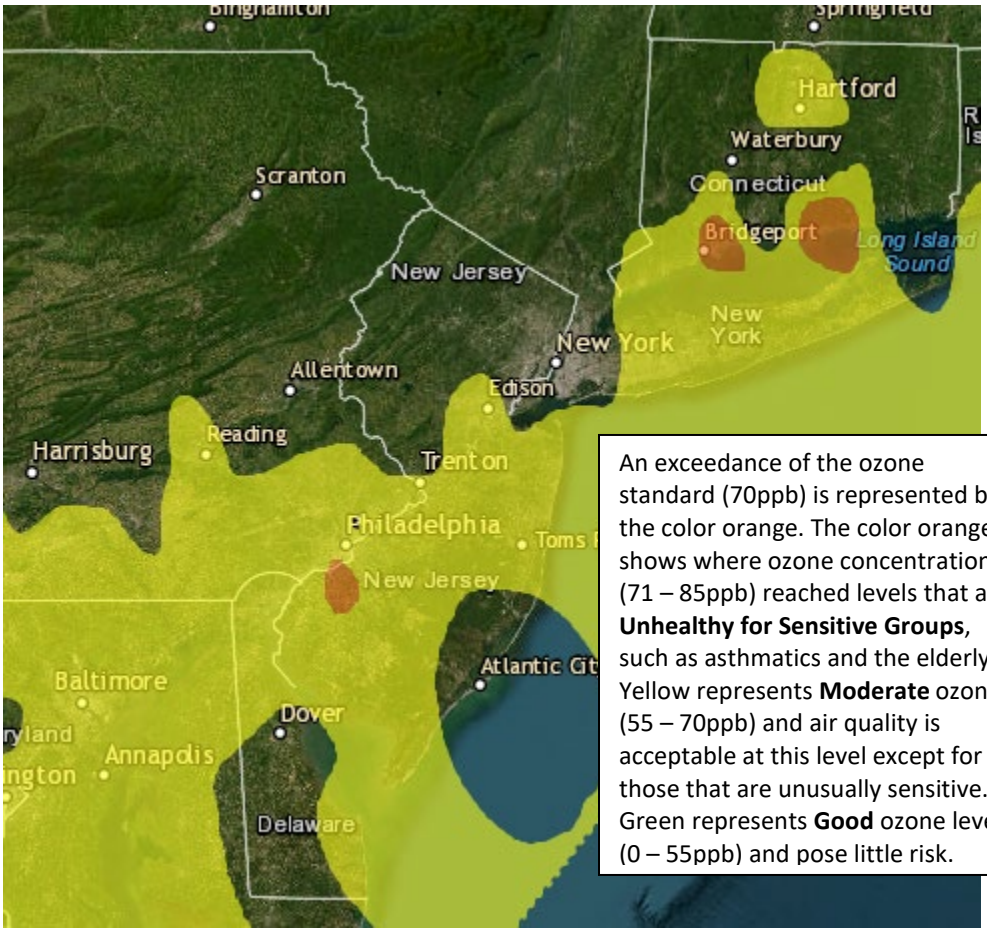
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	47
CT	Greenwich	66
CT	Madison-Beach Road	74
CT	Middletown-CVH-Shed	48
CT	New Haven	49
CT	Stratford	74
CT	Westport	69
DE	BCSP (New Castle Co.)	54
DE	BELLFNT2 (New Castle Co.)	60
DE	KILLENS (Kent Co.)	48
DE	LEWES (Sussex Co.)	55
DE	LUMS 2 (New Castle Co.)	59
DE	MLK (New Castle Co.)	61
DE	SEAFORD (Sussex Co.)	48
MD	Fair Hill	63
NY	Babylon	62
NY	Bronx - IS52	50
NY	CCNY	51
NY	Flax Pond	59
NY	Fresh Kills	51
NY	Holtsville	No Data
NY	Pfizer Lab	49
NY	Queens	54
NY	Riverhead	61
NY	Rockland Cty	39
NY	White Plains	45
PA	BRIS (Bucks Co.)	59
PA	CHES (Delaware Co.)	64
PA	NEWG (Chester Co.)	57
PA	NORR (Montgomery Co.)	56
PA	LAB (Philadelphia Co.)	53
PA	NEA (Philadelphia Co.)	62
PA	NEW (Philadelphia Co.)	58
	TOTAL EXCEEDANCES	2

The number of days in 2023 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 2023

STATE	# of Days NAAQS was Exceeded January 1 – August 21, 2023 NAAQS = 70 ppb
Connecticut	18
Delaware	4
Maryland	3
New Jersey	15
New York	14
Pennsylvania	10

Figure 1. Ozone Air Quality Index for August 21, 2023



Source: www.airnow.gov

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

Weather

On Monday, August 21st, high pressure moved offshore as a cold front approached the region from the northwest. Early Monday morning, a prefrontal trough moved into the area, extending along the coastline from Maine to South Carolina. Light southwest to westerly flow set up across the region, bringing a brief return of heat and humidity. Under the influence of the prefrontal trough, clouds increased during the day, with several breaks occurring. This allowed sunshine to peak through for extended periods of time across the nonattainment area as the day progressed. Ozone levels began to rise due to these favorable conditions, with several locations reaching the moderate category as well as isolated locations reaching the unhealthy for sensitive groups (USG) category. In addition, wildfire smoke was also observed throughout the region, possibly enhancing ozone concentrations further. The cold front moved through in the late afternoon, bringing in a cooler and drier airmass to the region.

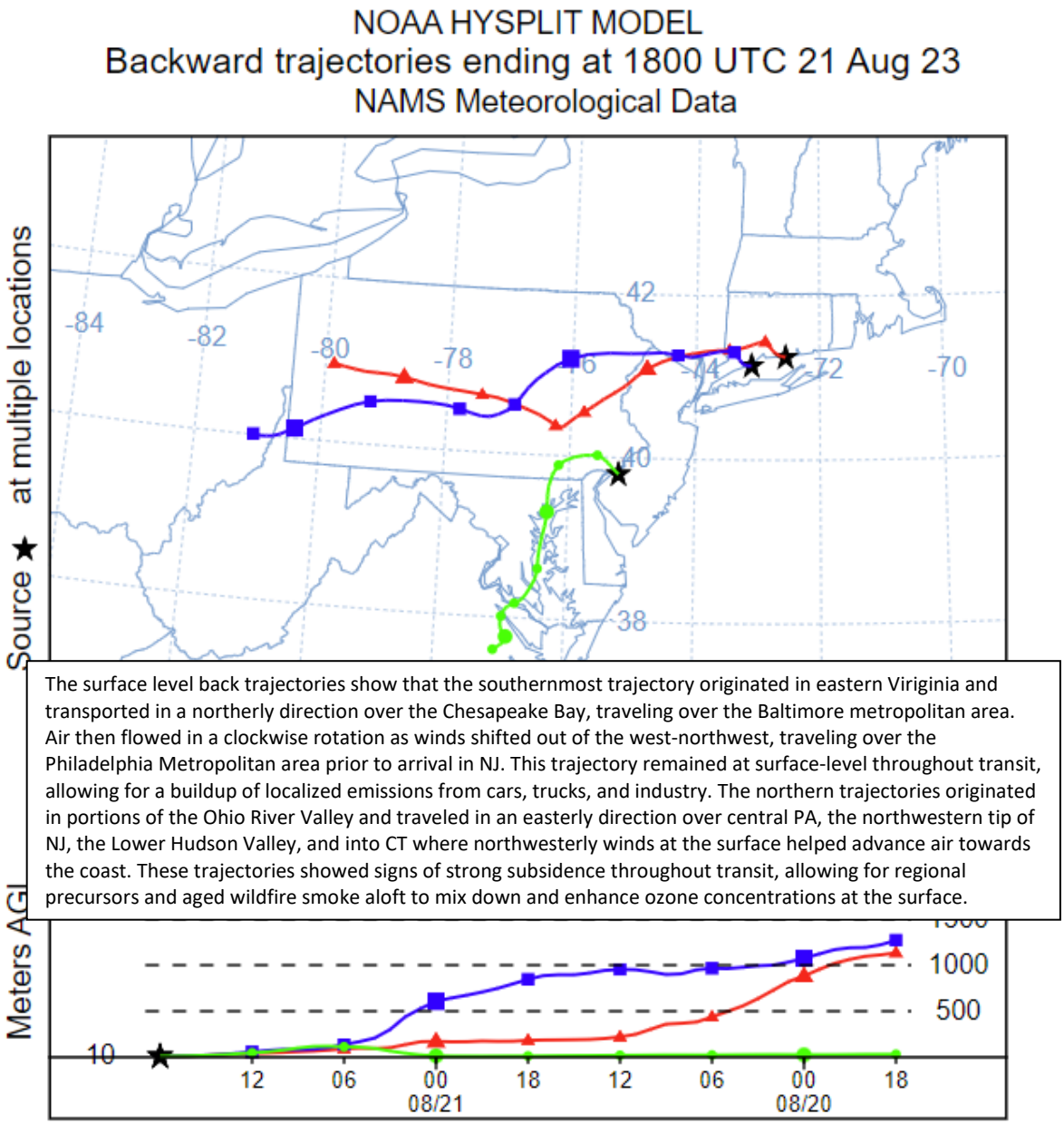
Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories of different wind heights for the monitored exceedance(s) on this day. The figures illustrate where the air came from during the 48 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 day (Figure 5). 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 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Madison–Beach Road	74
CT	Stratford	74
NJ	Clarksboro	73

Figure 2. 48-hour Back Trajectories for August 21, 2023 at 10 meters



The surface level back trajectories show that the southernmost trajectory originated in eastern Viriginia and transported in a northerly direction over the Chesapeake Bay, traveling over the Baltimore metropolitan area. Air then flowed in a clockwise rotation as winds shifted out of the west-northwest, traveling over the Philadelphia Metropolitan area prior to arrival in NJ. This trajectory remained at surface-level throughout transit, allowing for a buildup of localized emissions from cars, trucks, and industry. The northern trajectories originated in portions of the Ohio River Valley and traveled in an easterly direction over central PA, the northwestern tip of NJ, the Lower Hudson Valley, and into CT where northwesterly winds at the surface helped advance air towards the coast. These trajectories showed signs of strong subsidence throughout transit, allowing for regional precursors and aged wildfire smoke aloft to mix down and enhance ozone concentrations at the surface.

Figure 3. 48-hour Back Trajectories for August 21, 2023 at 500 meters

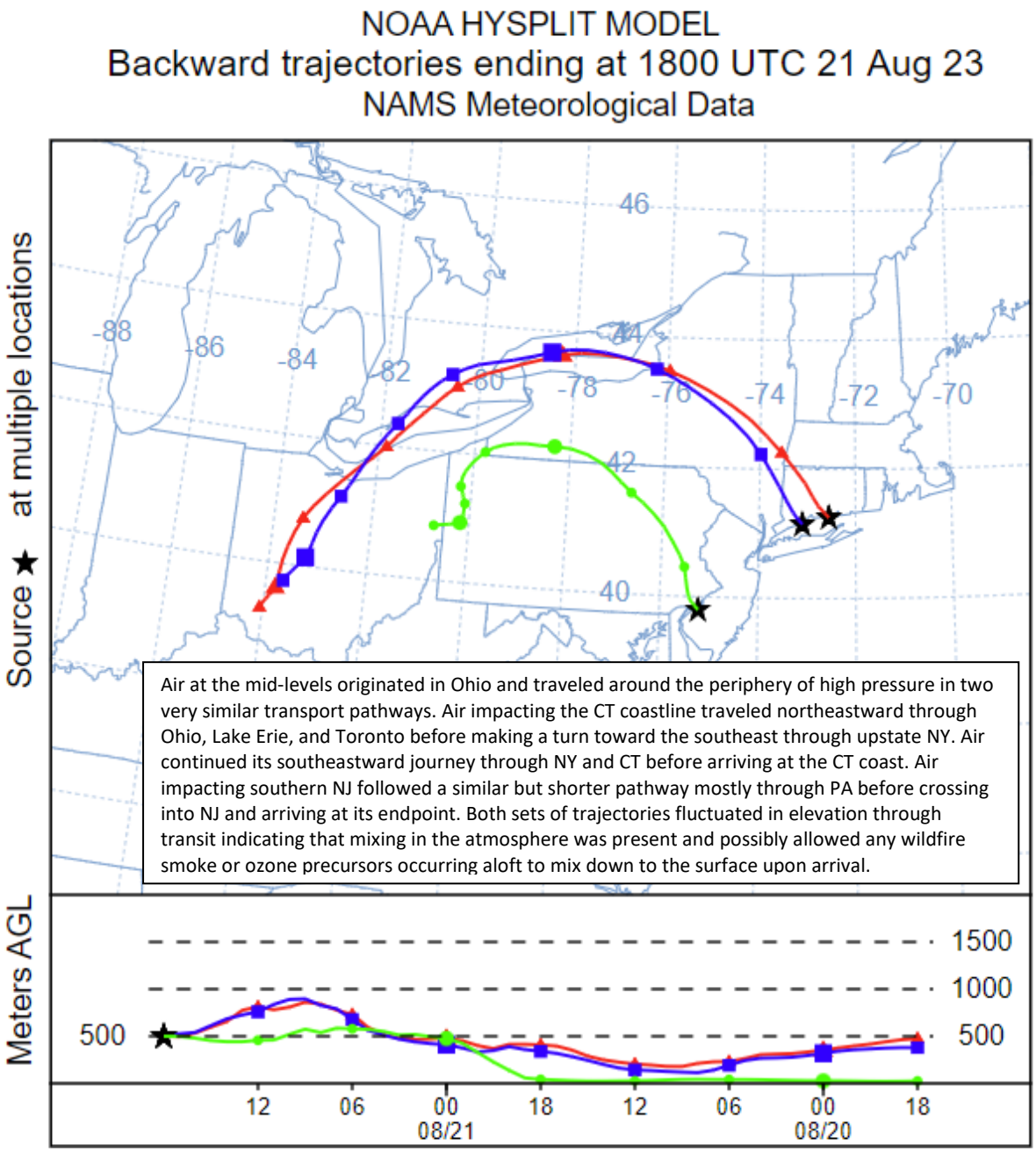


Figure 4. 48-hour Back Trajectories for August 21, 2023 at 1500 meters

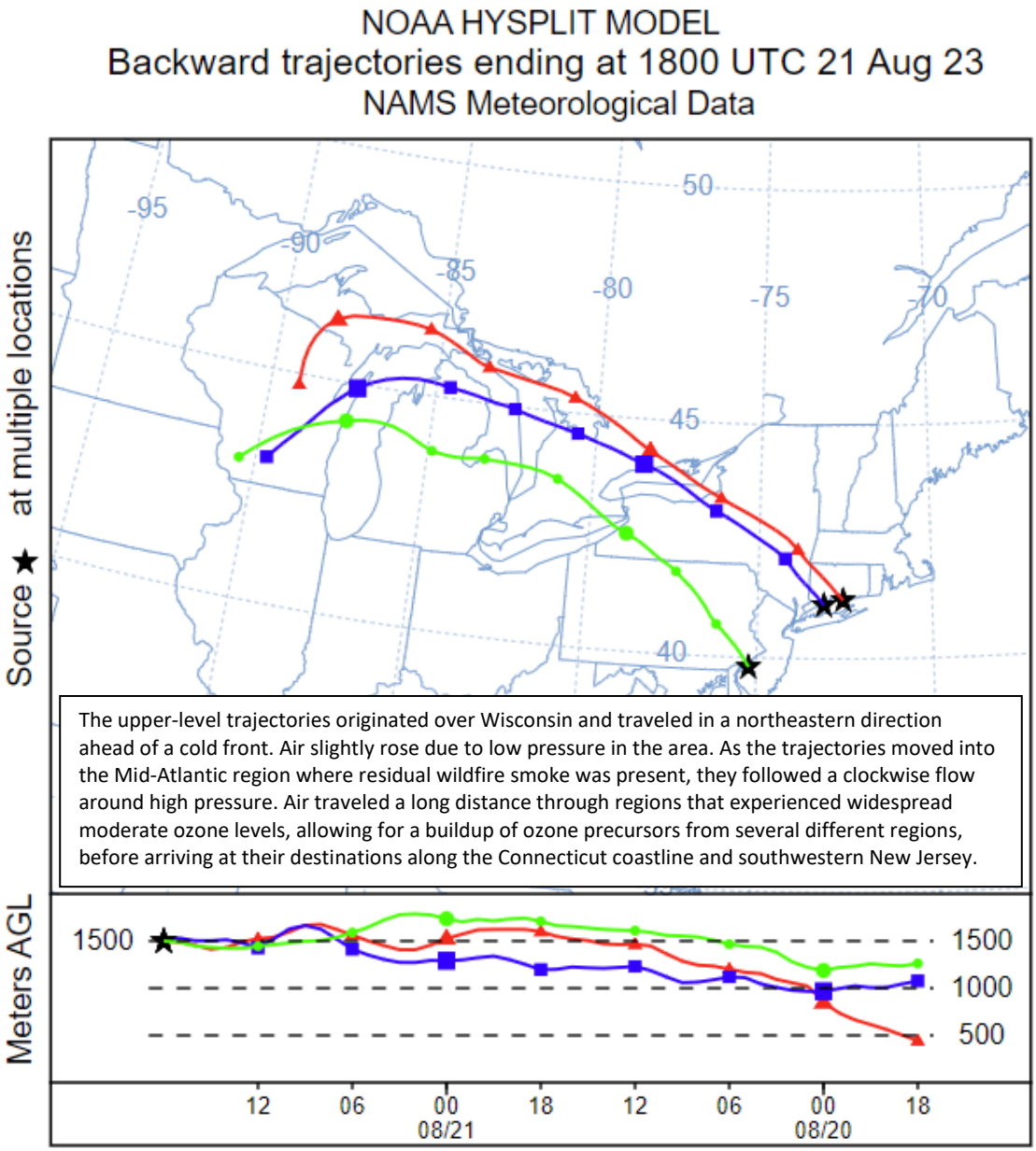
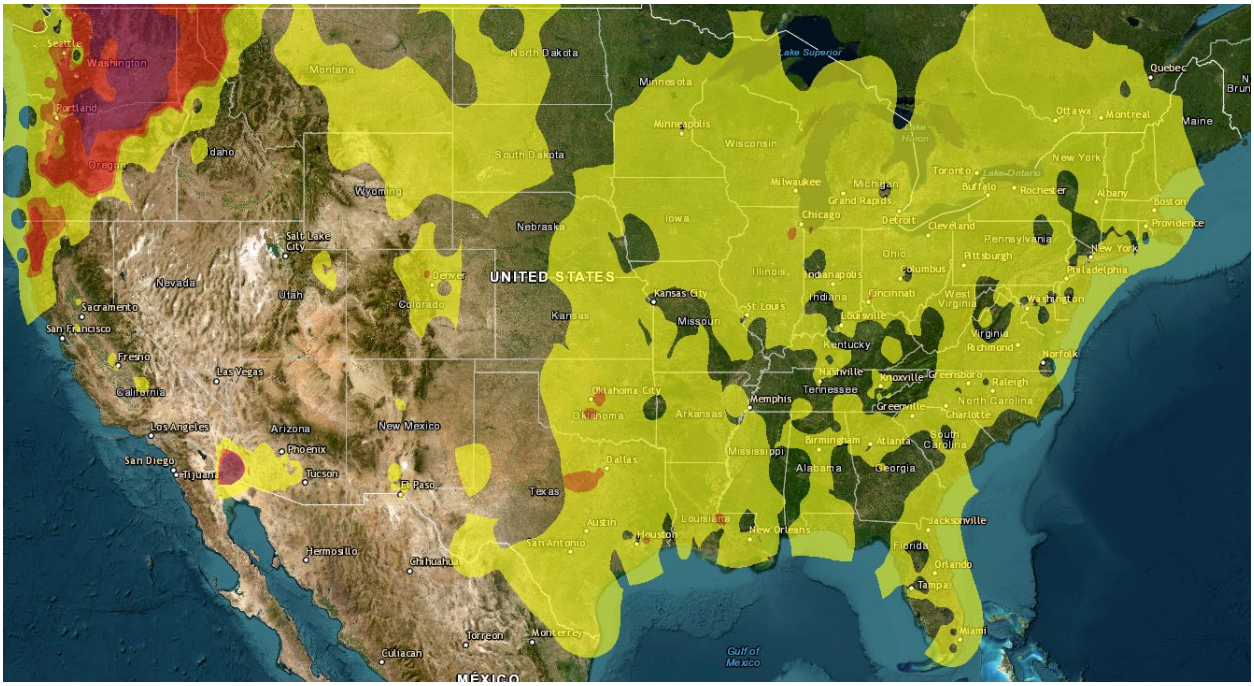


Figure 5. Air Quality Index for the United States on August 20, 2023



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 .