Ozone National Ambient Air Quality Standard Health Exceedances on July 13, 2020

Exceedance Locations and Levels

On Monday, July 13, 2020, 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 7/13/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	48
Bayonne	39
Brigantine	50
Camden Spruce St	44
Chester	39
Clarksboro	46
Colliers Mills	46
Columbia	35
Flemington	41
Leonia	42
Millville	47
Monmouth University	48
Newark Firehouse	43
Ramapo	35
Rider University	43
Rutgers University	42
Washington Crossing*	41
TOTAL EXCEEDANCES	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 non-attainment areas, there was one (1) exceedance of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on 7/13/2020

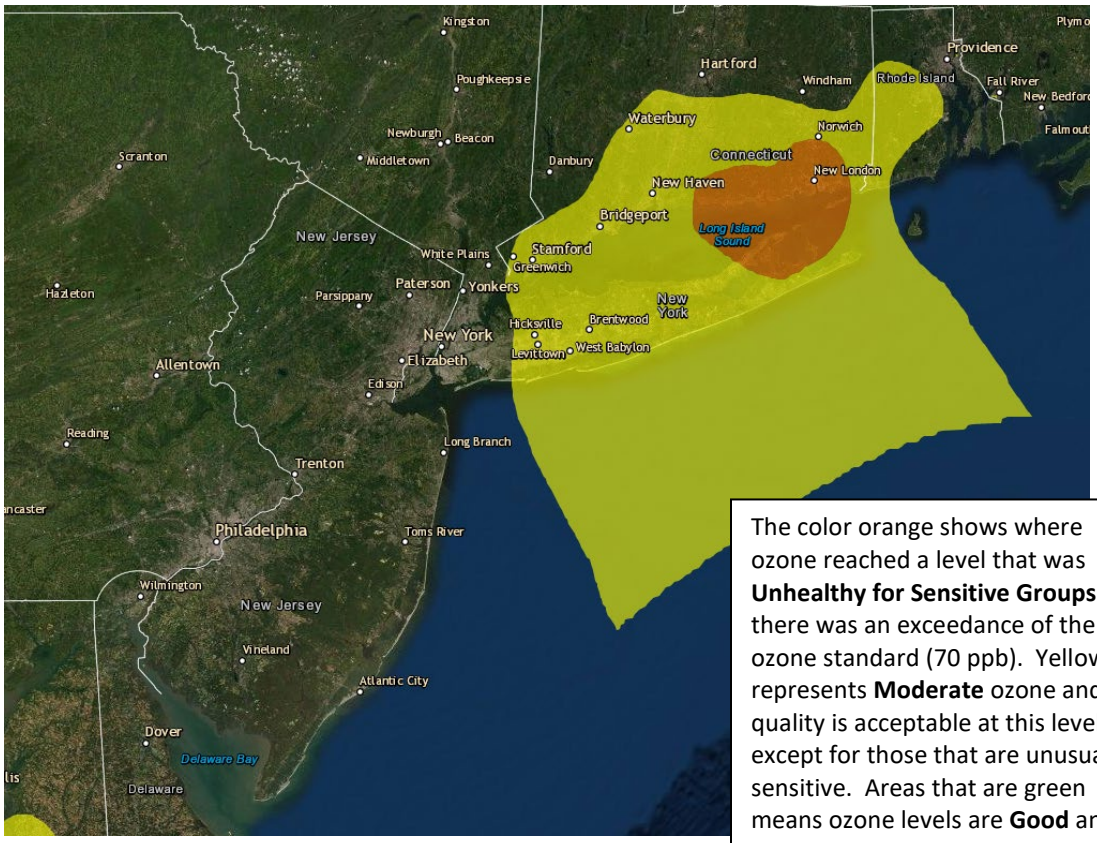
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	43
CT	Greenwich	58
CT	Madison-Beach Road	75
CT	Middletown-CVH-Shed	61
CT	New Haven	63
CT	Stratford	69
CT	Westport	58
DE	BCSP (New Castle Co.)	43
DE	BELLFNT2 (New Castle Co.)	45
DE	KILLENS (Kent Co.)	42
DE	LEWES (Sussex Co.)	51
DE	LUMS 2 (New Castle Co.)	47
DE	MLK (New Castle Co.)	48
DE	SEAFORD (Sussex Co.)	45
MD	Fair Hill	45
NY	Babylon	66
NY	Bronx - IS52	46
NY	CCNY	45
NY	Fresh Kills	40
NY	Holtsville	65
NY	Pfizer Lab	46
NY	Queens	53
NY	Riverhead	64
NY	Rockland Cty	36
NY	White Plains	43
PA	BRIS (Bucks Co.)	42
PA	CHES (Delaware Co.)	46
PA	NEWG (Chester Co.)	46
PA	NORR (Montgomery Co.)	46
PA	LAB (Philadelphia Co.)	42
PA	NEA (Philadelphia Co.)	43
PA	NEW (Philadelphia Co.)	45
	TOTAL EXCEEDANCES	1

The number of days in 2020 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2020

STATE	# of Days NAAQS was Exceeded January 1 – July 13, 2020 NAAQS = 70 ppb
Connecticut	3
Delaware	0
Maryland	0
New Jersey	2
New York	2
Pennsylvania	1

Figure 1. Ozone Air Quality Index for July 13, 2020



The color orange shows where ozone reached a level that was **Unhealthy for Sensitive Groups** and there was an exceedance of the ozone standard (70 ppb). Yellow represents **Moderate** ozone and air quality is acceptable at this level except for those that are unusually sensitive. Areas that are green means ozone levels are **Good** and pose little risk.

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

On Monday, July 13th, a complex frontal pattern was in place over much of the eastern United States, which included a stationary front draped over the northeast from a well-defined center of low pressure over southern Quebec. This stationary front in combination with favorable meteorological conditions allowed for an isolated ozone exceedance at Madison-Beach Road, CT.

A weak cold front slowly traversed through the non-attainment area early on July 13th, before meandering off the coast and eventually stalling over the region throughout the day. Despite the frontal boundary, skies remained mostly sunny throughout the day especially to the east of the front, which allowed temperatures to rise into the mid-80s for the majority of the non-attainment area. Winds also shifted out of the northwest for all locations west of the stationary front, keeping these regions in the good category for the majority of the day. All of New Jersey, the NYC metropolitan area, and even western portions of Connecticut remained in the good category throughout the day on the 13th due to a relatively cleaner air mass and partly cloudy skies. However, locations east of the stationary front (eastern CT and Long Island, NY) received more sunshine, a continued southwesterly flow, and additional mixing of pollutants aloft down to the surface. Just 50 miles west, Danbury CT reached an 8-hour max of only 43 ppb, meanwhile Madison-Beach Road (east of the stationary front), was able to reach the USG category.

This isolated exceedance of the Ozone NAAQS in Madison-Beach Road, CT was likely due to its location relative to the stationary front that lingered over the region on the 13th. The stationary front allowed for pollutants aloft to mix down to the surface at locations east of the front, and rapidly create ozone due to favorable meteorological conditions.

Where Did the Air Pollution that Caused Ozone Come From?

Please note, this exceedance is occurring while COVID-19 restrictions in New Jersey are in place, which have impacted transportation, business operations and energy use. As more data becomes available, the Department may have a better characterization of the conditions that influenced elevated ozone pollution levels in 2020.

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedance on July 13, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedance. One monitoring station was chosen to run back trajectories and is listed in Table 4 below.

Table 4. Monitoring Station with an 8-hr Ozone Exceedance that was Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Madison-Beach Road	75

Back trajectories from July 13th show that air was influenced by a stationary frontal boundary that was draped over the non-attainment area on this day. Air was transported from points south and west at various levels of the atmosphere and under the influence of this frontal boundary and was mixed

toward the surface, enhancing an atmosphere already favorable for ozone formation along the Connecticut coastline.

Surface-level back trajectories (Figure 2) show air at the surface originated along the Virginia coastline before traveling generally north-northeast along the New Jersey coastline, through eastern Long Island and the Long Island Sound to its destination. Air at this level was steered up the U.S. east coast by a stationary front that was draped, north to south, over the non-attainment area. During this time this air traveled along the surface, allowing for air to pick up any localized emissions, specifically in the Long Island Sound vicinity.

Mid-level back trajectories (Figure 3) show that air originated in Ohio before traveling southeast toward the Virginia/Maryland coast through late on July 12th, picking up emissions from this heavily industrialized region. Air then made a sharp turn northeast, traveling through the Chesapeake Bay and southeastern Pennsylvania through early July 13th. Finally, air traveled east-northeast through the northern New Jersey /NYC metropolitan area and the Long Island Sound through arrival.

Finally, upper-level back trajectories (Figure 4) show that air originated in the Kentucky / West Virginia vicinity, an area that saw moderate levels of ozone in the days preceding this exceedance event. This already polluted air traveled east toward Virginia through late July 12th. Air then turned northeast traveling along the I-95 corridor through the Chesapeake Bay vicinity, portions of New Jersey, and the Long Island / Long Island Sound vicinity through arrival. As air turned northeast, it started to become influenced by the stationary front over the non-attainment area allowing for the potential mixing of polluted air aloft down toward the surface, enhancing ozone levels along the Connecticut coastline.

Figure 5 shows the National Air Quality Index observed on July 12th, the day prior to the exceedance. As shown in the figure, moderate levels of ozone were observed over portions of the Appalachian Valley, indicating that previously polluted air may have been transported into the nonattainment area from this region in the mid- to upper-levels of the atmosphere and mixed toward the surface in the presence of the abovementioned stationary front. This transport along with favorable weather conditions for ozone formation allowed ozone levels to reach the unhealthy for sensitive groups category at Madison-Beach Road, CT on July 13th.

Figure 2. 48-hour Back Trajectories for July 13, 2020 at 10 meters

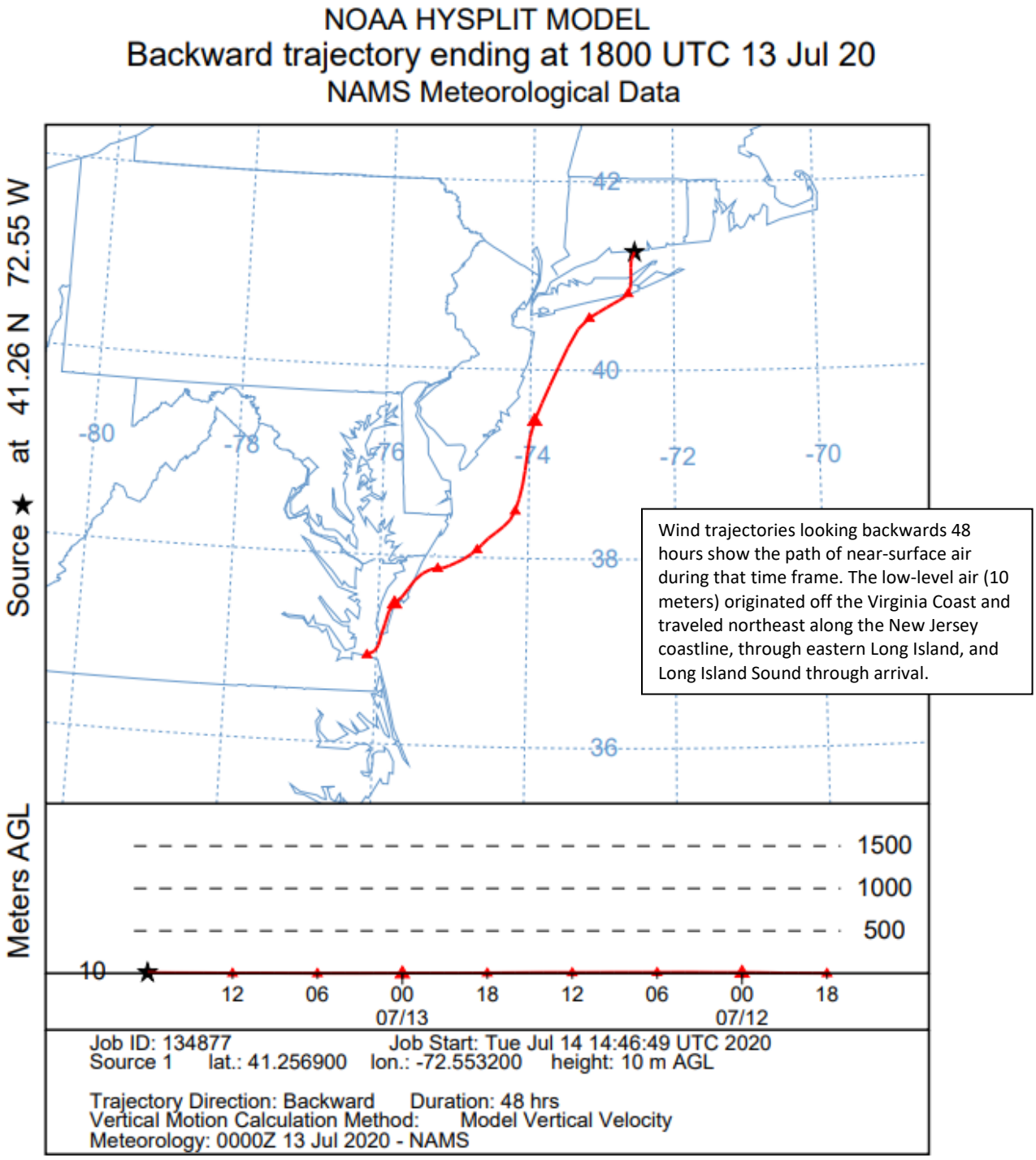


Figure 3. 48-hour Back Trajectories for July 13, 2020 at 500 meters

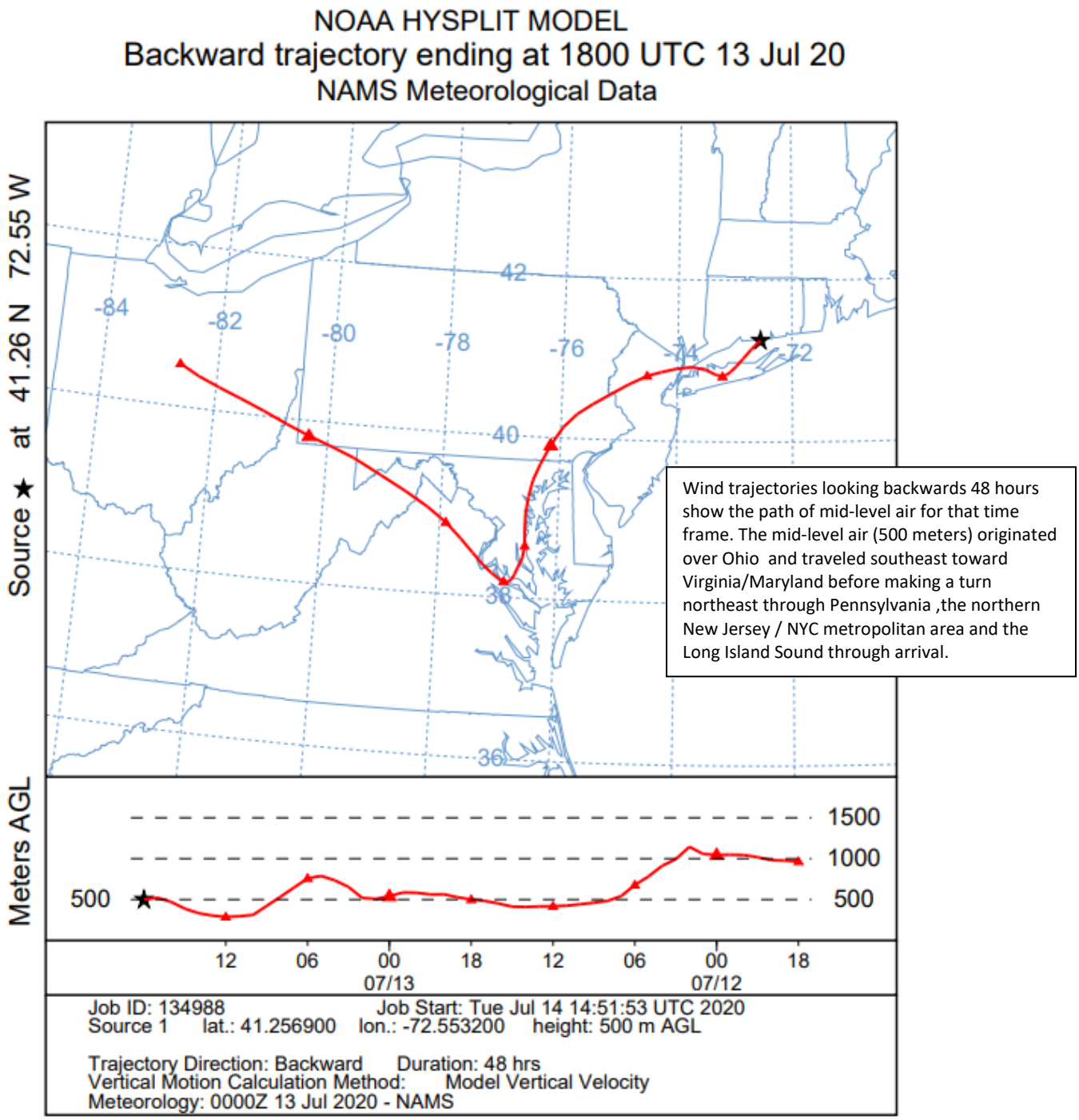


Figure 4. 48-hour Back Trajectories for July 13, 2020 at 1500 meters

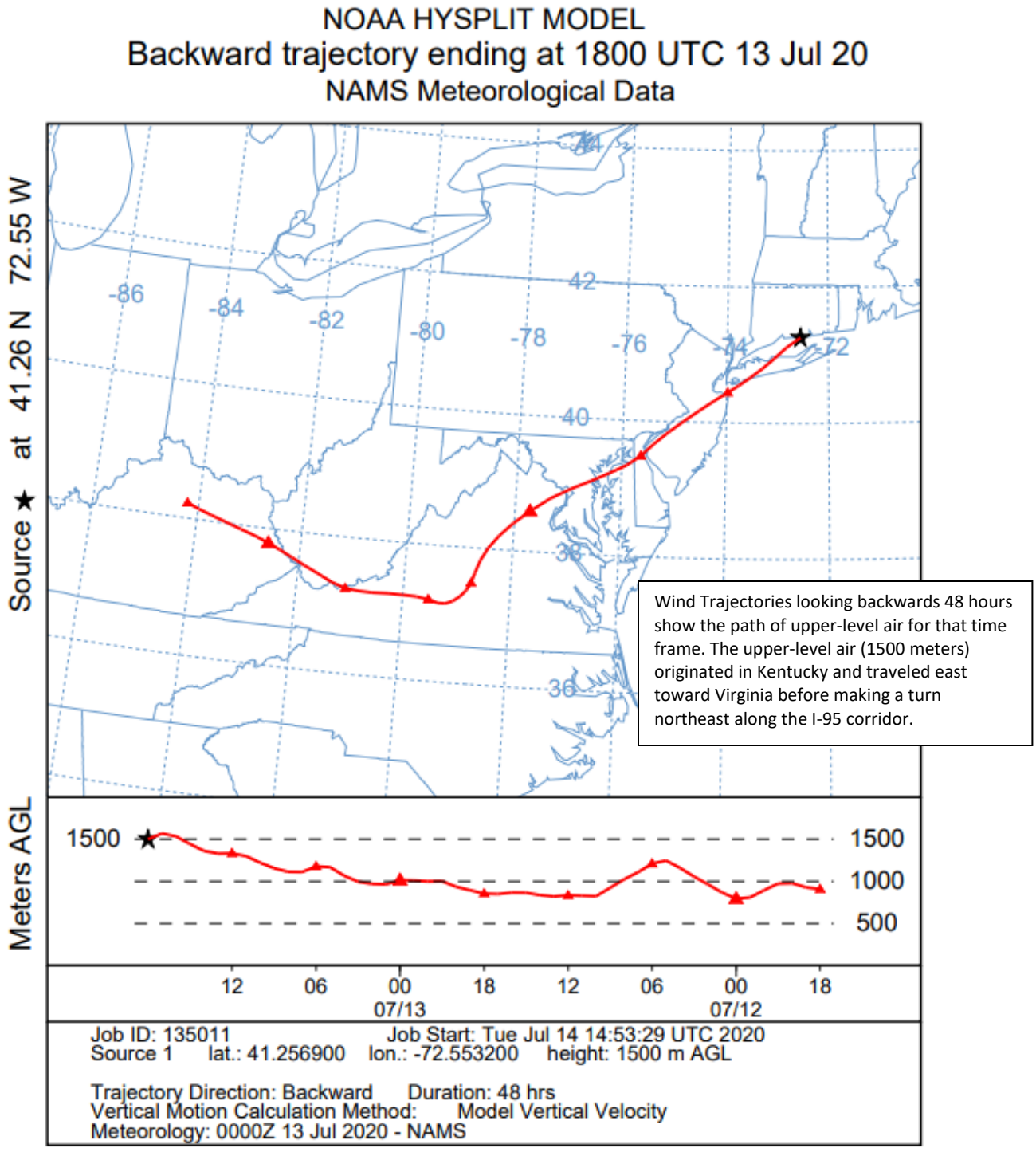
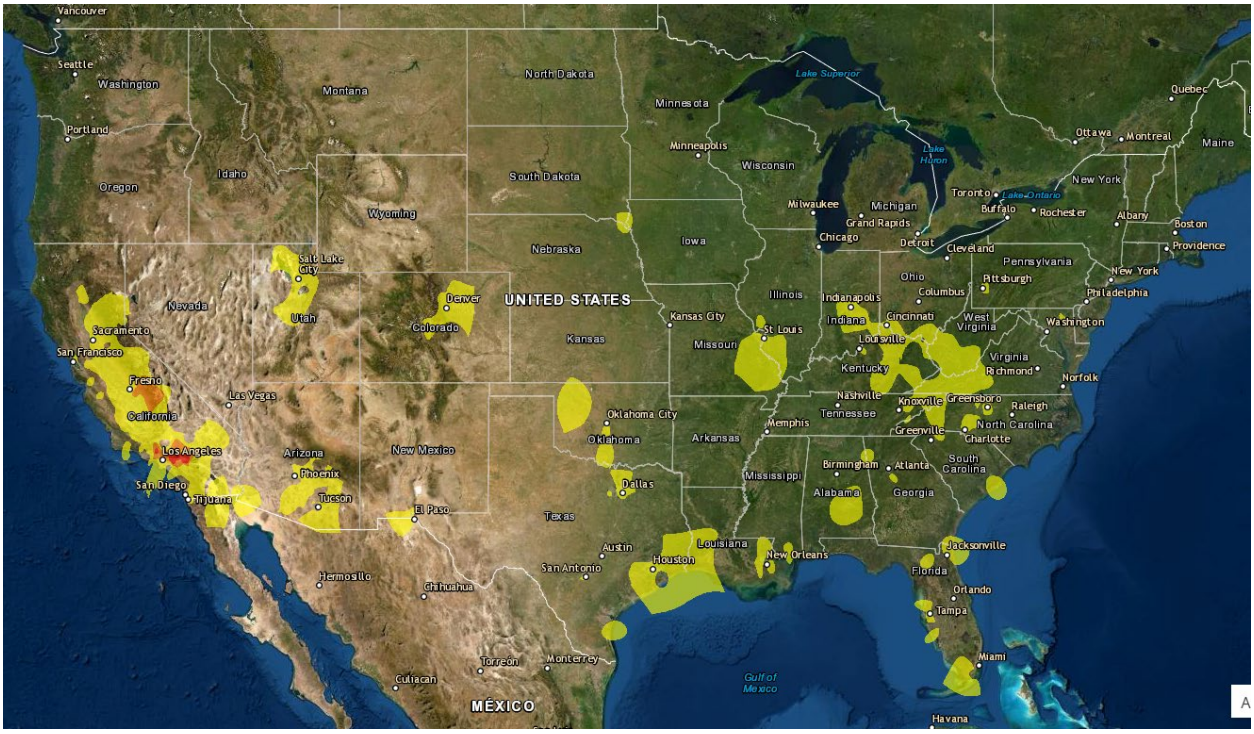


Figure 5. Air Quality Index for the United States on July 12, 2020



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of 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 http://www.nj.gov/dep/cleanairnj/ .