



Seasonal Report

2025 Fine Particles (PM_{2.5})

OVERVIEW

Fine Particle pollution, or **PM_{2.5}**, is one of six **criteria pollutants** to have National Ambient Air Quality Standards (**NAAQS**) set by the Environmental Protection Agency (**EPA**). PM_{2.5} comes from many sources, including vehicle exhaust, power plants, industrial activity, sea salt, and wildfires; it can also form through chemical reactions in the atmosphere. Since 2005, there has been a downward trend in fine particle pollution in Maryland; 2025 was a continuation of this trend.

Due to its small size (**Figure 1**), PM_{2.5} can travel deep into the respiratory tract and reach the lungs, causing adverse health effects. Scientific studies have found associations between PM_{2.5} exposure and many health problems, including heart and kidney diseases, diabetes, hypertension, lung cancer, pneumonia, and aggravated asthma. (See [EPA](#) and [CDC](#) sites for more on PM_{2.5} and health)

When daily average PM_{2.5} concentrations exceed 35.4 micrograms per cubic meter (**µg/m³**), the equivalent of 100 on the Air Quality Index (**AQI**) (see *color bar on bottom of page*), air quality is deemed **Unhealthy for Sensitive Groups (USG)** otherwise known as an **"exceedance day"**. Maryland has seen a steady decrease in the number of PM_{2.5} exceedance days over the past 15+ years (**Figure 2**), due largely to the adoption of regulations to reduce emissions.

HIGHLIGHTS & STATS

In 2025, Maryland had 211 **"Good"** AQI days, accounting for about 58% of the year (**Figure 3**). This follows the general trend of increasing **Good** days over the past 10+ years. It is important to note, in comparison with seasonal reports from previous years, these **Good** days were calculated using a stricter new threshold. When the EPA lowered the annual PM_{2.5} standard from an average of 12 to 9 µg/m³, the threshold for a **Good** day was also tightened to 9 µg/m³. **Figure 3** shows this transition: the old standard is shown in blue, and the new, tougher standard is in green. Even with a higher bar, the increase of **Good** days continues.

Because Maryland's air is getting cleaner, we also look at **"haze days"** as an alternative metric. A haze day occurs when PM_{2.5} daily maximum concentration levels exceed 25 µg/m³, (an 81 AQI), which is the point where the air can look perceptibly smoky, or hazy. As shown above in **Figure 4**, Maryland had an exceptionally clean year in 2025, with only two days fitting this criterion.

This was a major decrease from 2023, when heavy wildfire smoke poured into the region from Canada. You can see a visual comparison of a **Good** day (44 AQI) vs. an **Unhealthy** day (179 AQI) with visible haze due to wildfire smoke below, in **Figures 5 & 6**.

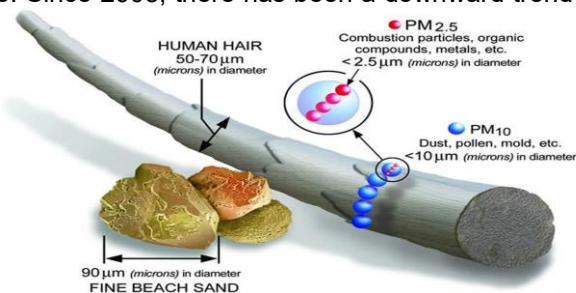


Figure 1: PM size comparison. (Image courtesy of EPA)

Maryland PM_{2.5} Exceedance Days

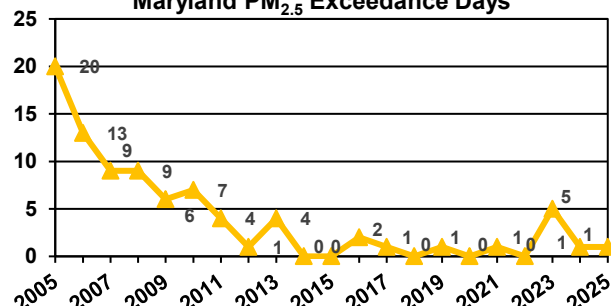


Figure 2: Annual number of days AQI surpassed 100 at any PM_{2.5} monitor in Maryland, 2005-2025.

Maryland "Good Days", AQI ≤50

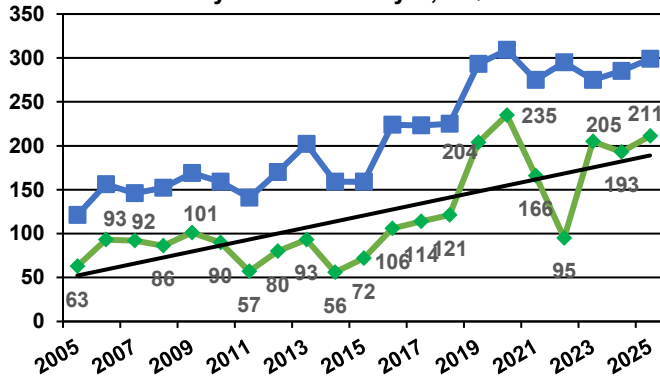


Figure 3: Annual number of days highest PM_{2.5} monitor(s) remained at or below 50 AQI, or "Good", in Maryland. 2012 standard, 2024 standard; black trend line included.

Maryland "Haze Days" above 25µg/m³

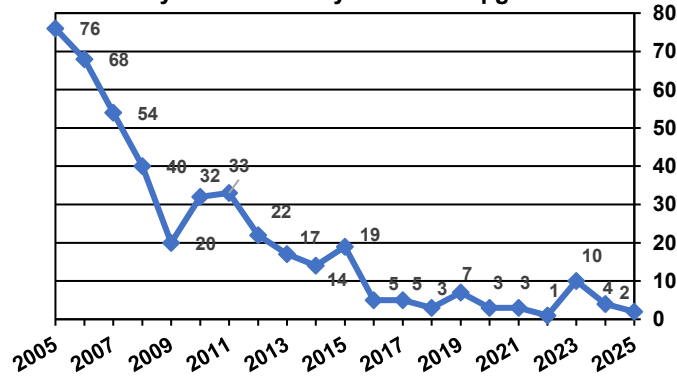


Figure 4: Annual number of days PM_{2.5} concentrations reached 25 µg/m³ or greater at any monitor in Maryland, 2005-2025.



Figures 5 & 6: AQI and visibility demonstrated using drone photos taken over Northeast Baltimore. Left, a **Good** Daily AQI of 44 on October 24, 2023 vs. right, an **Unhealthy** Daily AQI of 179, as measured at MDE's nearby Lake Montebello monitoring site on June 29, 2023 during a wildfire event (see 2023 PM Annual Report).

AQI 0-50 Good	51-100 Moderate	101-150 USG*	151-200 Unhealthy	201-300 Very Unhealthy	301-500 Hazardous
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*USG: Unhealthy for Sensitive Groups

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Wes Moore, Governor | Aruna Miller, Lt. Governor | Serena McIlwain, Secretary





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FEATURED EPISODE: June 14th, 2025

PM_{2.5} exceedances were numerous in Maryland 20+ years ago (see **Figure 2**) but have decreased in frequency due to regulation and reductions in atmospheric pollutants such as sulfur dioxide and nitrogen oxides. More recent elevated PM_{2.5} concentrations have largely been driven by two factors: meteorological impacts, like **temperature inversions** (See 2017 PM Annual Report), which mostly occur in winter, and wildfires, which occur year-round, but are more common in warmer months. As climate conditions get hotter and drier, wildfires have become more intense, and their smoke can cause poor air quality in Maryland, even if the fires occur out-of-state.

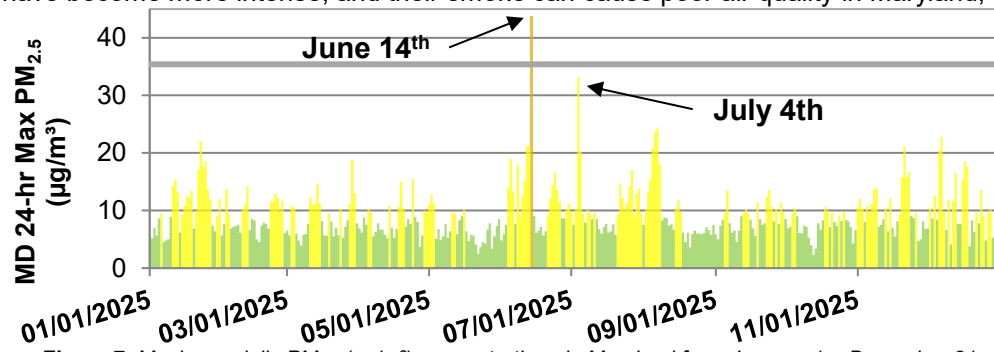


Figure 7: Maximum daily PM_{2.5} (µg/m³) concentrations in Maryland from January 1 – December 31, 2025. Bars are color coded by AQI. Exceedance day level threshold (35 µg/m³) is noted by the thicker grey line. The top two 2025 daily maximum PM_{2.5} concentrations of 43.7 µg/m³ on June 14th, and 33.2 µg/m³ on July 4th are indicated.



Figure 8: Mines Spung Fire, near Shamong Township, Burlington County, New Jersey; image courtesy of the [New Jersey Forest Fire Service](#).

An example of an out-of-state fire impacting our air quality started early on June 13, 2025, when the **Mines Spung Fire** ignited in the **Wharton State Forest** in Burlington County, New Jersey. The fire spread rapidly through dry pine timber and underbrush, eventually burning over **6,400 acres**. While the fire was centered in the Pine Barrens of southern New Jersey, the most significant public health impacts were felt across state lines. By the early morning of **June 14**, a shift in wind patterns combined with a low-level **temperature inversion**, trapped air near the ground and funneled a dense plume of PM_{2.5}-laden smoke directly into northern and central Maryland.

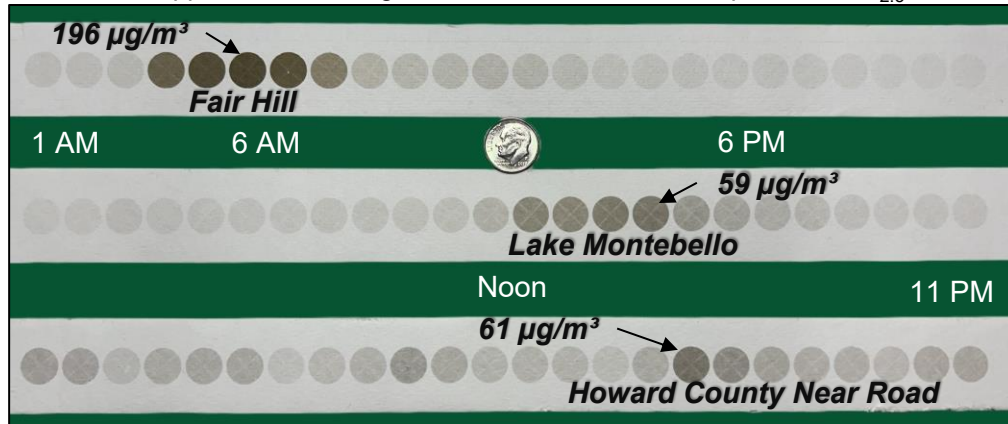


Figure 9: Filters from hourly PM_{2.5} monitors at (top to bottom) Fair Hill, Lake Montebello, and Howard County Near Road (HCNR), over the course of June 14th: each circle represents one hour. The highest hourly concentration at Fair Hill (196 µg/m³) can be seen around 6AM, as heavy smoke arrives in Maryland. The smoke plume can be observed traveling south throughout the day, with local maximums occurring later, further south along the I-95 corridor. (dime for size reference, hourly maximums indicated)

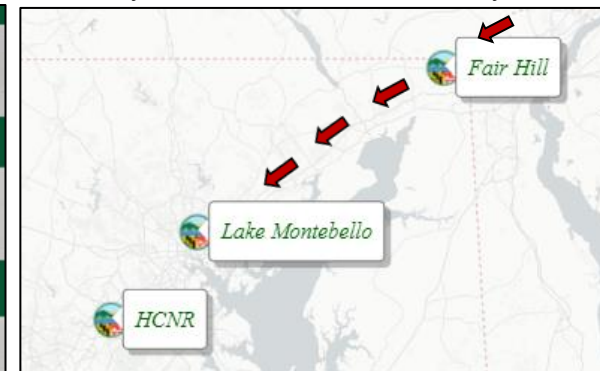


Figure 10: Winds (red arrows) from about midnight - 3pm on 6/14/2025, moving southeast into Maryland from New Jersey.

In response, **MDE** issued a Code Red air quality alert for Harford County and Code Orange alerts for the Baltimore metropolitan area. Monitoring sites at **Edgewood** and **Fair Hill** recorded 24-hour PM_{2.5} averages of **43.7** and **40.8 µg/m³** respectively, both exceeding the **24-hour PM_{2.5} NAAQS** of **35µg/m³**. This event highlights how regional meteorological conditions—specifically light northeasterly winds—can transport fire emissions into high-density population centers, turning a remote New Jersey forest fire into a Maryland public health priority. The **New Jersey Forest Fire Service** and local volunteer fire companies achieved 90% containment by June 18th, with substantial rainfall later that week fully extinguishing the fire. The cause of the fire remains uncertain. To learn more about air quality, please visit MDE's [Air Monitoring page](#), and sign up for air quality alerts at [enviroflash.info](#).



Figure 11: U.S. Army CH-47 Chinook helicopters fly in formation over the National Capital Region during the Army's 250th birthday parade, on June 14, 2025, through diffuse smoke transported from the Mines Spung Fire in New Jersey; image courtesy [the Defense Visual Information Distribution Service \(SrA G. Nguyen\)](#). VRIN:250614-F-T0650-1012

AQI 0-50 Good	51-100 Moderate	101-150 USG*	151-200 Unhealthy	201-300 Very Unhealthy	301-500 Hazardous
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