2022 Air Quality Progress

2000

2010

2022
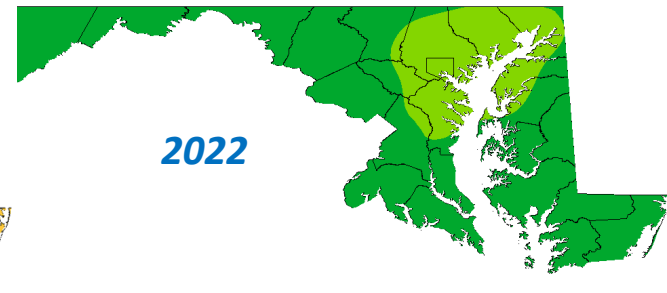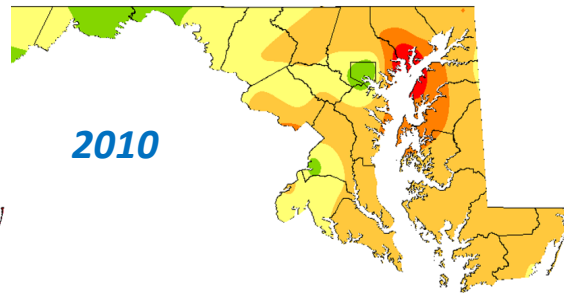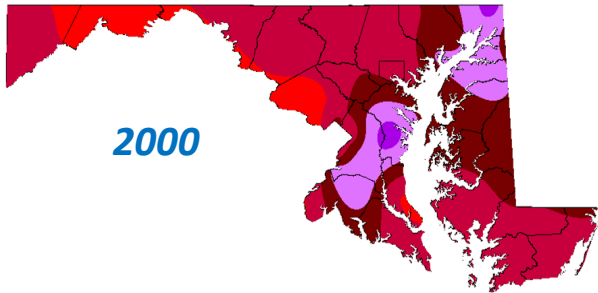
Clean Air Partners – September 2023

Kelsey Sisko, Natural Resources Planner, Air and Radiation Administration

Overview of Presentation

- Background
- Clean Air Progress
- 2023 Exceedance Days
- Questions/Discussion

2023 Clean Air Progress Report

A recap of air quality in Maryland for 2022

Maryland Department of the Environment
April 18, 2023

AIR QUALITY BASICS

Air Quality in the Past

- Up until 2010, Maryland continued to experience numerous bad air quality events with ground-level ozone and particulate matter levels in the unhealthy range
  - 2005 MIT PM Study - Maryland identified as the riskiest place to breathe the air east of the Mississippi
  - 2008 - EPA designates the Baltimore area as the worst ozone area outside of California and Texas

Federal Hill, Baltimore, Maryland 1995
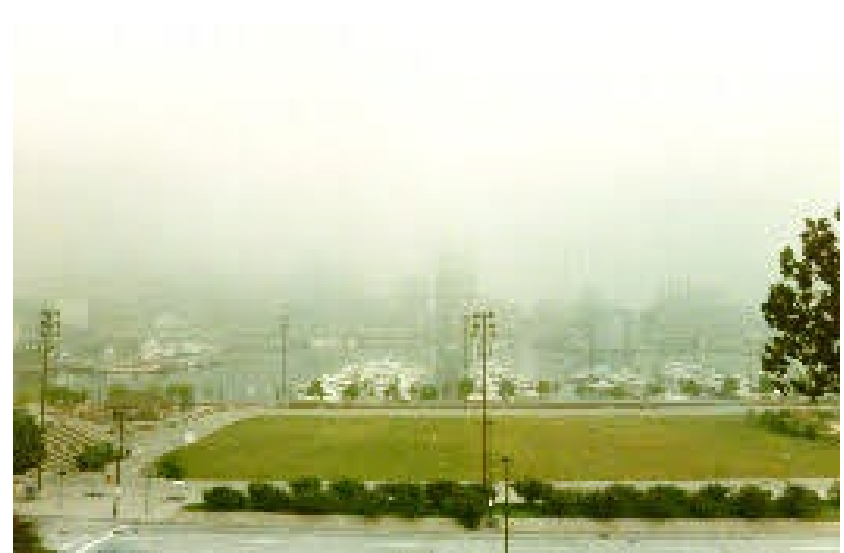
Federal Hill, Baltimore, Maryland 1995

Air Quality in the Present

- In recent years, Maryland has achieved the federal fine particle standard, as well as the 2008 ozone standard, and is moving towards achieving the more stringent 2015 ozone standard. In 2020 and 2022, Maryland recorded the fewest number of bad ozone days ever recorded in a year

2022
CLEAN AIR HIGHLIGHTS

"*Maryland has been measuring and monitoring air pollution levels for over 30 years. I can now announce the State is, for the first time ever, measuring levels of air pollution that meet all ambient air quality standards in every part of Maryland.*"

-Serena McIlwain, Secretary of the Maryland Department of the Environment

Clean Air Highlights

- For nearly 30 years, Maryland's air quality has dramatically improved
- Air quality policies and regulations have lowered levels of six common pollutants — particles, ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide

In 2022, Maryland measured attainment of the federal standard for ground-level ozone for the first time in history. The state is now measuring levels of air pollution that meet all ambient air quality standards!
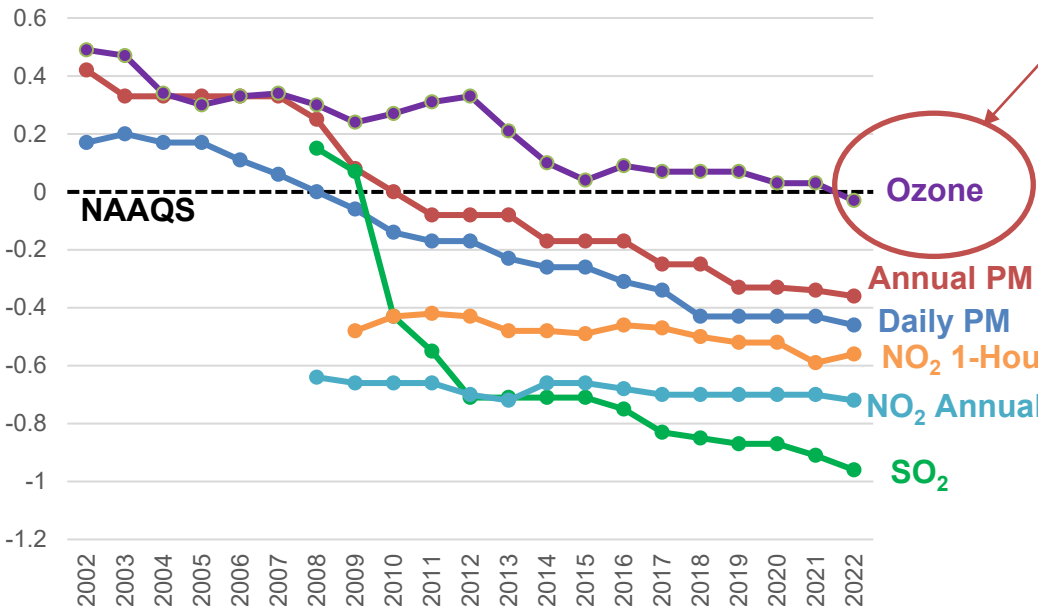
Nitrogen Dioxide (NO_2) Annual 21% (2008 – 2022)

Nitrogen Dioxide (NO_2) 1-Hour 16% (2009 – 2022)

Ozone (O_3) 35% (2002 – 2022)

Particles ($PM_{2.5}$) Annual 55% (2002 – 2022)

Particles ($PM_{2.5}$) 24-Hour 54% (2002 – 2022)

Sulfur Dioxide (SO_2) 1-Hour 96% (2008 – 2022)

Chart labels: NAAQS, Ozone, Annual PM, Daily PM, NO_2 1-Hour, NO_2 Annual, SO_2

Maryland Bad Ozone Days

Exceedance Days
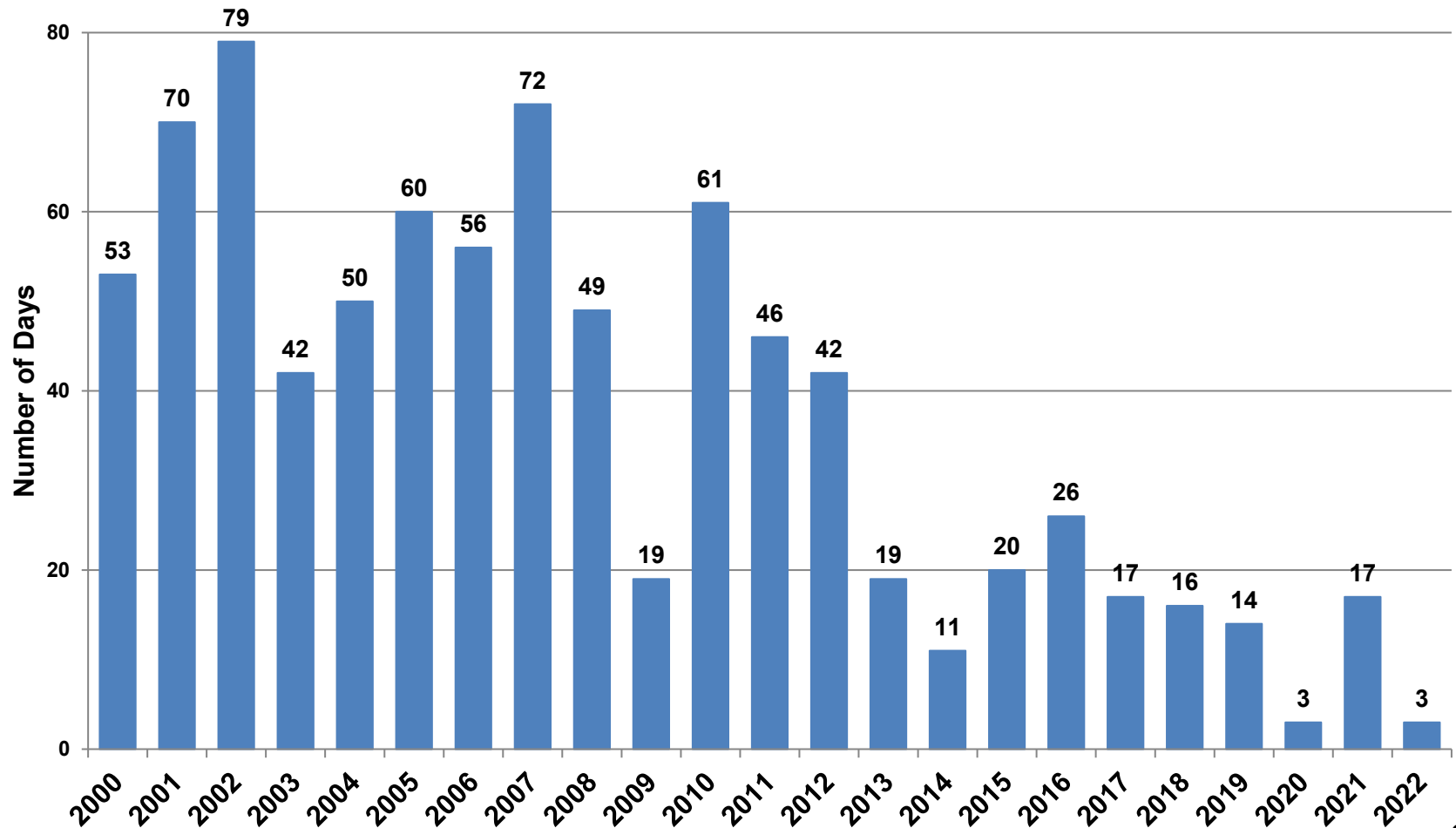
Ozone is Shrinking

1998
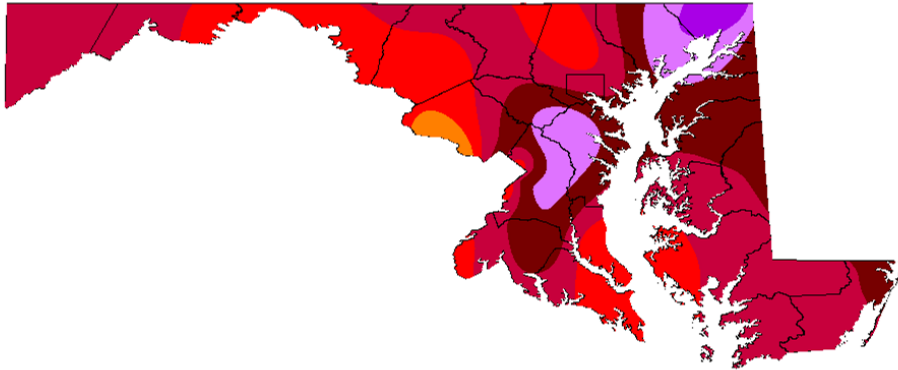
2022
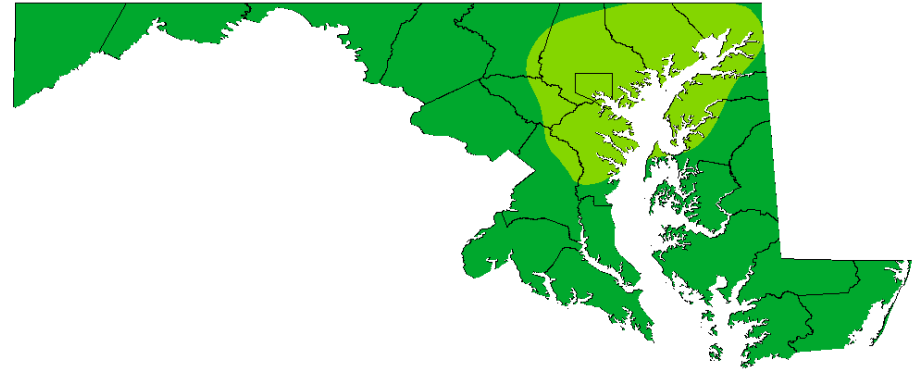
Lower Ozone Levels and Significant Spatial Risk Reduction

8-Hour Ozone

Meets Standard | Exceeds Standard

<65   70   75   80   85   90   95   100   105   >110 ppb
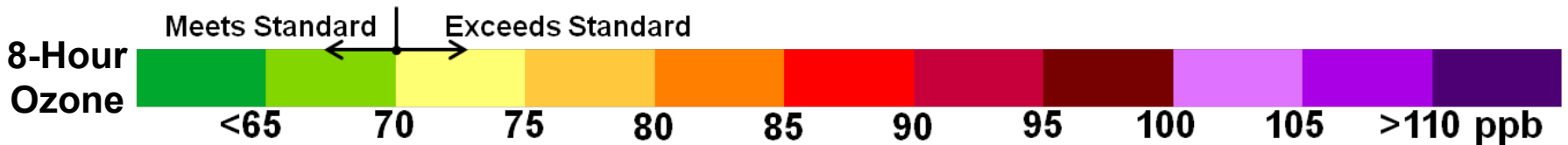
Fine Particle Air Pollution
Lower Levels Across the State

EPA Annual Standard 12 μg/m³

Annual PM2.5 (ug/m3)

Year

Year	Value
2002	17
2003	16
2004	16
2005	16
2006	16
2007	16
2008	15
2009	13
2010	12
2011	11
2012	11
2013	11
2014	10
2015	10
2016	10
2017	9
2018	9
2019	8
2020	8
2021	7.9
2022	7.7

11
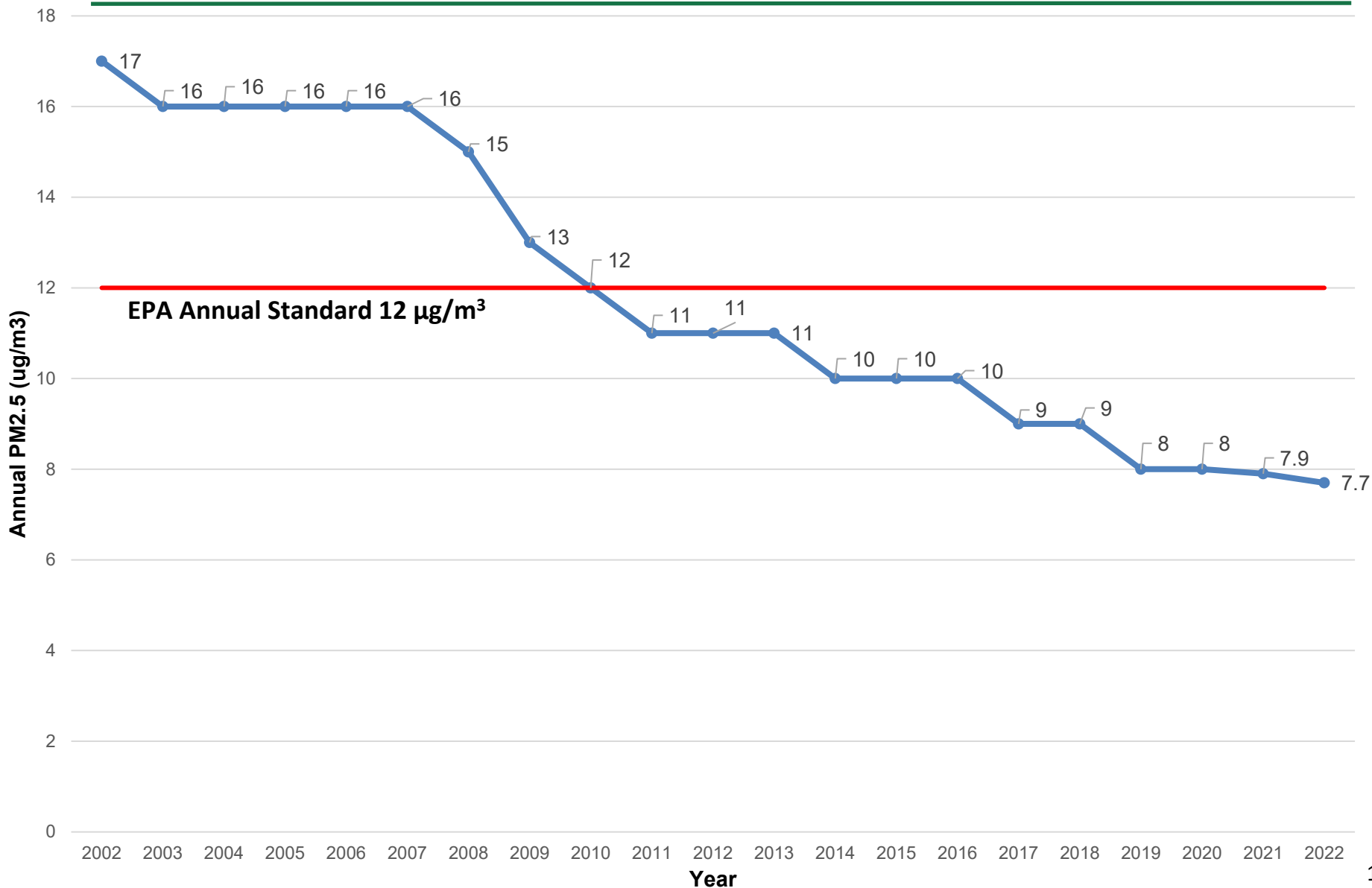
Annual SO$_2$ and NO$_x$ Emissions

- The State has greatly reduced NO$_x$ and SO$_2$ emissions by cleaning local coal-fired power plant emissions, and transported emissions have also significantly lessened

Annual SO$_2$ and NO$_x$ Emissions

2023 Exceedance Days

MARYLAND'S OZONE MAX 8-HOUR AVERAGE IN 2023

Last updated: 09/07/2023 Raw data, subject to change. 2022 3-year Design Values are preliminary and subject to change.

Metropolitan Statistical Area (Group Number)

	Aldino	Edgewood	Essex	Lake Montebello	Glen Burnie	Padonia	South Carroll	Calvert	PG Equest. Ctr.	Frederick	Howard U.	Beltsville*	Rockville	So. Maryland	Fair Hill	Blackwater NWR*	Millington	Horn Point	Hagerstown	Piney Run	Daily max 8-hour ozone conc. (ppb)	Daily number of sites with an occurrence
2021 Design Value	68	72	70	68	70	69	64	58	65	65	67	70	63	59	67	62	64	64	60	58		
2022 Design Value	67	68	68	68	66	68	64	58	64	63	63	67	63	59	65	61	64	63	61	58		
04/13/2023	73	74						71	72					75	73			72	71		75	8
04/21/2023										73											73	1
05/12/2023						71							72								72	2
06/01/2023						71				78	74		72						71		78	5
06/02/2023	76	85	87	74	71		73		75	72		73			71		81				87	11
06/03/2023										74											74	1
06/07/2023														75		71		76			76	3
06/11/2023						74															74	1
06/15/2023									72									71			72	2
06/19/2023							71														71	1
06/29/2023	75	76	110	95	85	89	83		87	81	79	79	71		72	73	74	76	76		110	17
06/30/2023	71																76	71			76	3
07/11/2023		75	75						73												75	3
07/12/2023	73	73								72											73	3
07/13/2023				74																	74	1
07/17/2023	71	75	78	72							71	73									78	6
07/18/2023									73								71	72			73	3
07/26/2023						74	71			74											74	3
07/28/2023	71	78	75																		78	3
09/06/2023		72																			72	1

2023 Exceedances

- 2023 has been an unusual year due to smoke – trend lines are showing this as well
- 19 Ozone exceedances thus far
- Normally only have one PM exceedance in a year on New Years or 4th of July
    - In 2023 we have had 5 PM exceedances
- PM exceedance days due to the smoke
- Smoke, VOCs, and PM caused ozone exceedances as well
- Came down to communications during these unusual events
- Without the smoke influence, there would have likely been only 4-5 ozone exceedances

Ozone Episodes, 2023

Ozone Episode

| Date	Value	
04/13/2023	75	Flint Hills, KS Fires & Eastern CONUS Fires
04/21/2023	73	Mexico & Southeast CONUS Fires
05/12/2023	72	Alberta & Saskatchewan, Canada Fires
06/01/2023	78	
06/02/2023	87	Nova Scotia, Canada & New Jersey Fires
06/03/2023	74	
06/07/2023	76	Quebec, Canada Fires
06/11/2023	74	Quebec, Canada Fires & Southeast US
06/15/2023	72	Aged Quebec, Canada Smoke
06/19/2023	71	

Saturday, June 10

- Four Exceptional Event (EE) initial notifications already submitted to EPA
  - Final EE applications will be assessed at the end of the season
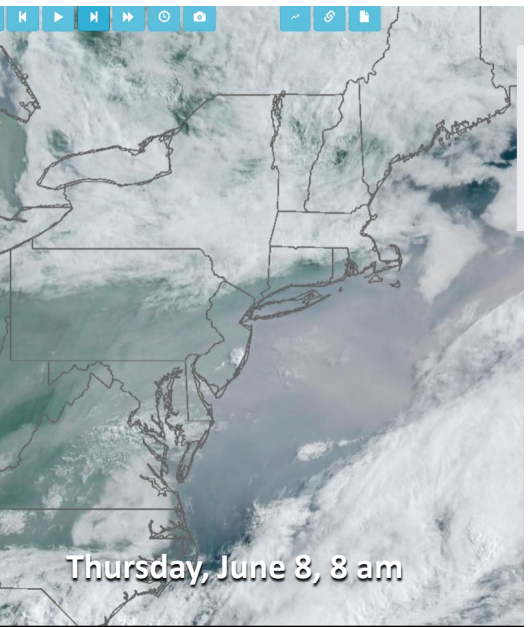
PRELIMINARY DATA
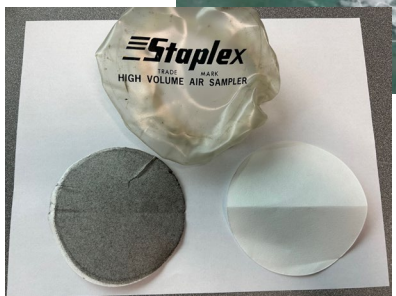
June 6-8, 2023 Quebec Smoke Event
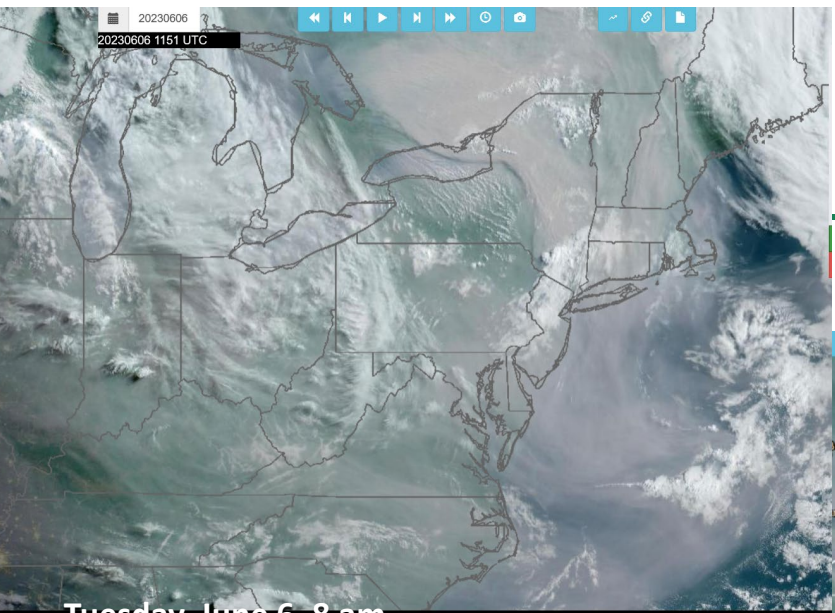
Tuesday, June 6, 8 am
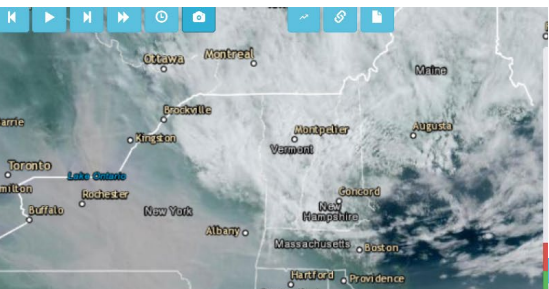
Wednesday, June 7, 9 am

Thursday, June 8, 8 am

Image/Sample Courtesy: Dr. Russ Dickerson

June 8, 2023

179 µg m^{-3}

Picture taken by MDE meteorologist Joel Dreessen on June 8, 2023 at 7:52 am EDT from the Montgomery Park Offices in southeastern Baltimore City. The picture corresponds to the circle highlighted by the blue arrow. The hourly concentration was 179 µg m^{-3}. Note: EPA requires all observations in EST
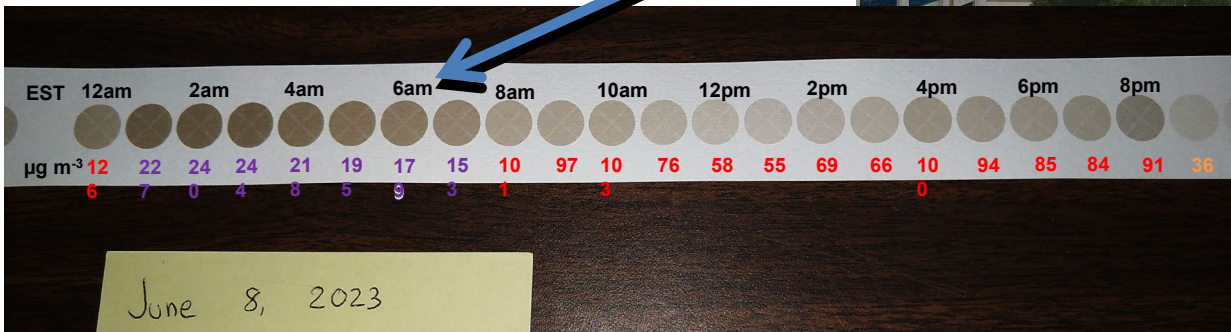
View is to the south, towards the Bay. The Key Bridge would be visible 4 miles away, nearly where the blue arrow is pointing

EST	12am		2am		4am		6am		8am		10am		12pm		2pm		4pm		6pm		8pm	
µg m^{-3}	12	22	24	24	21	19	17	15	10	97	10	76	58	55	69	66	10	94	85	84	91	36
	6	7	0	4	8	5	9	3	1		3						0					

June 8, 2023

The above image is an MDE PM$_{2.5}$ "Beta Attenuation Monitor" (BAM) sample tape from June 8, 2023. Each circle corresponds to a 1-hour sample spanning midnight to midnight on June 8 from the Lake Montebello site in downtown Baltimore. The filter collects what is in the air onto a filter for measurement, essentially illustrating what would end up in your lungs if breathing outside for an hour. The PM$_{2.5}$ standard is 35.4 µg m^{-3} as a 24-hour average. The hour highlighted measured 179 µg m^{-3}.

PRELIMINARY DATA