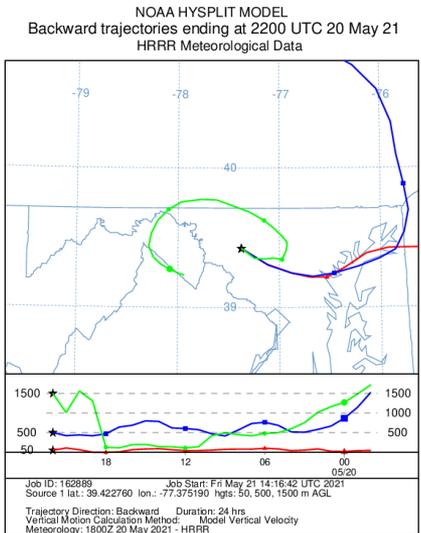
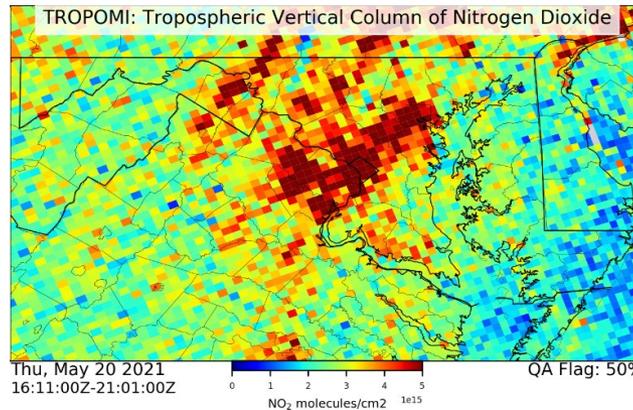
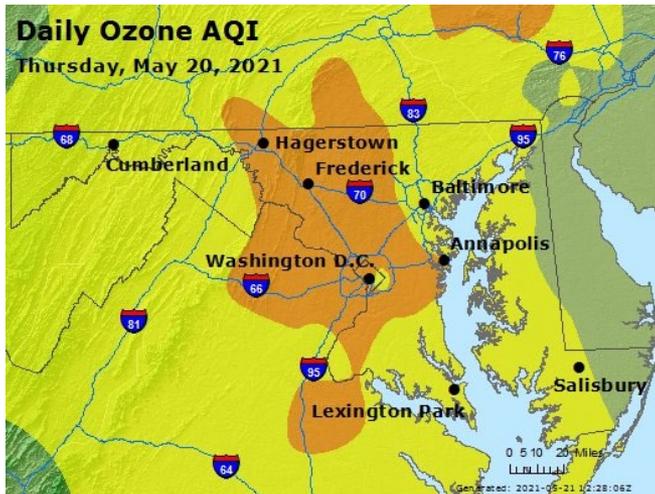




# Peak Ozone Day Partnership 2022 Season Summary





# Peak Day Program Wrap Up

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- The Peak Day Program is coming to an end
- Over the last several years, the Peak Day Program achieved many of the goals it aimed towards tackling
- Ozone levels are reduced, and larger source units are emitting less or have completely shut down, such as coal-fired EGUs
- The program met all goals other than combustion turbines still emitting immense amounts of NO<sub>x</sub>, which the Department is currently working on turning around
- Ozone attainment is within arms reach due to the progress of this program



# Overview of Presentation

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- The Peak Ozone Day Partnership Program
  - Overview of Program
  - Moving Toward Attainment
  - 2022 Air Quality Update
- What our 2022 analyses tells us to date
  - Units that operated on peak day partnership action days - Did cleanest units run?
- Moving Forward
  - Working towards a cleaner energy future for MD
  - Continued support from our partners
  - Contingency Measure regulations for CT units





# **PEAK DAY PARTNERSHIP**

***AN OVERVIEW***



# The Peak Ozone Day Partnership

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- Since 2018, this voluntary partnership between MDE and key Maryland industries has helped to limit NO<sub>x</sub> emissions when air quality is forecasted to be unhealthy
- MDE has asked that industry members either maximize their emission controls on peak days, run their most efficient units or not operate when possible
- Partner efforts have been helpful as well as the transition to cleaner fuels in the energy sector
- This program has been a key measure of MDE's efforts to reach ozone attainment



# Why Peak Days are Important

- On average, there are more summer days in Maryland where temperatures exceed 90 degrees than ever before
  - The potential for poor air quality increases when temperatures are high
  - Energy units run the most on hot days
  - Public health risks from ozone are elevated on peak days
  - For the first time in history, Maryland monitors measured below the ozone NAAQS
    - EPA is looking to reconsider the 2015 8-hour ozone standard by December 2023 to be lower than 70 ppb, falling as low as 60 ppb
    - EPA is also reconsidering annual PM standard by Spring 2023 to a range of 8-10 ug/m<sup>3</sup>, with a few CASAC members finding 10-11 ug/m<sup>3</sup> to be appropriate, & the 24-hour standard to have a range of 25-30 ug/m<sup>3</sup>
  - Attaining the ozone standard equals cleaner air, improved health, a better economy and less regulatory burdens
  - In 2021, roughly half of the ozone exceedances occurred at a single monitoring location
  - Shaving peak emissions during these crucial times is critical

Sources:

All4, <https://www.all4inc.com/4-the-record-articles/pm2-5-naaqs-reconsideration-progress-update/>, March 31, 2022

Clean Air Task Force, <https://www.caft.us/2021/10/epas-decision-to-reconsider-national-ambient-air-quality-standards-for-ozone-is-a-long-awaited-step-in-the-right-direction/>, October 28, 2021

The United States Environmental Protection Agency, <https://www.epa.gov/ground-level-ozone-pollution/epas-reconsider-previous-administrations-decision-retain-2015-ozone>, October 11, 2022.



# Maryland's Air Quality Update



# MD Air Pollution History

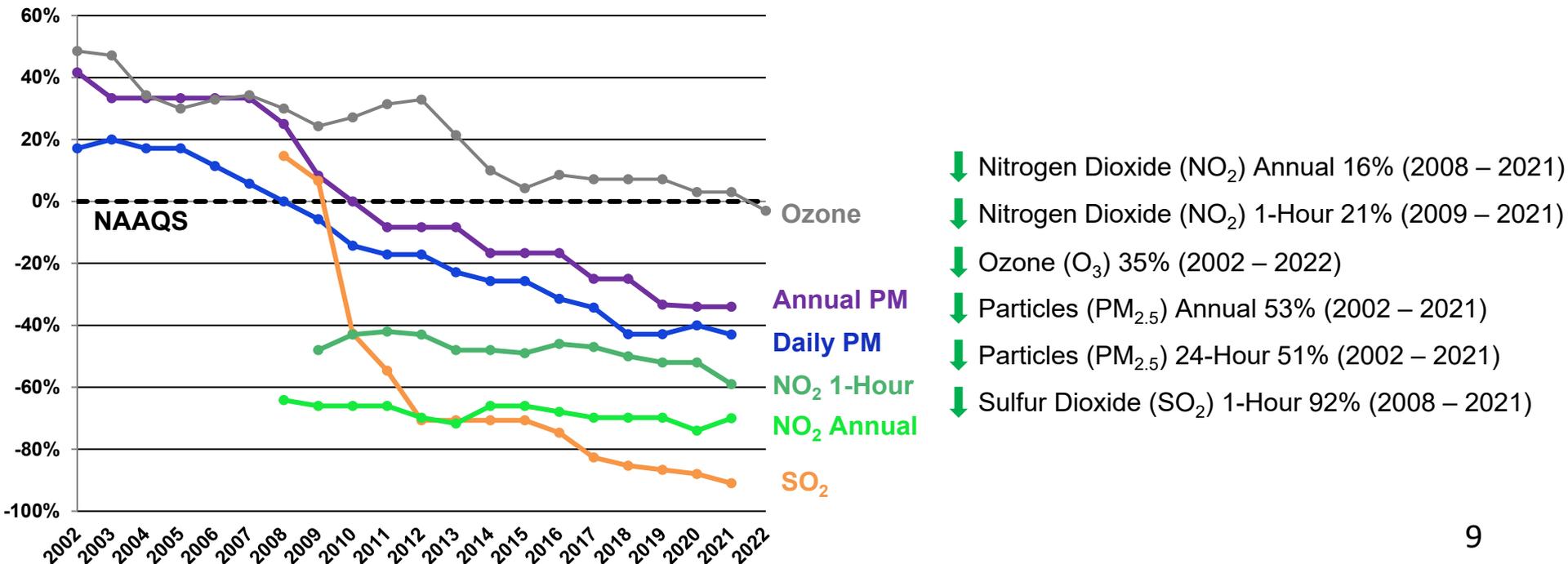
- **The Ugly:** From 1940 to 1970, you could see, smell, and taste the air pollution. Across the country, there were air pollution emergencies in areas like Denora, PA.
- **The Bad:** In 2005, MD was identified by the Massachusetts Institute of Technology (MIT) as having some of the riskiest air to breathe on the East Coast. In 2008, EPA designates Baltimore as the worst ozone area outside of California and Texas.
- **The Good:** From 2010 to present, MD has been in attainment for all standards except ozone. In 2020 and 2022, Maryland recorded the fewest number of ozone days ever recorded in a year!





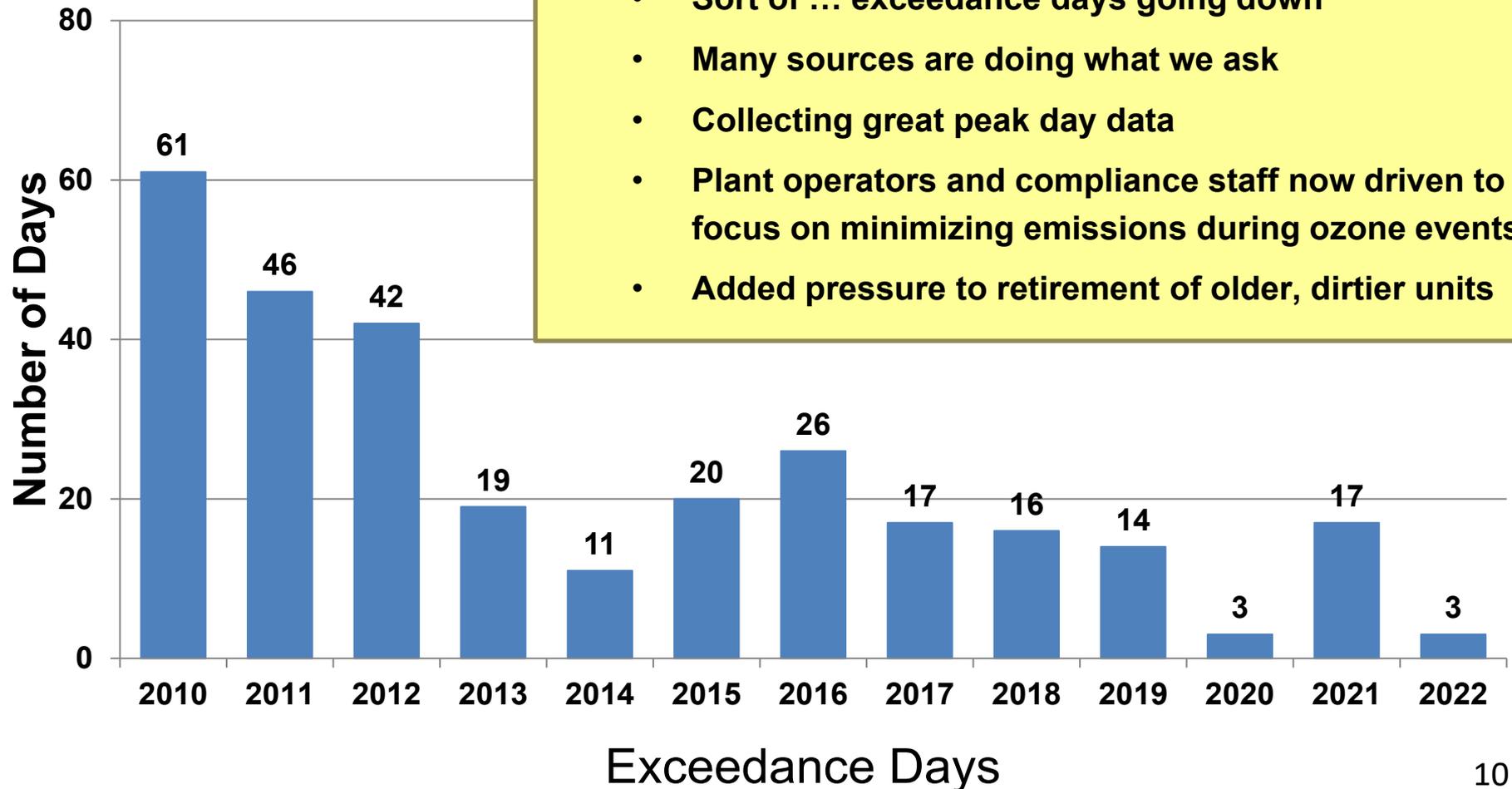
# Clean Air Highlights

- For the last 20 years, MD's air quality has dramatically improved
- Air quality policies and regulations have lowered levels of the six common pollutants — particles, ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide





# Maryland Bad Ozone Days

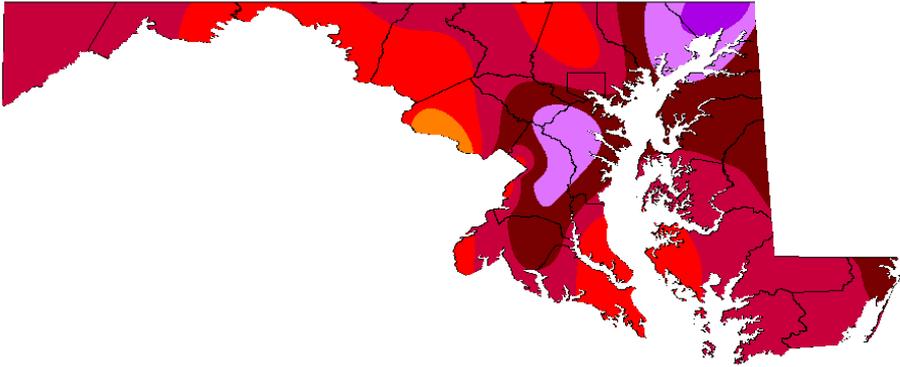


- **So ... Is it working?**
  - **Sort of ... exceedance days going down**
  - **Many sources are doing what we ask**
  - **Collecting great peak day data**
  - **Plant operators and compliance staff now driven to focus on minimizing emissions during ozone events**
  - **Added pressure to retirement of older, dirtier units**

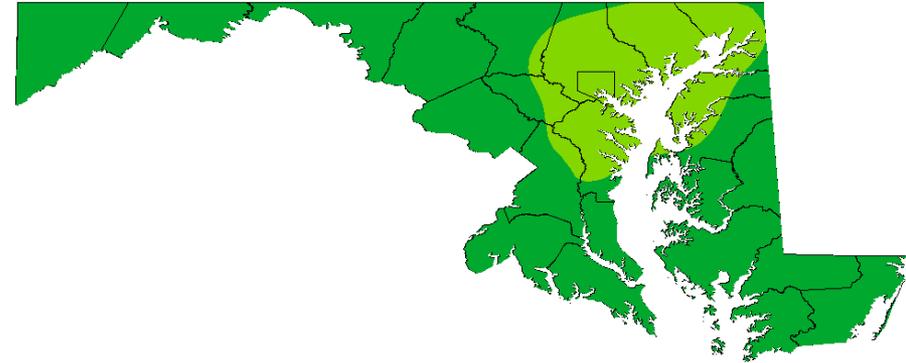


# Shrinking Ozone

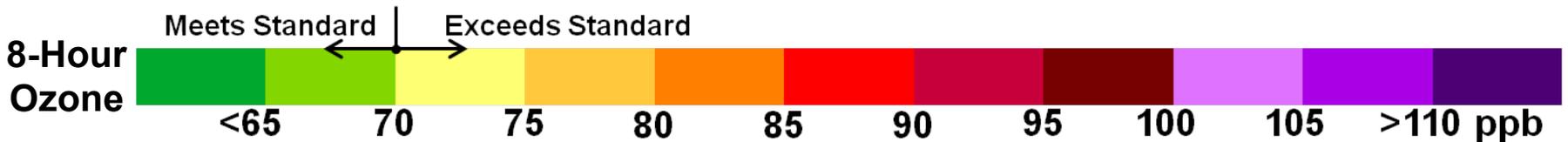
1998



2022\*

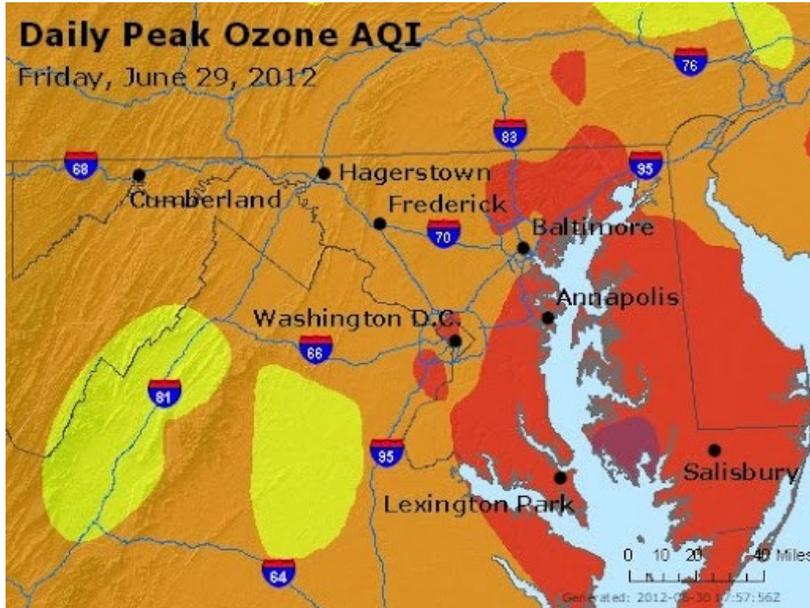


The Shrinking Ozone Problem: Not just the magnitude, but its nature: “We’re going local”



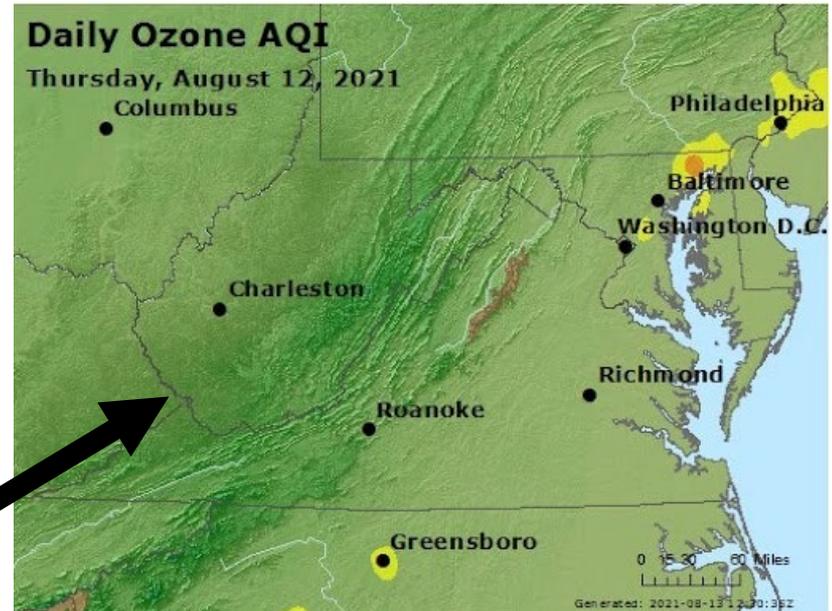
\*Preliminary Data: Subject to Change

# What Does A Bad Ozone Day Look Like in 2022?



- Just 10 years ago, many bad ozone days looked like this

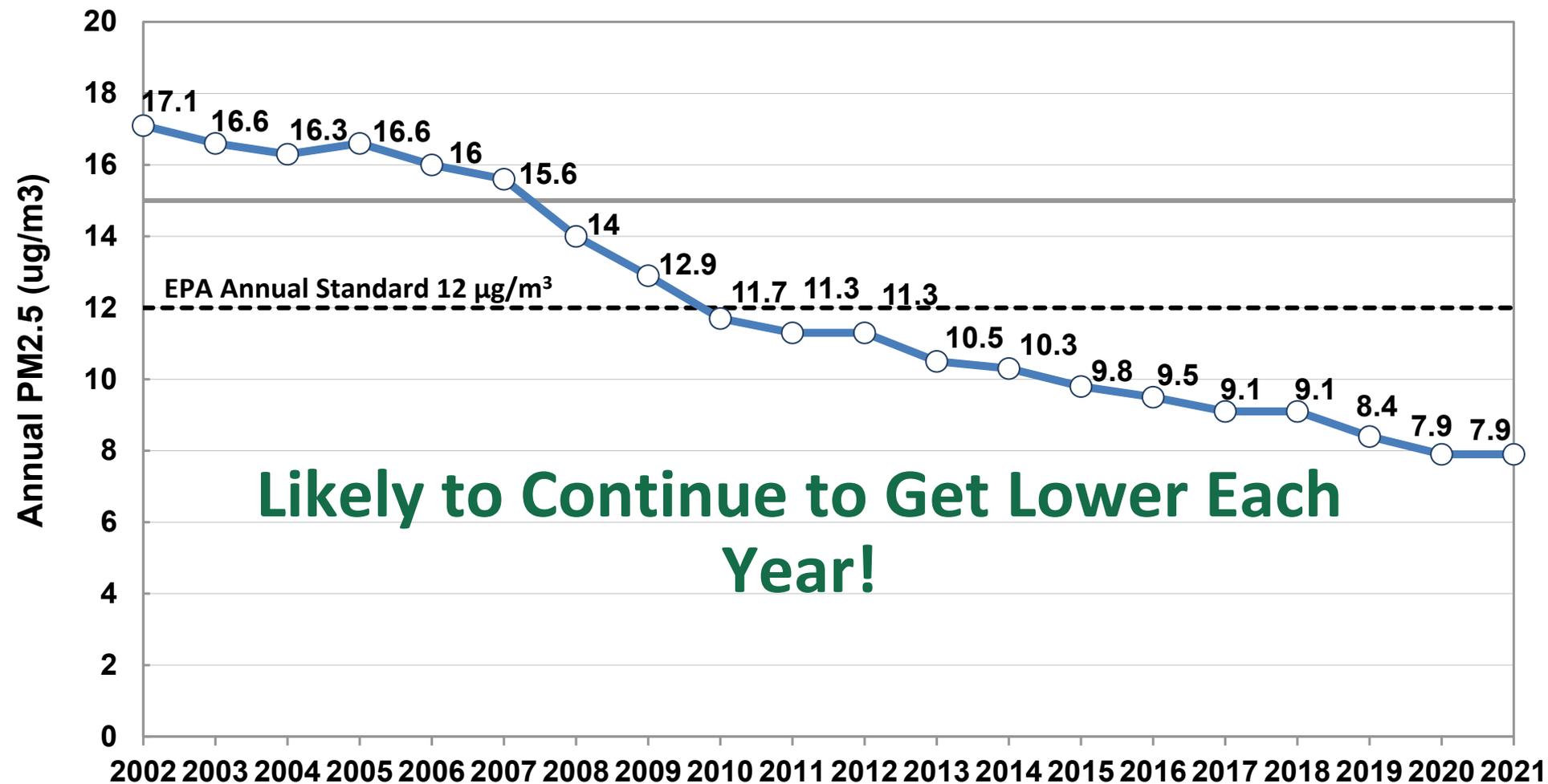
- In the summer of 2021, MD had 17 days where at least one monitor went above the standard
- Over half of those days looked like this





# Fine Particle Air Pollution

## *Lower Levels Across the State*



# Fine Particle Air Pollution

## *Spatial Exposure and Risk Reduction*

**Annual PM<sub>2.5</sub> Design Values: 2006**





# Moving Toward Attainment

- In 2022, preliminary ozone concentrations recorded at all of Maryland monitors measured below the NAAQS for the first time. The state will still have SIP obligations and a federal process to demonstrate attainment
  - Record low ozone levels for Maryland in 2020 and 2022
  - 2021 saw an increase in the number of ozone exceedance days, but the trend continues downward
  - There were several days where exceedances occurred at a single monitor or by just a few ppb over the NAAQS
- Retirement of coal-fired electric utility steam generating units (EGUs) and transition to cleaner energy sources continue to show improvements
- Local optimization and peak day partnership efforts clearly helped



# Ozone, PM, and other Air Pollution Progress Will Continue

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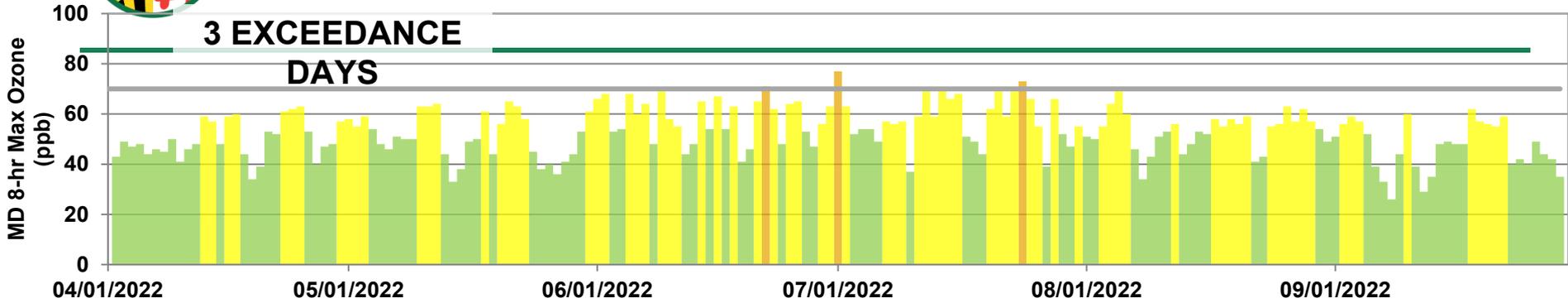
- Super-regional programs to reduce NO<sub>x</sub> and sulfur dioxide emissions from power plants, mobile, and other sources will continue to get stronger each year
  - This will drive lower and lower ozone, PM and Haze levels
- Markets are driving major changes in certain sectors like energy and transportation
- Climate Change mitigation policies are also driving very significant changes in all sectors
  - Technology
  - Shifting consumer demand
  - A refreshed focus on making “zero emissions” a real goal



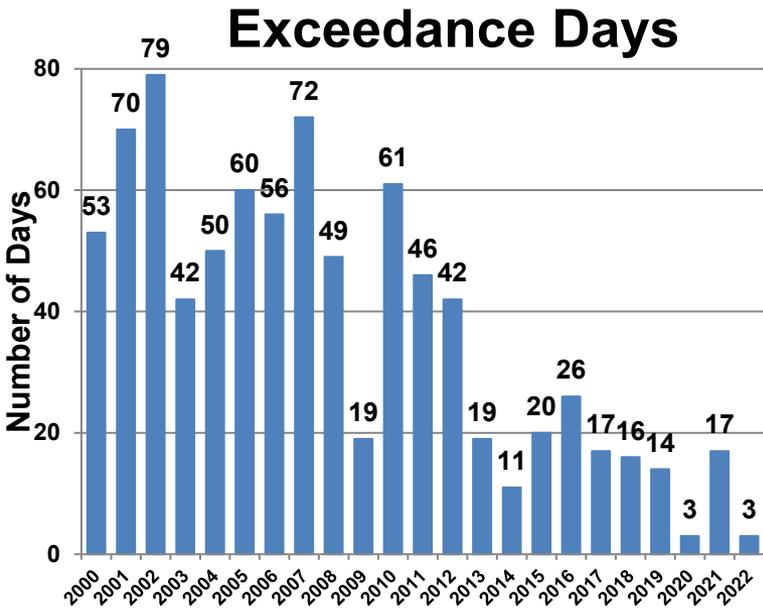
# **2022 Ozone Season Summary**



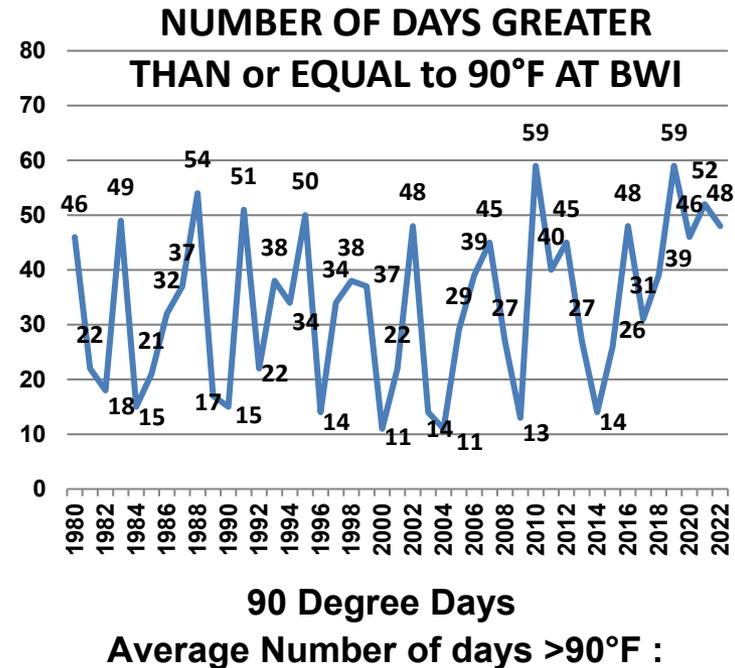
# 2022\* Season at a Glance



The summer of 2022 was warm; **8<sup>th</sup> most** number of 90 degree days at BWI. Maryland tied for the **fewest** exceedances ever in 2022. Summer weather comparable to 2021, slightly cooler



- 2 of the 3 exceedances triggered by just one monitor
- 6 days of record warmth recorded at BWI during 2022 ozone season
- Summer wildfire season much quieter vs 2021



\*Preliminary Data, subject to change



# Single Monitor Exceedances

## MARYLAND'S OZONE MAX 8-HOUR AVERAGE IN 2022

Raw data, subject to change. 2022 3-year Design Values are preliminary and subject to change.

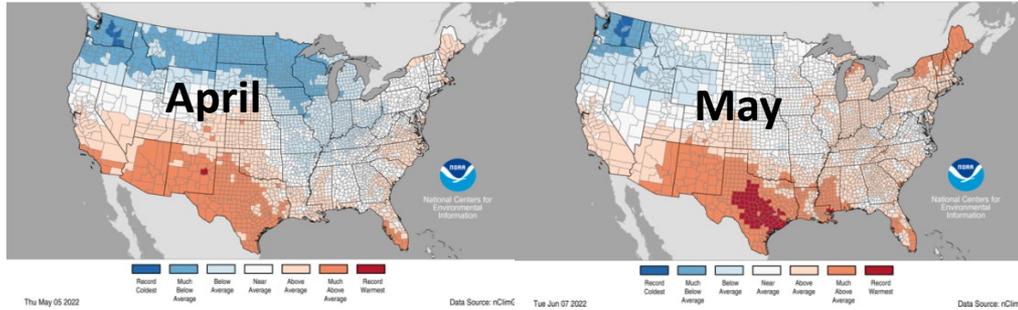
	Metropolitan Statistical Area (Group Number)																			Daily max 8-hour ozone conc. (ppb)	Daily number of sites with an occurrence		
	1					2					3	4			5	6							
	Aldino	Edgewood	Essex	Lake Montebello	Glen Burnie	Padonia	South Carroll	Calvert	PG Equest. Ctr.	Frederick	Howard U.	Beltsville*	Rockville	So. Maryland	Fair Hill	Blackwater NWR*	Millington	Horn Point	Hagerstown			Piney Run	
06/22/2022															71						71	1	
06/30/2022			72	74		77	74			75		71	76									77	7
07/24/2022				73																		73	1
<b>Number of occurrence days</b>																							
2022: 3	0	0	1	2	0	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0			
2021: 17																							

Due the spatial nature of ozone and exceedances, emissions from a single source are becoming increasingly important.

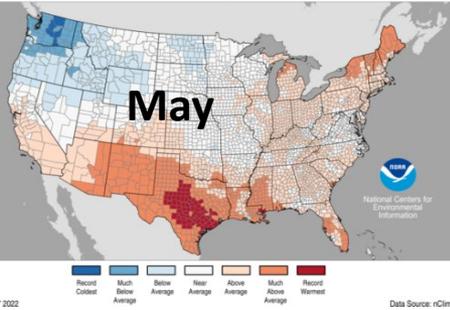


# 2022 Weather Synopsis

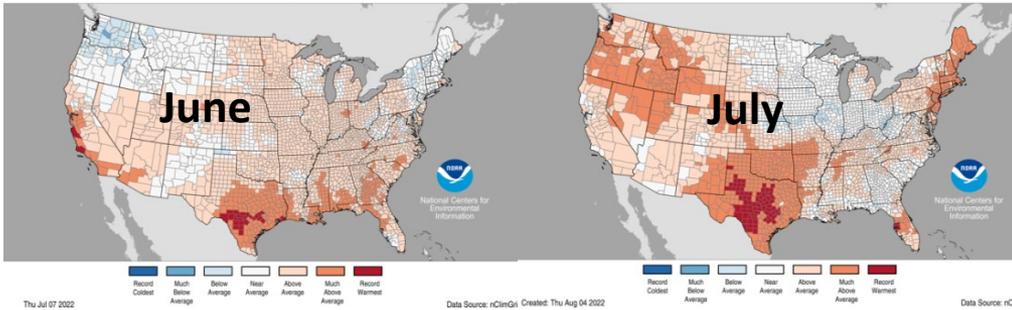
County Maximum Temperature Ranks  
April 2022  
Period: 1895-2022



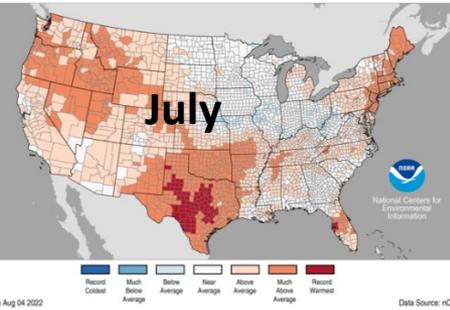
County Maximum Temperature Ranks  
May 2022  
Period: 1895-2022



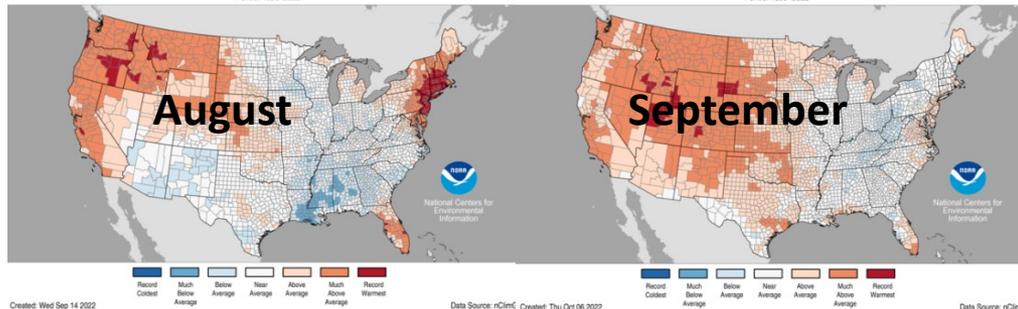
County Maximum Temperature Ranks  
June 2022  
Period: 1895-2022



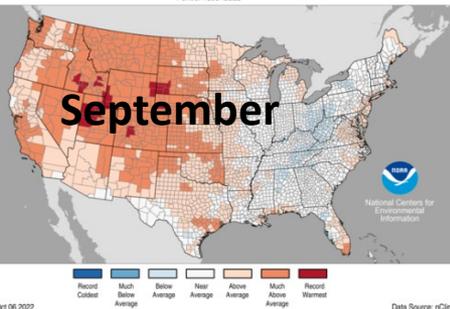
County Maximum Temperature Ranks  
July 2022  
Period: 1895-2022



County Maximum Temperature Ranks  
August 2022  
Period: 1895-2022



County Maximum Temperature Ranks  
September 2022  
Period: 1895-2022



- 48 days  $\geq 90^\circ\text{F}$  (15 Days above average)
  - Near seasonal in April and May
  - June – Sept all in the top 30% in MaxT
  - August was the 8<sup>th</sup> warmest MaxT in MD all time
  - 6 record warmth days at BWI during the 2022 between April & September
  - **Overall summer (JJA) was warmer than normal, 14<sup>th</sup> warmest on record (2021 was 12<sup>th</sup> warmest)**
- 2022 fire season was much more tame versus 2021
  - Early season agricultural burning across SE was non-impactful
  - Any wildfire smoke from mountain west or Canada typically stayed aloft or was very diffuse

A bright sun is positioned in the upper right quadrant of the image, casting a strong glow and creating a lens flare effect. The sky is a deep, clear blue, and several large, fluffy white cumulus clouds are scattered across the scene, particularly on the left and right sides. The overall atmosphere is bright and clear, suggesting a sunny day.

# **2022 PEAK DAY WEATHER SUMMARY**



# What Happened in 2022?

Valid Date	Forecast MD Max O3 (ppb)	Actual MD Max O3 (ppb)
May 18	Multi-day Call to Action (May 21)	
May 21	71	63
May 29	Multi-day Call to Action (May 31)	
May 31	71	66
June 21*	67	71
June 30	72	77
July 20	72	69
July 23	72	73
August 3	71	64
August 4	75	69

\* Emails not sent out for these days

- Pilot Program began April 1<sup>st</sup>
- Call to Action issued 9 times
  - ✓ Two multi-day advance notices
  - ✓ Seven day ahead emails
    - One resulted in an exceedance
  - ✓ Two near misses (July 20, Aug 4)
- 2 of 3 exceedances were triggered by just one-monitor



Did extra  
action help  
???



# Peak Day Ozone: Day Ahead

Day-advanced notices were sent out 7 separate times during the 2022 ozone season...

Date Forecast	Forecast MD Max O3 (ppb)	Actual MD Max O3 (ppb)	Hit/False Alarm
May 21	71	63	False Alarm
May 31	71	66	False Alarm
June 30	72	77	Hit
July 20	72	69	False Alarm
July 23	72	73	Hit
August 3	71	64	False Alarm
August 4	75	69	False Alarm



# Peak Day Ozone: Multi-Day

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Multi-Day advanced notices were sent out twice for 2 unique days during the 2022 ozone season...

Date Issued	Date Forecast	Actual MD Max O3 (ppb)	Hit/False Alarm
May 18	May 21	63	False Alarm
May 29	May 31	66	False Alarm



# Peak Day Ozone: Misses

There was only 1 day during the 2021 ozone season where Peak Day Ozone Pilot email was not sent out, yet Maryland saw an ozone exceedance....

Date	Forecast MD Max O3 (ppb)	Actual MD Max O3 (ppb)
June 21*	67	71

- This single monitor exceedance at Fairhill used a 6-hour max versus the usual 8-hour. 2 hours of observations were missing due to a necessary QC check. In all likelihood this would have kept the site from exceeding given the low ozone observations at nearby monitors over that timeframe.

\* Single monitor exceedances



# **2022 PEAK DAY PARTNERSHIP**

***CASE STUDY AS TO WHY PEAK DAY  
ACTIONS MATTER***



# June 30 Operational Data

## Units That Did Not Run

Unit	Comment
Wagner Units 1, 2, 3 & 4	Did Not Operate
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Unit 3	Did Not Operate
Chalk Point GT2, 3, 4, 5 & 6	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
Wheelabrator Unit 3	Did Not Operate

**- 21 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**

Unit	Comment
Wagner Unit 1	No Data Reported



# June 30 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.07 lb/mmBTU	Substituted data for 3 hours due to CEM maintenance
Brandon Unit 2	24 hours	0.12 lb/mmBTU	Unit was in start-up for the first 9 hours of the day
Chalk Unit 4	24 hours	0.11 lb/mmBTU	7.44 tons of NOx
Dickerson GT2	9 hours	0.11 lb/mmBtu	0.66 tons of NOx
Dickerson GT3	10 hours	0.08 lb/mmBtu	0.55 tons of NOx



# June 30 Operational Data

## Units That Ran

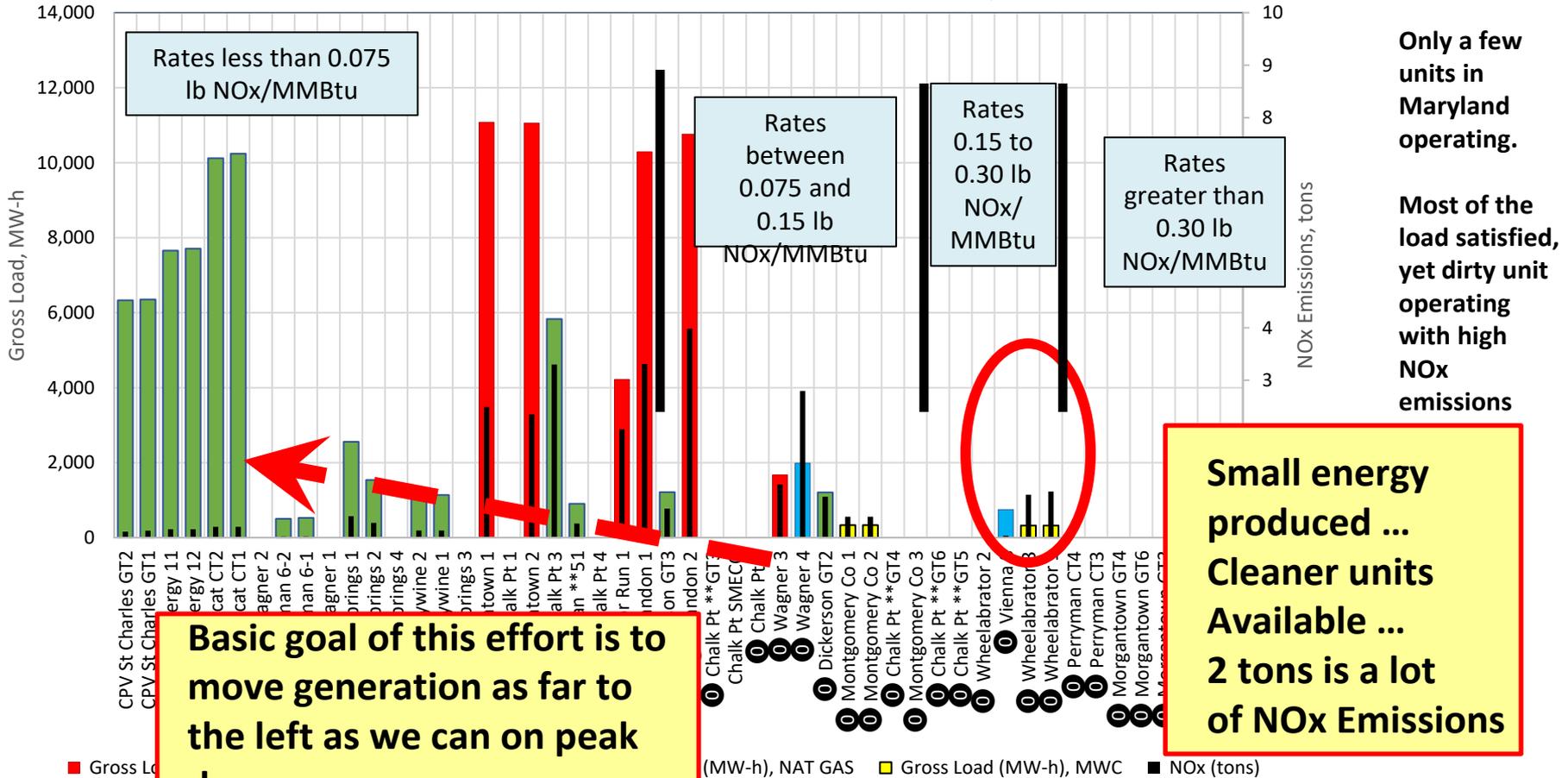
Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 2	24 hours 24 hours	134 ppm 142 ppm	Facility-wide total: 1.84 tons of NOx
MCRFF Unit 1 Unit 2 Unit 3	24 hours 7 hours 24 hours	73 ppm 75 ppm 92 ppm	Facility-wide total: 1.08 tons of NOx



# Who Emitted ... At What Rates

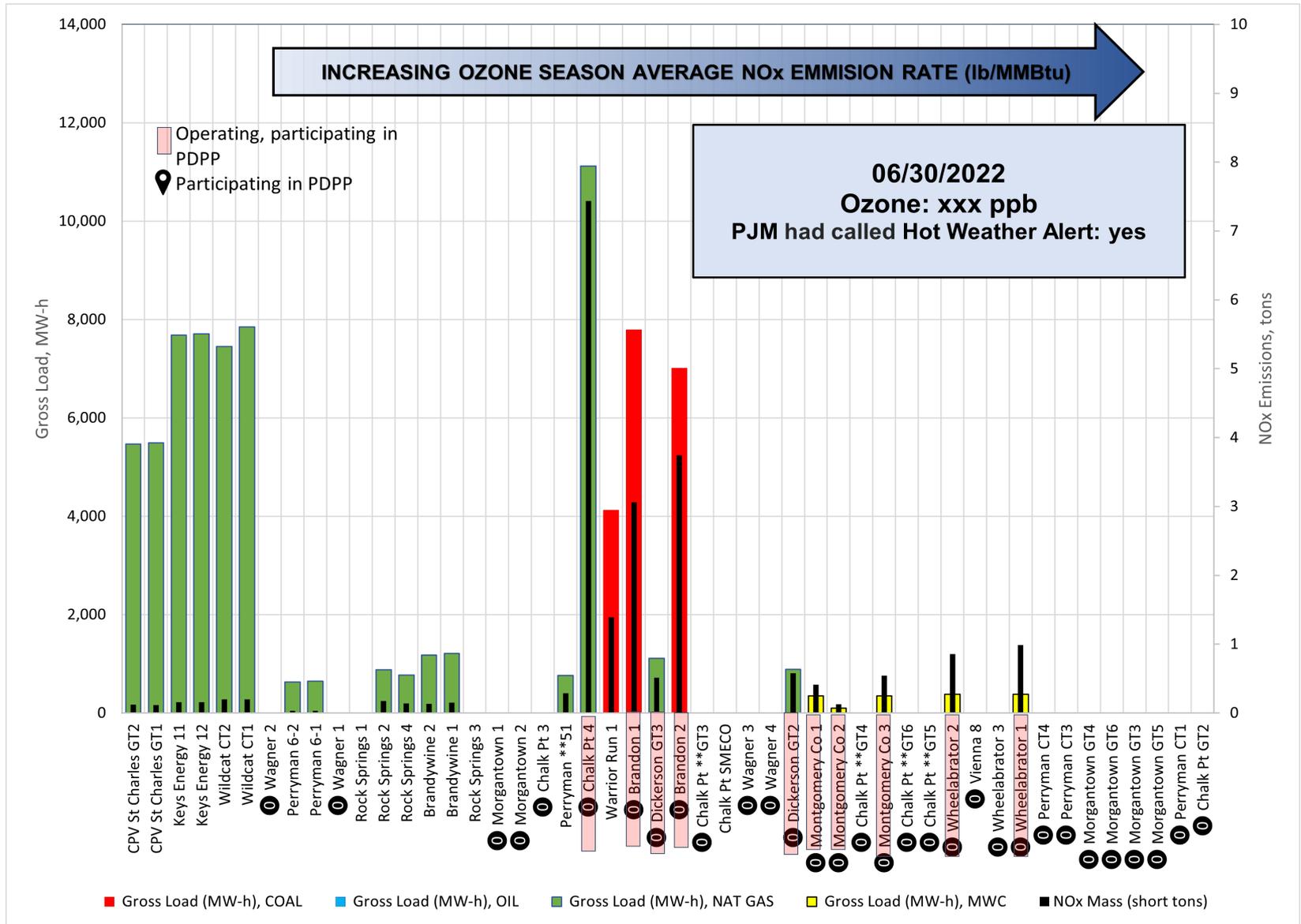
## Emissions Data Collection and Analysis

INCREASING OZONE SEASON AVERAGE NO<sub>x</sub> EMISSION RATE





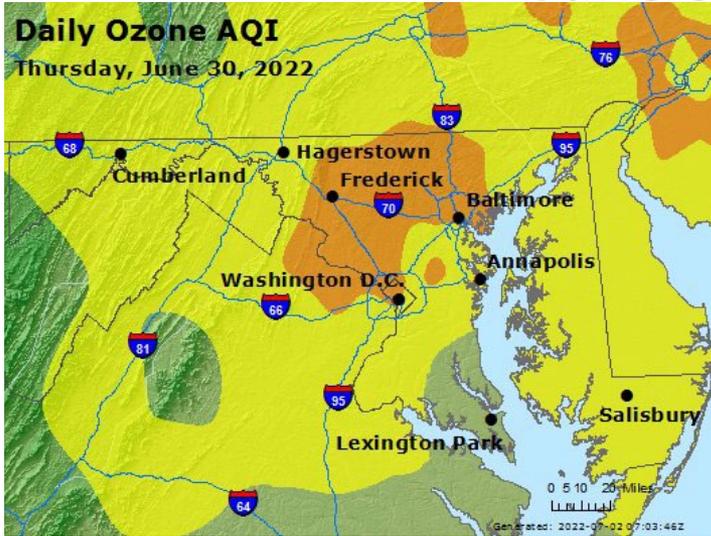
# June 30 - Are the Right Units Running?





# Peak Day Ozone: Day Ahead

## June 30<sup>th</sup> Exceedance (Thursday)



### Local – Upwind Transport aloft/ Local recirculation/Smoke?

High pressure lingered around the area for several days prior to the exceedance event. Meteorological conditions were ideal with plentiful sunshine and warm temperatures.

A substantial pool of ozone over a wide area to our west was noted on the 29<sup>th</sup> where several Ohio ozone monitors reached USG. It is suspected that the deterioration of the upwind air mass may have been partially tied to smoke.

High pressure began to gradually shift off the Mid-Atlantic coast on the 30<sup>th</sup>, surface winds during the day shifted from the west/northwest to southeast. Winds aloft however remained generally out of the west most of the day, tapping into the dirty upwind air mass. This shift at the surface provided a bit of recirculation from Baltimore/DC and the urban corridor as the bulk of the high ozone was eventually pushed north and west of I-95. In total, 7 monitors exceeded the 8-hr ozone standard in Maryland with the highest monitor reaching 77 ppb (Padonia) upwind of the Baltimore plume.

### Summary

**Forecast:** 72 ppb

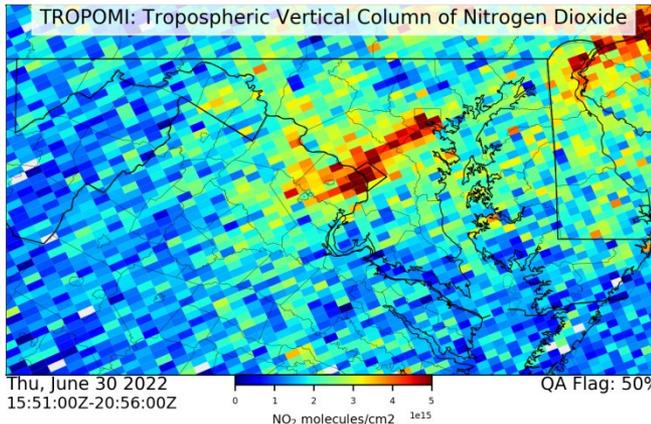
**Observed:** Padonia: 77 ppb

### Weather

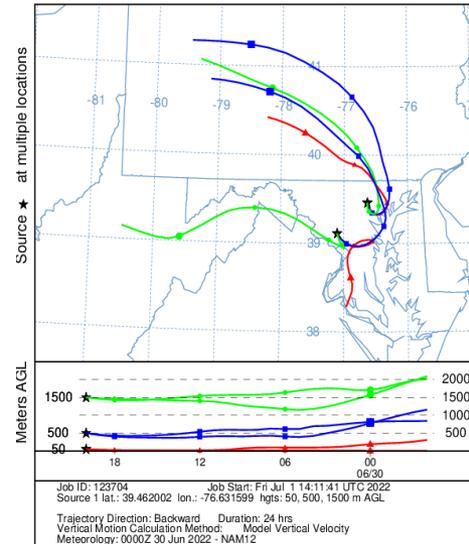
- 91°F High Temperature at BWI
- Avg sfc winds: NW -> SE @ ~5mph
- Mostly Sunny

# Verified

## Did EGUs do anything?



NOAA HYSPLIT MODEL  
Backward trajectories ending at 2000 UTC 30 Jun 22  
NAM Meteorological Data





# July 23 Operational Data

## Units That Did Not Run

Unit	Comment
Wagner Units 1, 2, 3 & 4	Did Not Operate
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5 & 6	Did Not Operate
Chalk Units 3 & 4	Did Not Operate
Chalk Point GT2, 3, 4, 5, & 6	Did Not Operate
Dickerson GT2 & 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3, & 4	Did Not Operate
Wheelabrator Unit 3	Did Not Operate

**- 24 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**



# July 23 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.05 lb/mmBTU	Incomplete data
Brandon Unit 2	24 hours	0.08 lb/mmBTU	Low load operation



# July 23 Operational Data

## Units That Ran

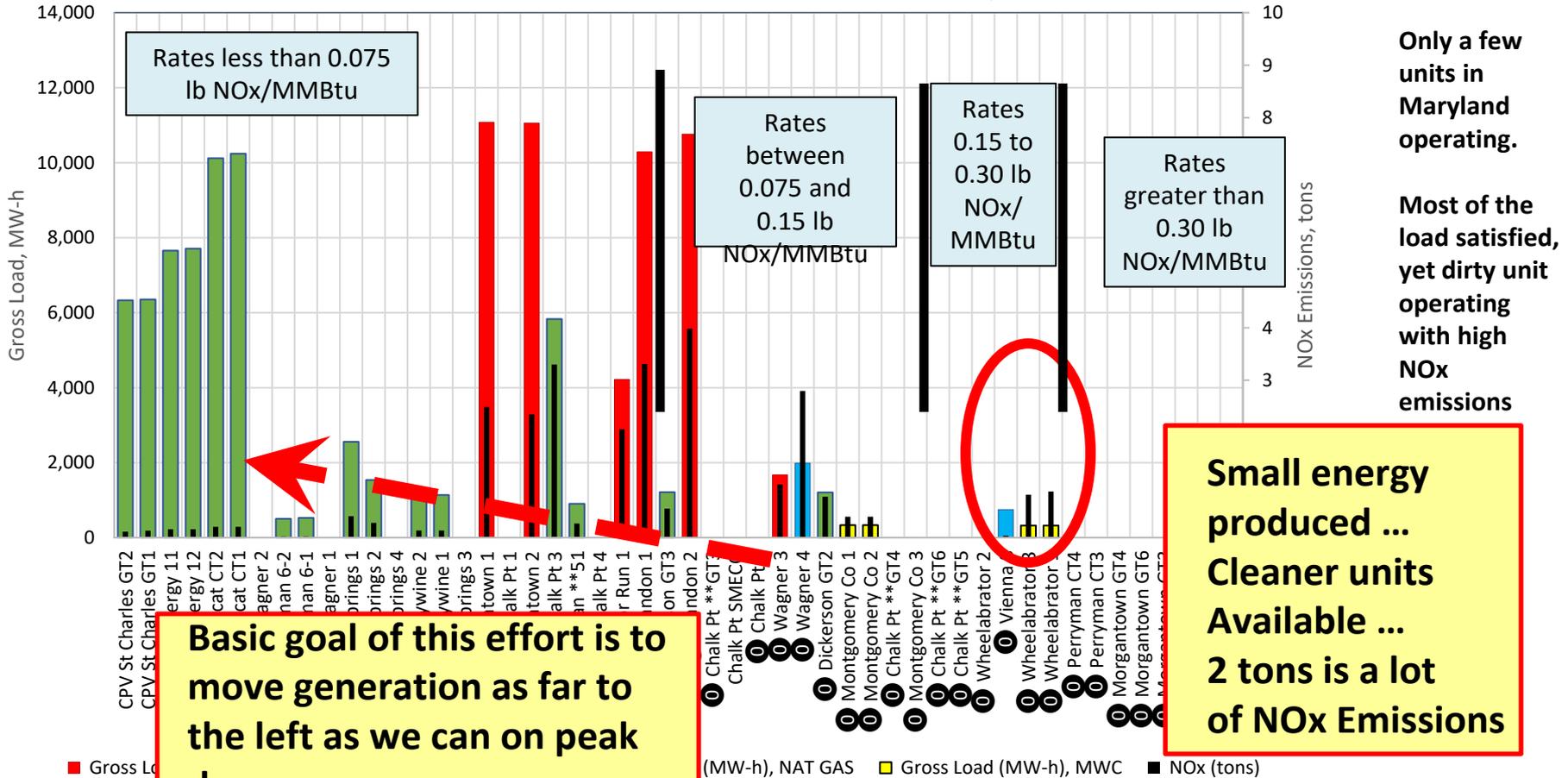
Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 2	24 hours 24 hours	140 ppm 143 ppm	Facility-wide total:  1.9 tons of NOx
MCRFF Unit 1 Unit 2 Unit 3	24 hours 15 hours 20 hours	72 ppm 61 ppm 74 ppm	Facility-wide total:  0.98 tons of NOx



# Who Emitted ... At What Rates

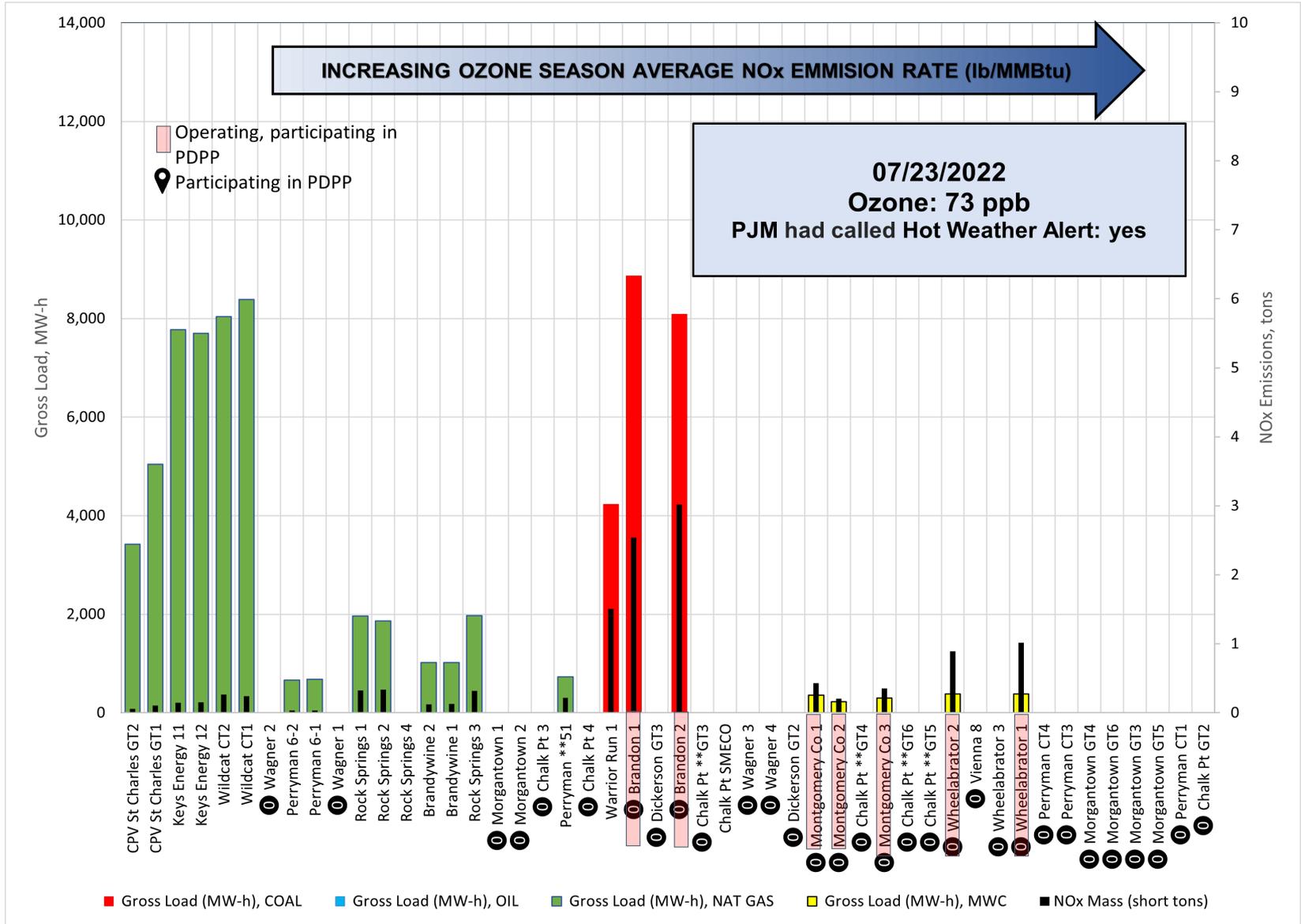
## Emissions Data Collection and Analysis

INCREASING OZONE SEASON AVERAGE NO<sub>x</sub> EMISSION RATE





# July 23 - Are the Right Units Running?





# Peak Day Ozone: Day Ahead

## July 23<sup>rd</sup> Exceedance (Saturday)

### Summary

**Forecast: 72 ppb**

**Observed: Lake**

**Montebello: 73 ppb**

**Single monitor exceedance**

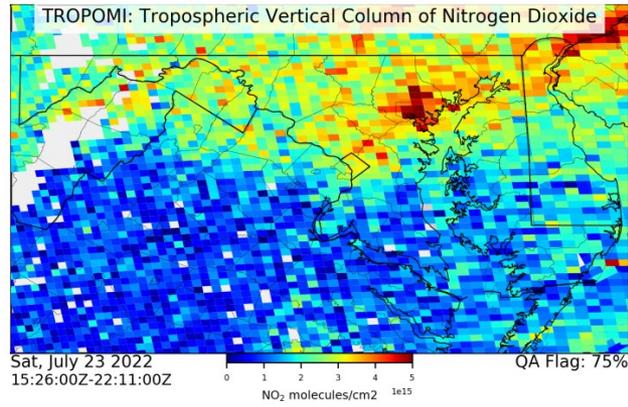
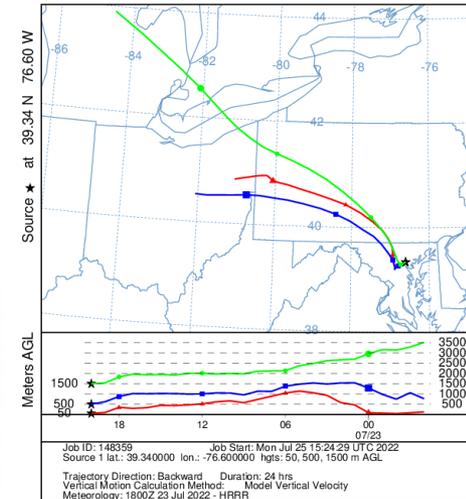
**Verified**

**Did EGUs do anything?**

### Weather

- 98°F\* High Temperature at BWI
- Avg sfc winds NW/Bay Influenced @ 3-5mph
- Mostly Sunny

NOAA HYSPLIT MODEL  
Backward trajectories ending at 2000 UTC 23 Jul 22  
HRRR Meteorological Data



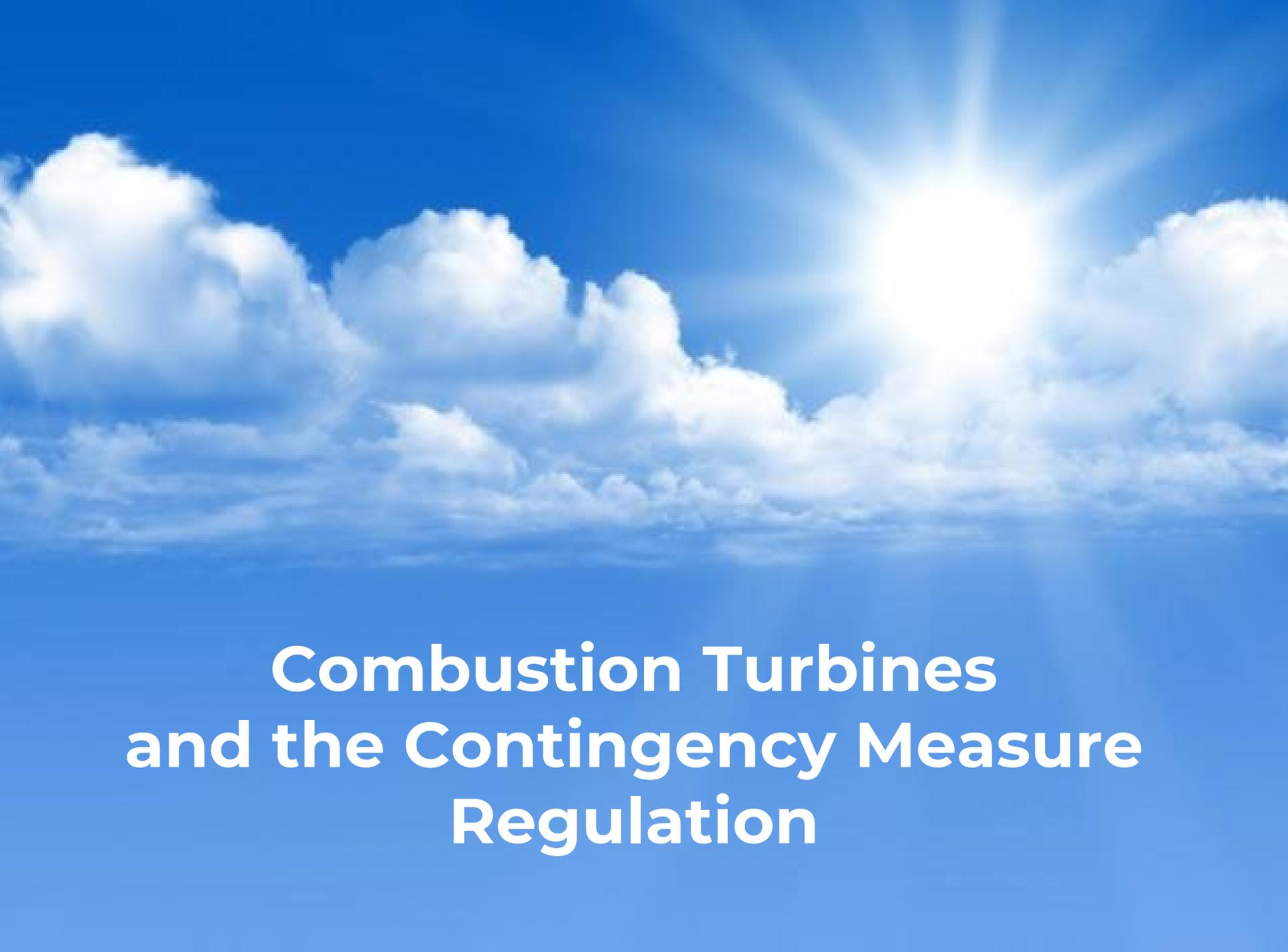
### Local Emissions/Smoke?

The 6<sup>th</sup> day in a row of temperatures well into the 90s as high pressure persisted to our south. A record high was set at BWI on the day of the exceedance at 98F.

Despite this prolonged period of intense heat regionally, the Mid-Atlantic and upwind air mass, in terms of ozone, was fairly clean. On Saturday, weak northwest flow brought ozone and ozone precursors from Metro Baltimore into the Bay. As temperatures began to climb during the late morning, Bay breezes developed. Surface winds were weak enough to allow the bulk of the dirty air to push back towards Baltimore.

Ozone values in the city were still not overly impressive with a 1-minute ozone concentration at the new Lake Montebello site only peeking out at 85ppb. This is likely tied to the typical morning NOx surge being on the weaker side given it being a Saturday. Despite this, ozone levels were able to maintain long enough in the Metro Baltimore area to reach USG thresholds. In total, just one monitor (Lake Montebello) in the state exceeded the ozone standard with an 8-hr maximum reaching 73ppb.

It is possible that some smoke enhancement played a role. Smoke was analyzed over the region by HRRR (although mostly aloft) and by HMS. It is difficult to say if and how much this western smoke played a role.



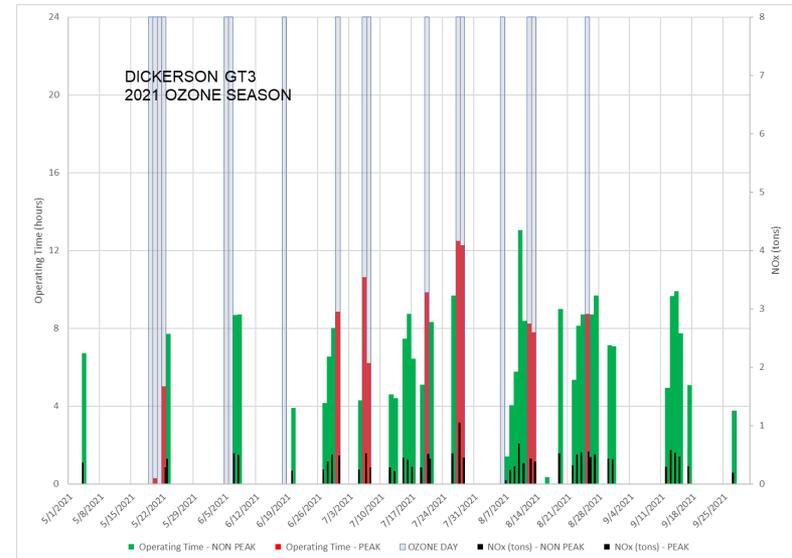
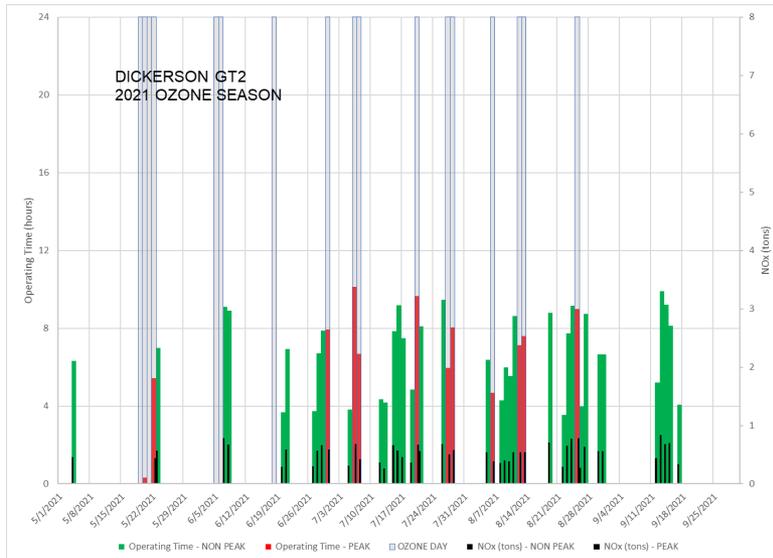
**Combustion Turbines  
and the Contingency Measure  
Regulation**



# CT Units Frequent Operations

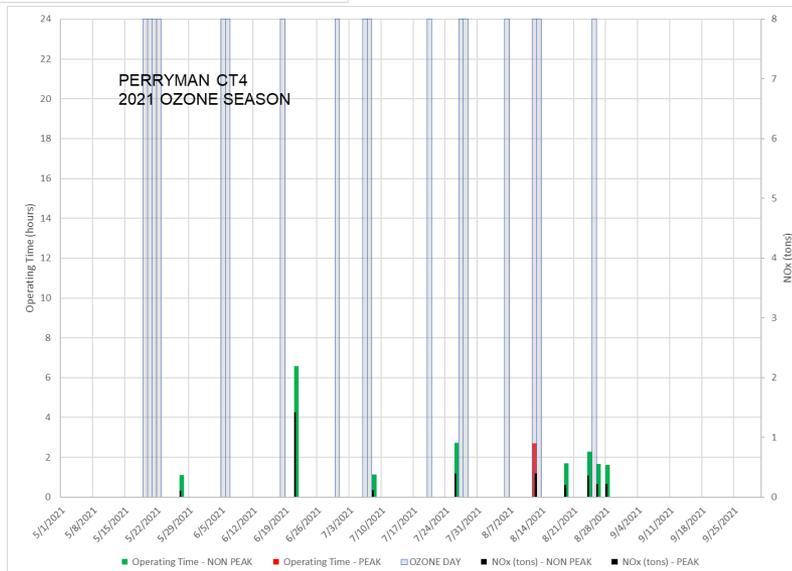
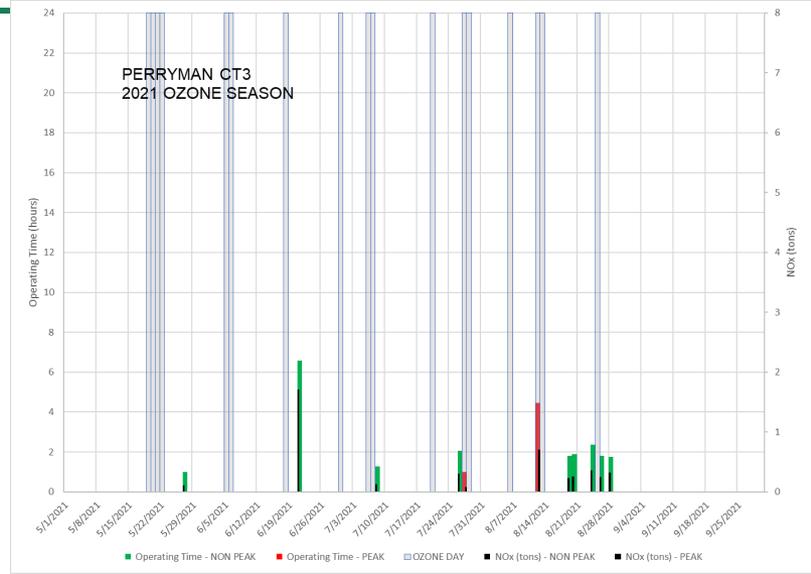
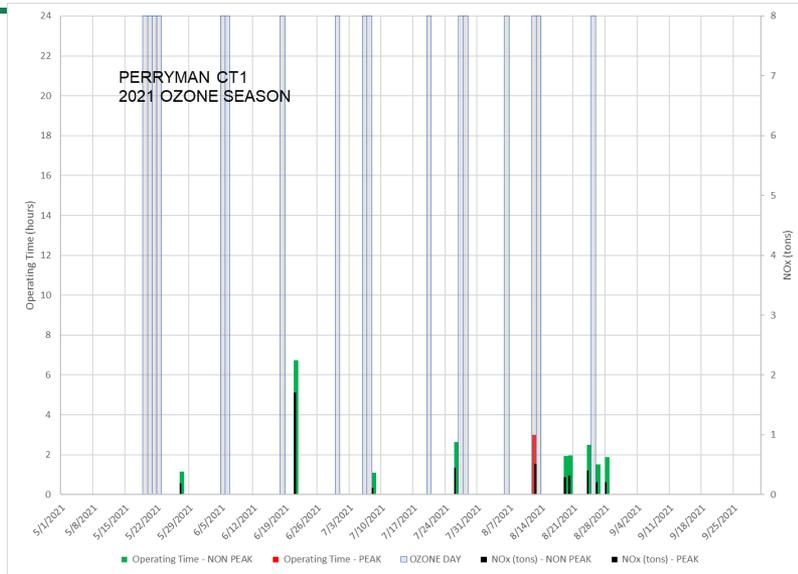
## 2021 OZONE SEASON - 17 Ozone Exceedance Days

	DICKERSON	
	GT2	GT3
<b>2021</b>		
total number of Ozone exceedance days	17	
total number of peak days called	13	
total number of days unit operated on peak day	12	11
total number of hours unit operated on peak day	82.58	90.38
<i>total amount of NOx emissions, on peak days (tons)</i>	6.13	4.99
total number of days unit operated prior to a peak day	7	6
<i>total amount of NOx emissions, prior to operating peak day (tons)</i>	3.89	2.45
total number of days unit operated	48	48
total number of hours units operated	324.74	341.84
total amount of NOx emissions (tons)	24.95	19.02





# CT Units Frequent Operations





# The Need For a Contingency Measure

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- Maryland measured below the NAAQS for preliminary ozone for the first time in history, but there is still a need for a contingency measure
- If the State is notified by the EPA that a nonattainment area has failed to achieve the level of reductions in the Reasonable Further Progress (RFP) SIP by the milestone year or has failed to attain the standard by the attainment date, the area must be able to implement contingency measures within one year of the EPA's notice
- The state of Maryland has identified combustion turbines (CTs) as being a significant source of NO<sub>x</sub> emissions during ozone season and the controlling of these units are crucial during peak days



# SIP Contingency Measure

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- A contingency measure is an action designed to be used in response to the failure of fulfilling certain requirements
- The state of Maryland is currently in the process of creating a new regulation for NO<sub>x</sub> standards during ozone season for CTs – COMAR 26.11.43 – Ozone Season NO<sub>x</sub> Standards for Combustion Turbines
  - This regulation will apply to CTs in the Baltimore ozone nonattainment area, Washington, DC, ozone nonattainment area, and the Philadelphia-Wilmington-Atlantic City ozone nonattainment area located in Maryland
- Section 172(C)(9) of the CAA and the EPA's Phase 2 Rule require that nonattainment areas include contingency measures in their RFP and Attainment SIPs
  - Only becomes effective if the region does not meet the requirements of Section 172(C)(9) of the CAA for the ozone standard



# CT Regulation Requirements

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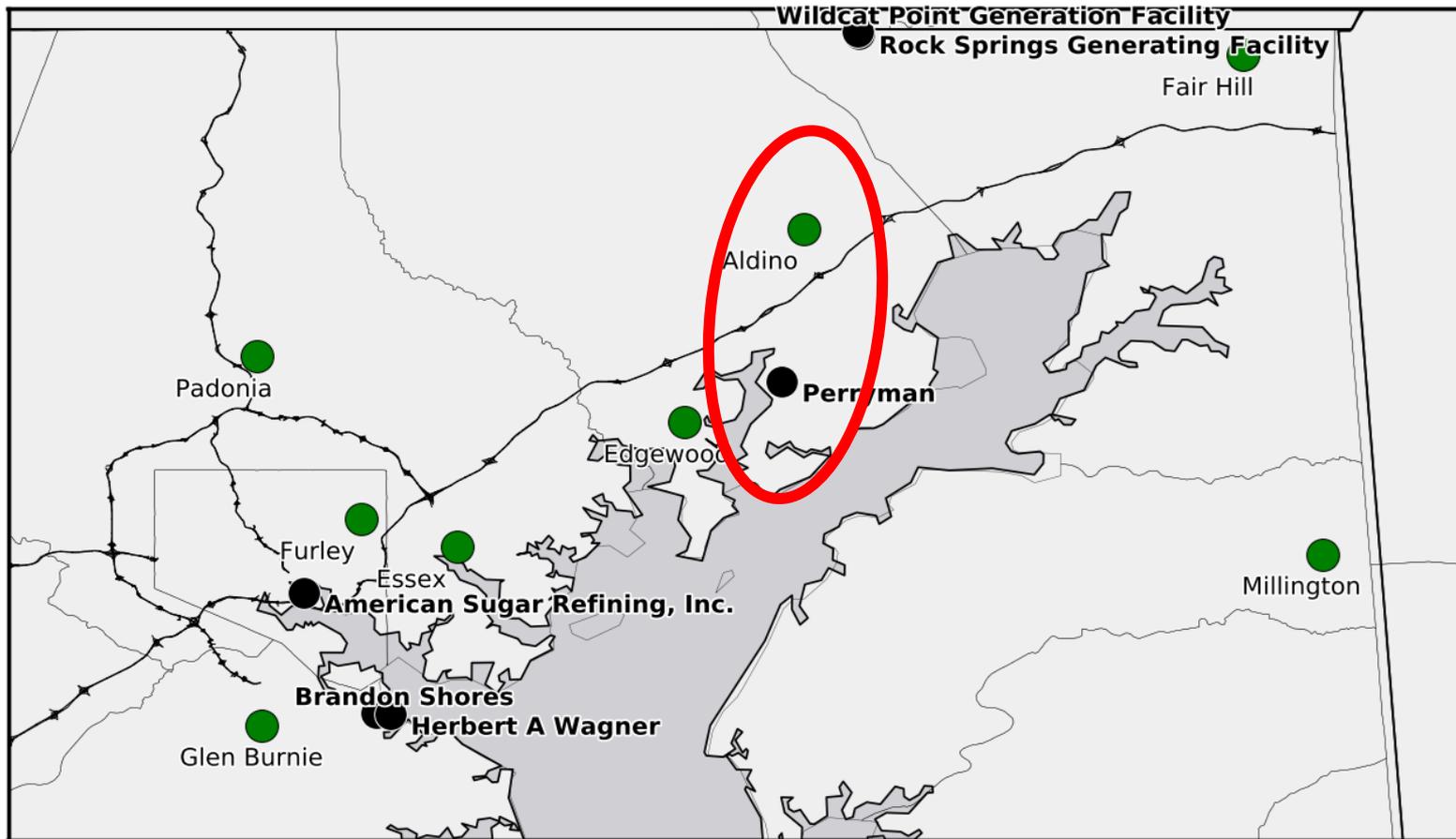
- CTs in nonattainment areas must meet a 0.09 lb/MMBtu 24-hour block emission rate to operate during the ozone season
- Other requirements will include monitoring, record keeping and reporting
- Provisions will be provided to ensure electric system reliability

# *Questions & Discussion*





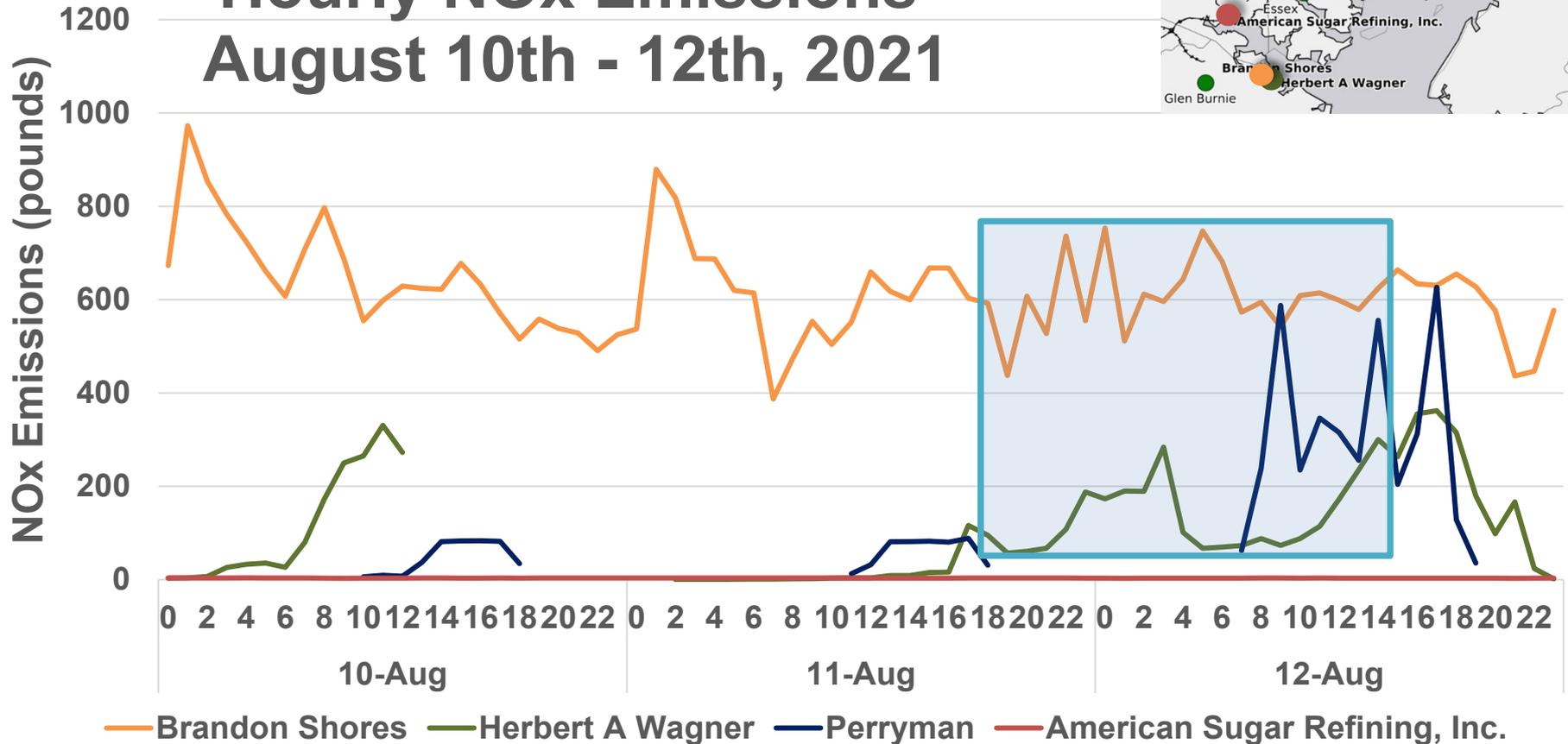
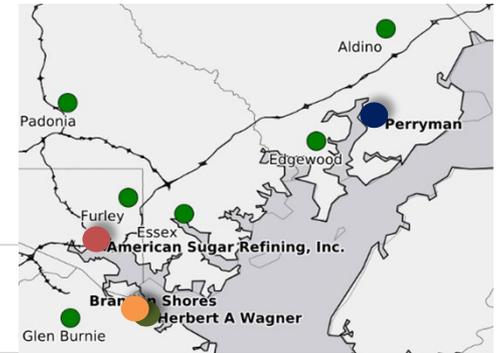
# CAMD NO<sub>x</sub> Sources and Ozone Sites





# CAMD NO<sub>x</sub> Emissions

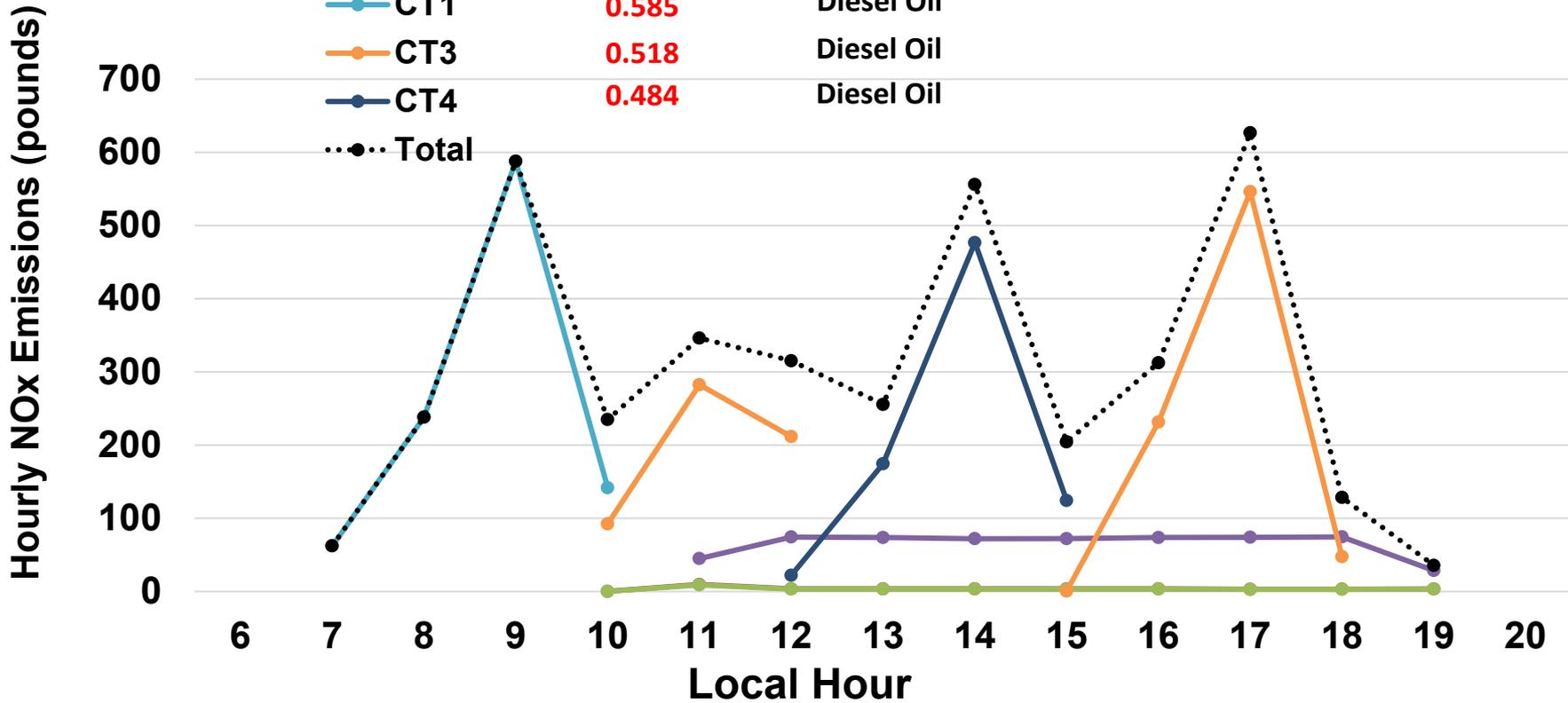
## Hourly NO<sub>x</sub> Emissions August 10th - 12th, 2021





# Perryman: August 12<sup>th</sup>, 2021

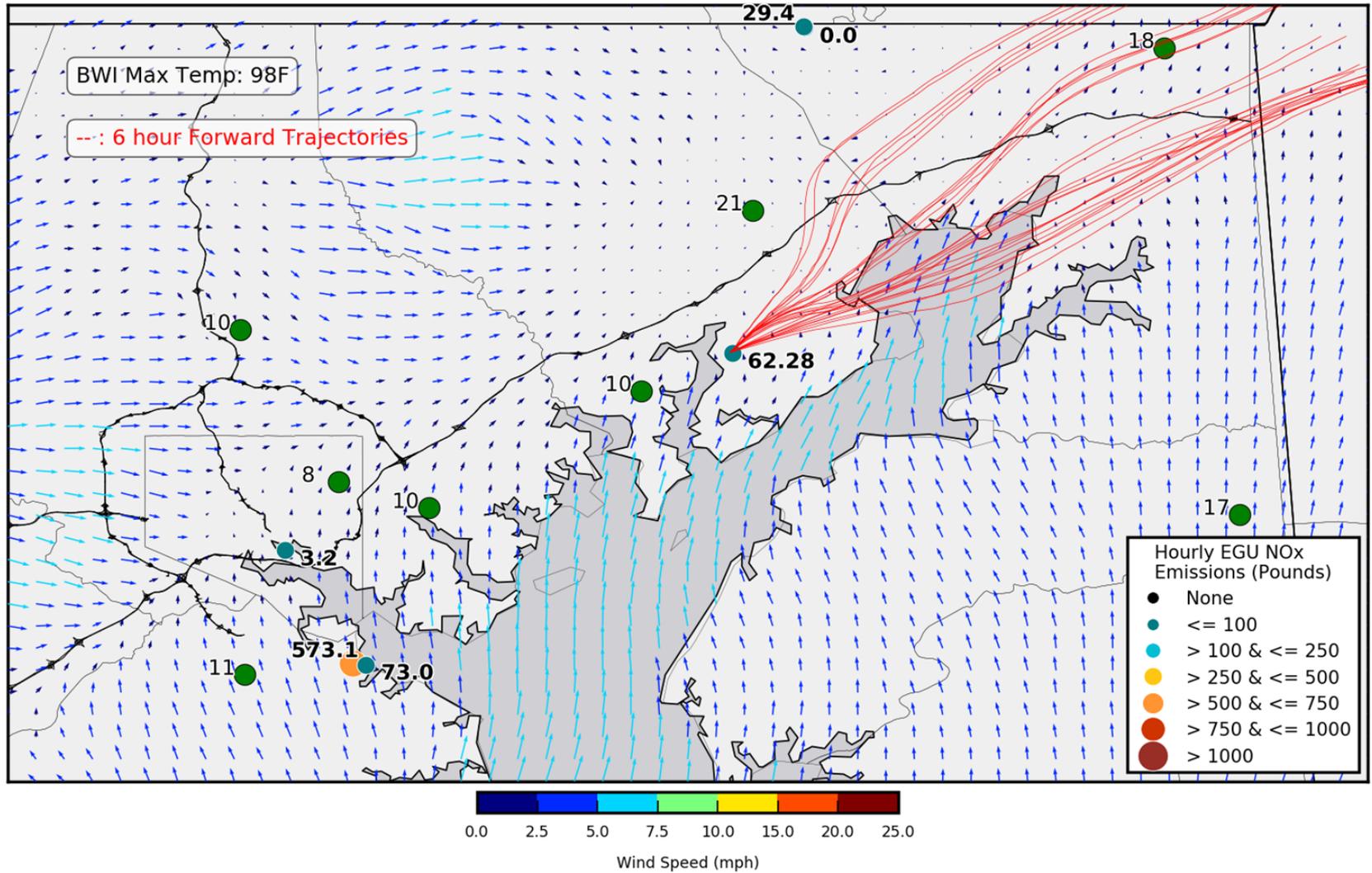
Facility Unit ID	Avg. NOx Rate (lb/MMBtu)	Fuel Type Primary/Secondary
44348	0.0836	Natural Gas/ Diesel Oil
44349	0.0836	Natural Gas/ Diesel Oil
**51	0.187	Natural Gas/ Diesel Oil
CT1	0.585	Diesel Oil
CT3	0.518	Diesel Oil
CT4	0.484	Diesel Oil
... Total		





# Perryman: August 12<sup>th</sup>, 2021

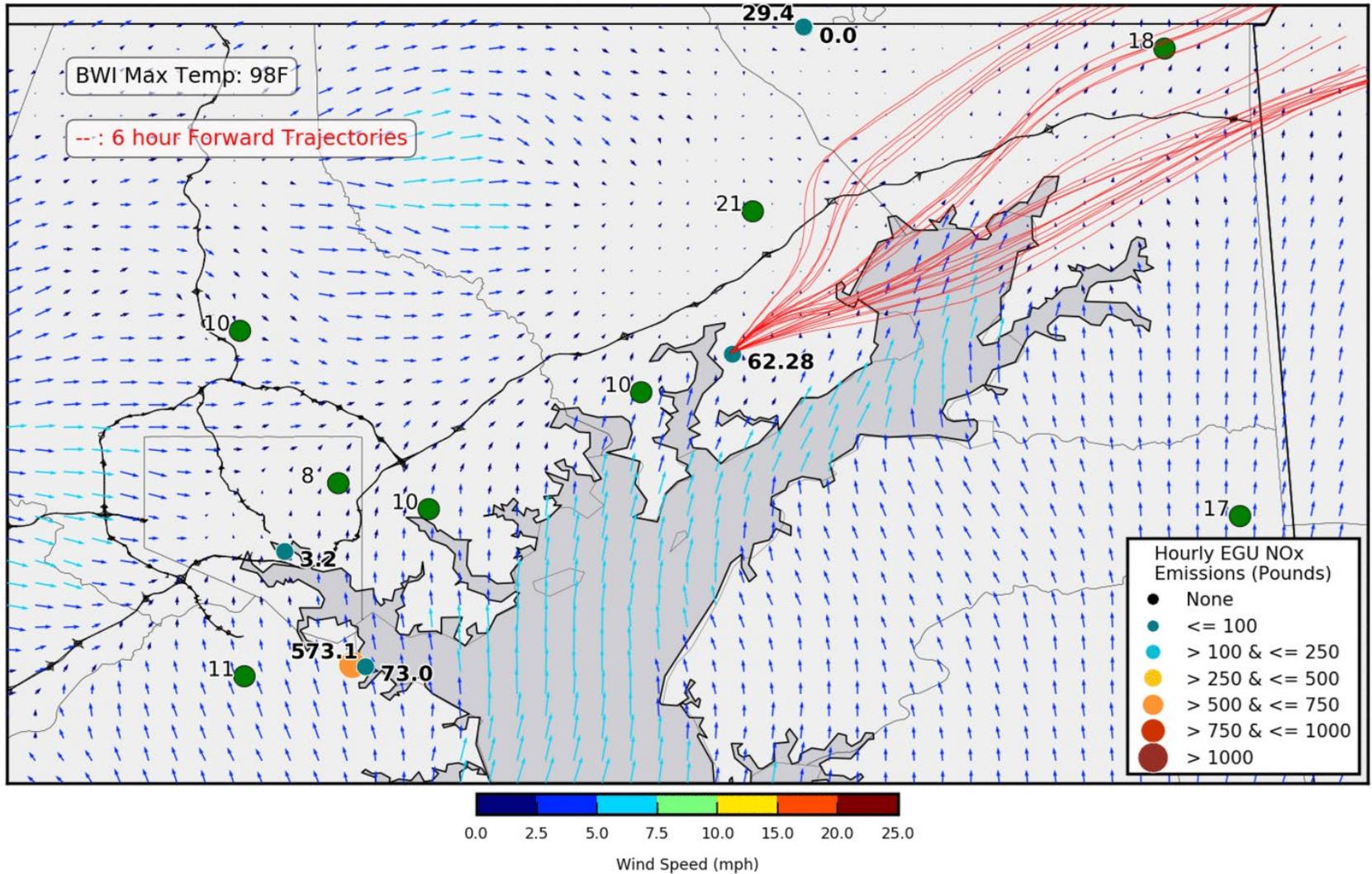
August 12 2021 12Z: Hourly Ozone, EGU NOx Emissions & HRRR Winds





# Perryman: August 12<sup>th</sup>, 2021

August 12 2021 12Z: Hourly Ozone, EGU NOx Emissions & HRRR Winds





# May 21 Operational Data

## Units That Did Not Run

Unit	Comment
Wagner Unit 1	Did Not Operate
Morgantown Unit 2	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Unit 3	Did Not Operate
Chalk Point GT2, 3, 4, 5 & 6	Did Not Operate
Dickerson GT2 & 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
Wheelabrator Unit 3	Did Not Operate

**- 29 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**

Unit	Comment
Wagner Unit 2	No Data Reported



# May 21 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.08 lb/mmBTU	Substituted data used for HI and NOx rate for 8 hrs due to CEM malfunction
Brandon Unit 2	24 hours	0.07 lb/mmBTU	Substituted data used for HI and NOx rate for 8 hrs due to CEM malfunction
Wagner Unit 3	24 hours	0.06 lb/mmBTU	SCR reading missing one hour
Wagner Unit 4	24 hours	0.05 lb/mmBTU	Unit was forced off due to boiler back pressure issue
Morgantown Unit 1	24 hours	0.04 lb/mmBTU	2.39 tons of NOx
Chalk Unit 4	23 hours	0.07 lb/mmBTU	4.82 tons of NOx



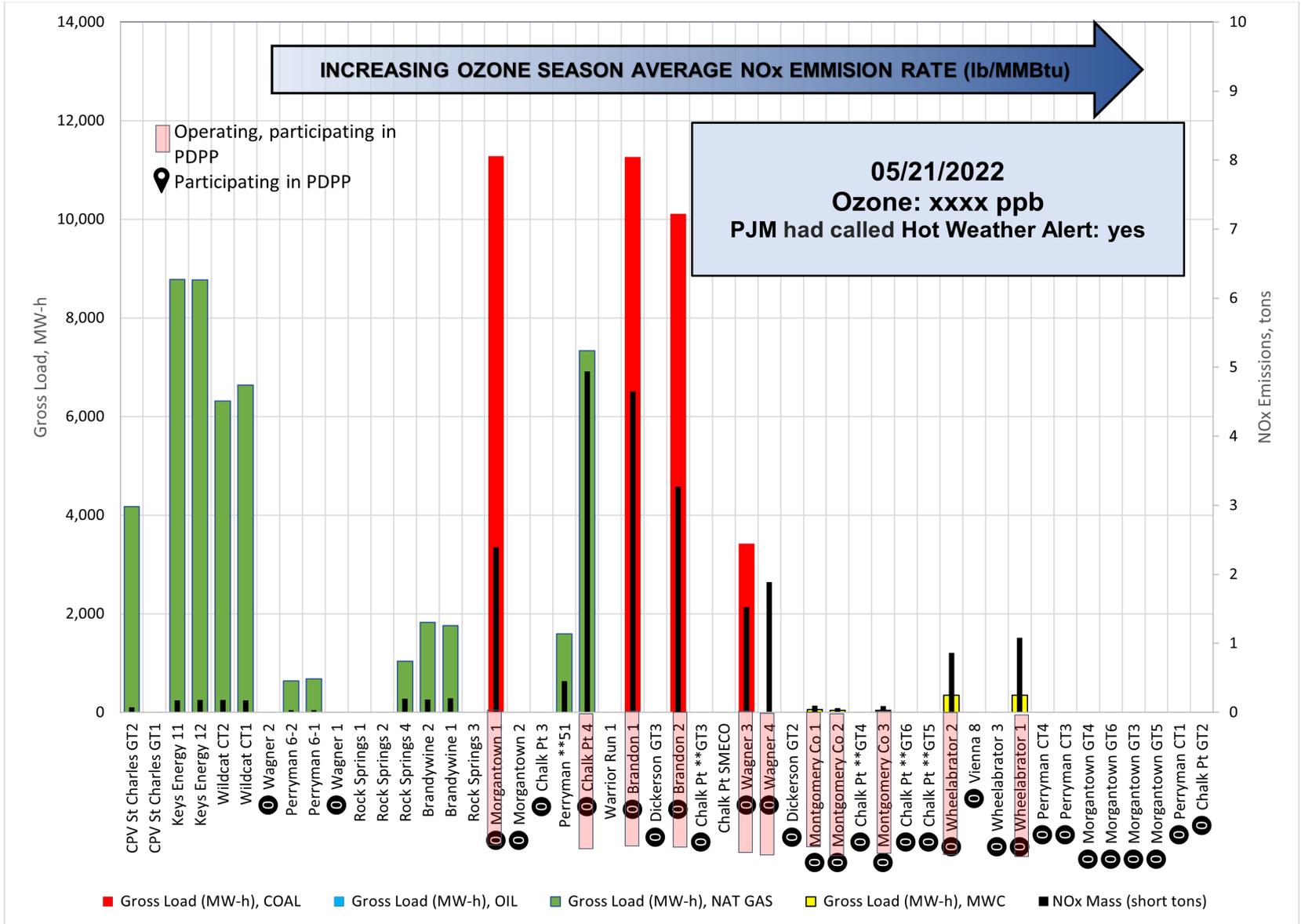
# May 21 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 2	24 hours 24 hours	144 ppm 141 ppm	Facility-wide total: 1.94 tons of NOx
MCRFF Unit 1 Unit 2 Unit 3	6 hours 4 hours 5 hours	95 ppm 85 ppm 98 ppm	Facility-wide total: 0.3 tons of NOx



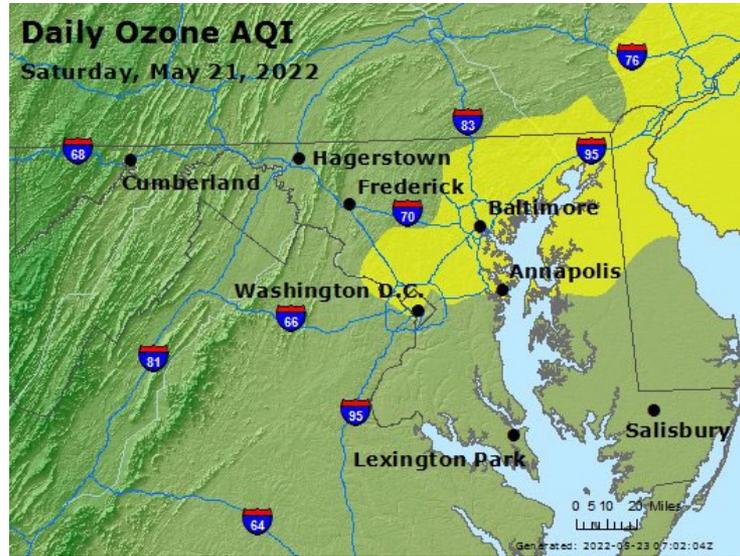
# May 21 - Are the Right Units Running?





# Peak Day Ozone: Multi-Day & Day Ahead

## May 21<sup>st</sup> (Saturday)



### Summary

**Forecast: 71 ppb**

**Observed: Essex: 63 ppb**

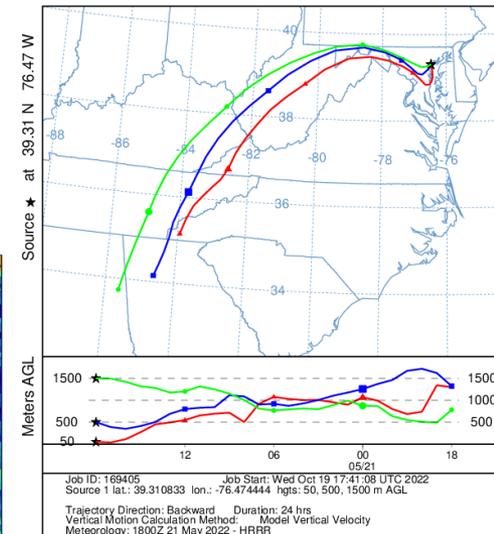
**Did Not Verify**

**Did EGUs do anything?**

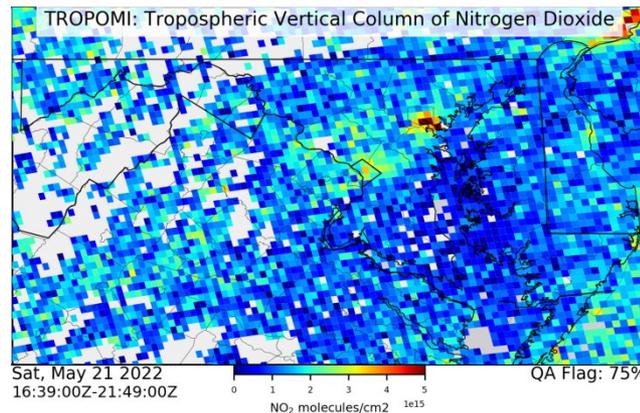
### Weather

- 95°F High Temperature at BWI
- Avg surface winds: SW @ ~7mph
- Partly to Mostly Sunny

NOAA HYSPLIT MODEL  
Backward trajectories ending at 1800 UTC 21 May 22  
HRRR Meteorological Data



Temperatures climbed to 95F at BWI with winds generally light, peaking 5-10mph in the afternoon. Gusts at BWI did reach 15-20mph at BWI from the Bay, which could have been enough to scour out Bay pollution. But EVERYWHERE along the east coast from Maryland to New York was terribly over predicted. The only ONE monitor exceeded along the east coast that day in far northwestern CT. NOAA model over predicted ozone by roughly 10-20 ppb across most of the Mid-Atlantic and Northeast.



Earlier in the week ozone developed over North Carolina in an area that was identical to NO<sub>2</sub> on TROPOMI. However, ozone afterwards seemed to simply “disappear” in coming days. TROPOMI NO<sub>2</sub> across MD on the 21<sup>st</sup> was quite low with the exception of the Baltimore port area.



# May 31 Operational Data Units That Did Not Run

Unit	Comment
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point GT2, 3, 4, 5 & 6	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
Wheelabrator Unit 3	Did Not Operate
MCRFF Unit 2	Did Not Operate

**- 17 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**

Unit	Comment
Wagner Unit 2	No Data Reported



# May 31 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.08 lb/mmBTU	Low SCR Temp and Low load operation for first 6 hours of the day
Brandon Unit 2	24 hours	0.11 lb/mmBTU	Unit Startup for first 7 hours of the day
Wagner Unit 1	24 hours	0.11 lb/mmBTU	Unit was called on by PJM
Wagner Unit 3	24 hours	0.10 lb/mmBTU	Unit Startup first 8 hours
Wagner Unit 4	3 hours	0.03 lb/mmBTU	Unit was running on natural gas
Chalk Unit 3	24 hours	0.10 lb/mmBTU	One hour of CEM downtime
Chalk Unit 4	24 hours	0.11 lb/mmBTU	7.04 tons of NOx
Dickerson GT2	11 hours	0.11 lb/mmBTU	0.93 tons of NOx
Dickerson GT3	11 hours	0.08 lb/mmBTU	0.67 tons of NOx



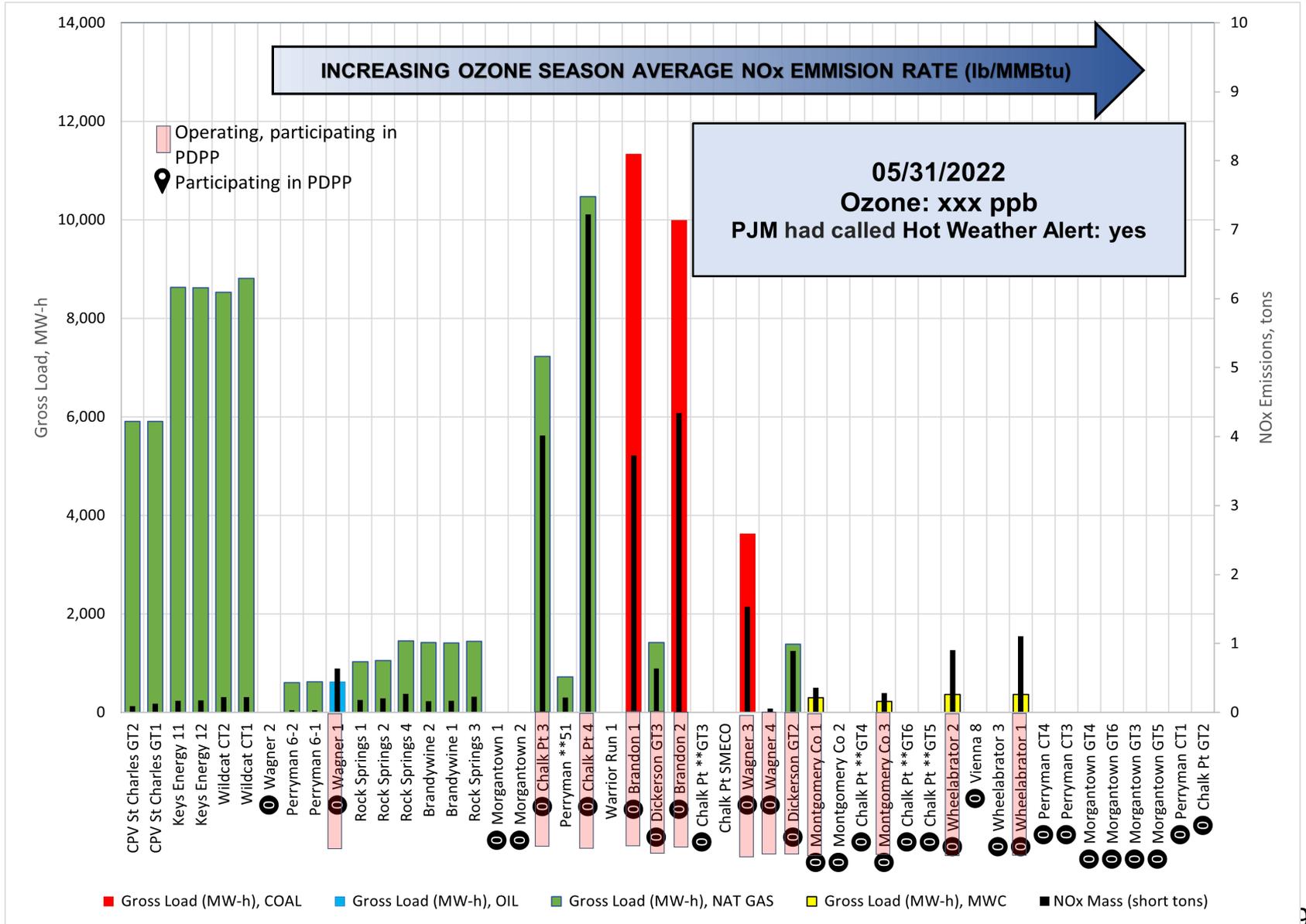
# May 31 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 2	24 hours 24 hours	146 ppm 142 ppm	Facility-wide total: 1.92 tons of NOx
MCRFF Unit 1 Unit 3	24 hours 18 hours	74 ppm 81 ppm	Facility-wide total: 0.6 tons of NOx



# May 31 - Are the Right Units Running?





# Peak Day Ozone: Multi-Day & Day Ahead

## May 31<sup>st</sup> (Tuesday)

### Summary

**Forecast:** 71 ppb  
**Observed:** Aldino: 66 ppb

**Did Not Verify**  
**Did EGUs do anything?**

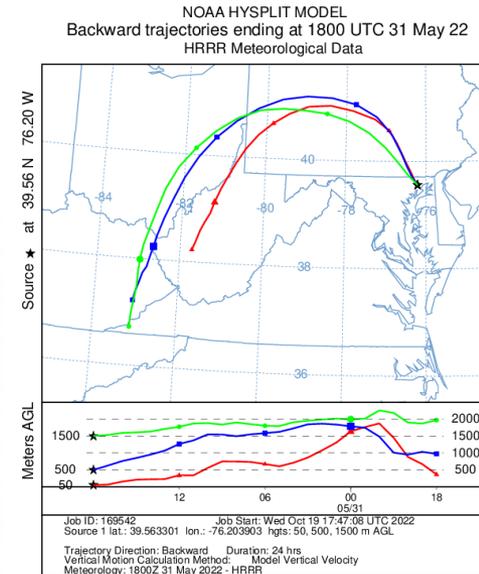
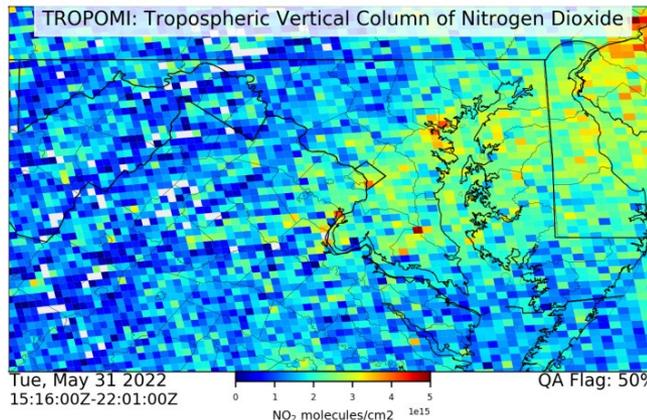
### Weather

- 96°F\* High Temperature at BWI
- Avg surface winds: WNW @ ~5mph
- Partly to Mostly Sunny



High pressure persisted just to Maryland's south and west for several days leading up to the potential event on the 31<sup>st</sup>. A record high was set at BWI of 96F. A classic NW arching trajectory, providing transport from western PA and the Ohio River Valley. In addition, the Hazard Mapping System did analyze smoke over the region due to agricultural burning across the SE US and Mexico. It is difficult to say if and how much this smoke reached the surface as PM<sub>2.5</sub> concentrations were on the lower side across Maryland.

In the end, surface winds were just a little too strong to get any significant recirculation from Baltimore/Bay. The bulk of the ozone was pushed downwind across the Bay to the Eastern Shore. This can also be seen on the TROPOMI vertical column NO<sub>2</sub>, where the highest readings were east of the I-95 corridor to the other side of the Bay. Aldino, which did see the highest observed ozone in the state, did get a late afternoon shift in the winds to southerly. A late spike in ozone was noted in the minute data, but it was not enough to lead to an exceedance. No exceedances were recorded across the Mid-Atlantic and Northeast.





# July 20 Operational Data

## Units That Did Not Run

Unit	Comment
Wagner Units 1, 2, 3 & 4	Did Not Operate
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5, & 6	Did Not Operate
Chalk Unit 4	Did Not Operate
Chalk Point GT2, 3, 4 & 6	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
MCRFF Unit 3	Did Not Operate

**- 20 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**



# July 20 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.06 lb/mmBTU	Incomplete data
Brandon Unit 2	24 hours	0.07 lb/mmBTU	Incomplete data
Chalk Unit 3	22 hours	0.09 lb/mmBTU	Unit began the day in startup
Chalk Point GT5	11 hours	0.09 lb/mmBTU	Gas run
Dickerson GT2	7 hours	0.11 lb/mmBTU	Gas run
Dickerson GT3	7 hours	0.08 lb/mmBTU	Gas run



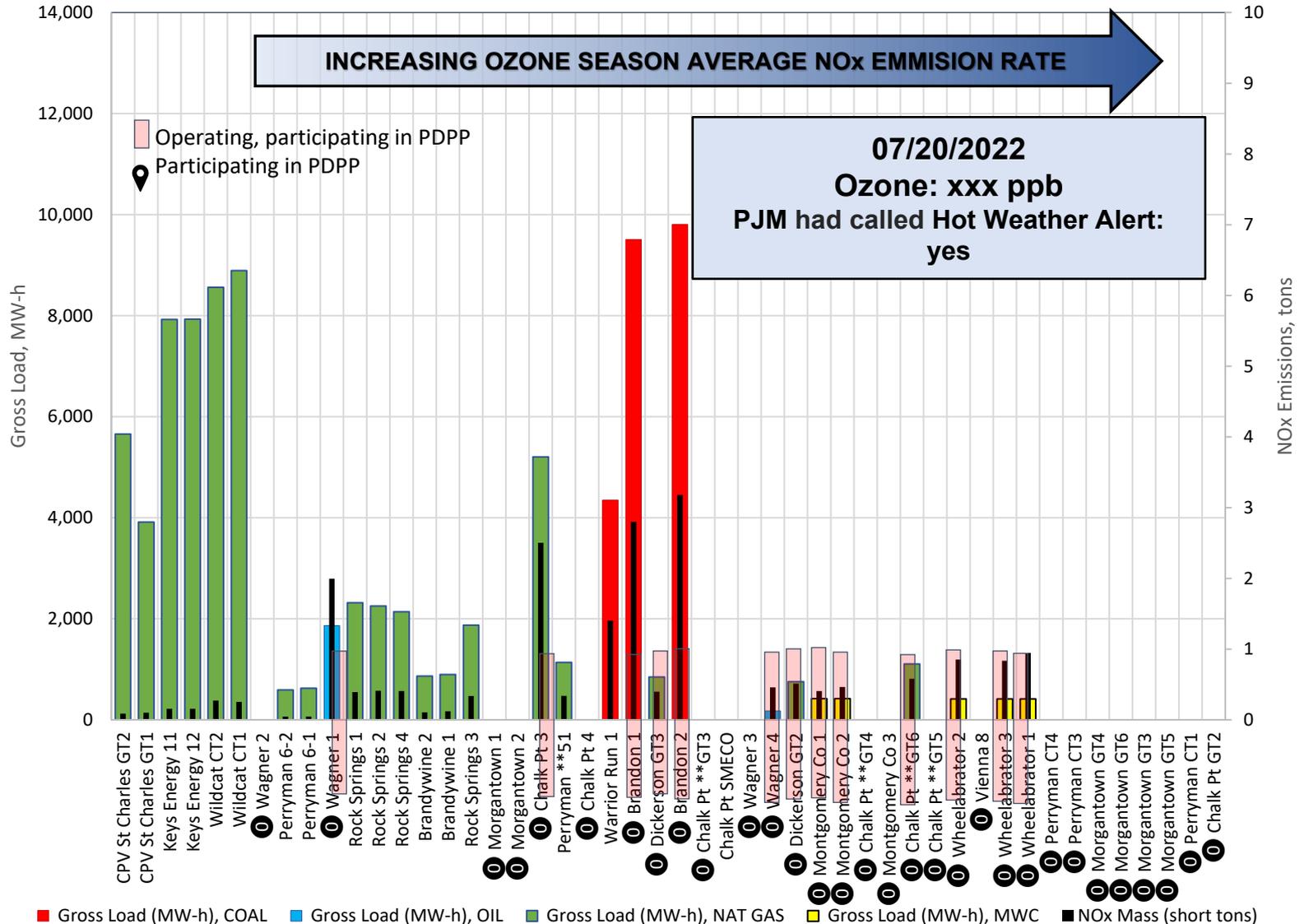
# July 20 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	135 ppm	
Unit 2	24 hours	144 ppm	2.64 tons of NOx
Unit 3	24 hours	122 ppm	
MCRFF			Facility-wide total:
Unit 1	24 hours	67 ppm	
Unit 2	24 hours	82 ppm	0.87 tons of NOx



# July 20 - Are the Right Units Running?





# Peak Day Ozone: Day Ahead

## July 20<sup>th</sup> Near Exceedance (Wednesday)



Near record warmth was recorded at BWI on the 20<sup>th</sup>

as high pressure set up across the SE US. There was little time to deteriorate the regional air mass however as the high pressure only set up the day prior. High elevation ozone monitors were generally in the 40s ppb. Otherwise an idealized situation given northwest trajectories and winds weak enough to get recirculation from the Bay. A hotspot in the TRPOMOI NO<sub>2</sub> was noted across the Baltimore area. The Hazard Mapping System again analyzed smoke over the area due to fires across south central Canada and the Pacific Northwest. This day, like others this year, were difficult to determine if and how much the potential smoke came into play. Surface PM<sub>2.5</sub> concentrations were in the Good AQI range across the entire state.

Ozone levels spiked, particularly around Essex due to the Baltimore recirculation. 5 hours of ozone measuring above 70ppb was not enough to push ozone to exceedance level thresholds. The max 8-hr ozone squeaked just under at 69ppb. Numerous ozone exceedance were noted however across PA,NJ and extending northeast into NY and CT.

### Summary

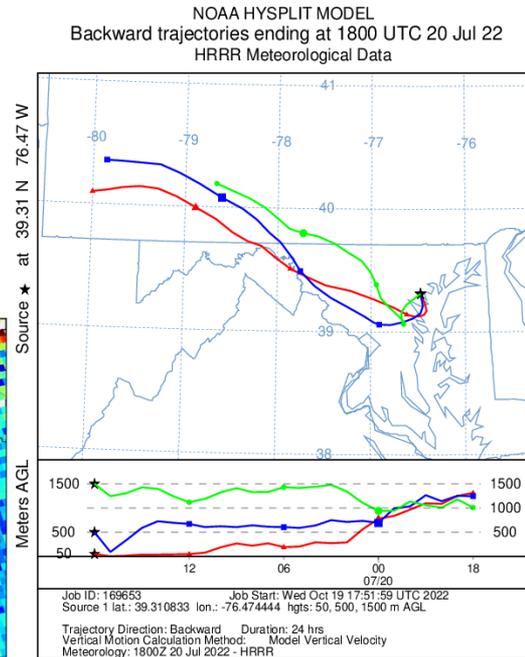
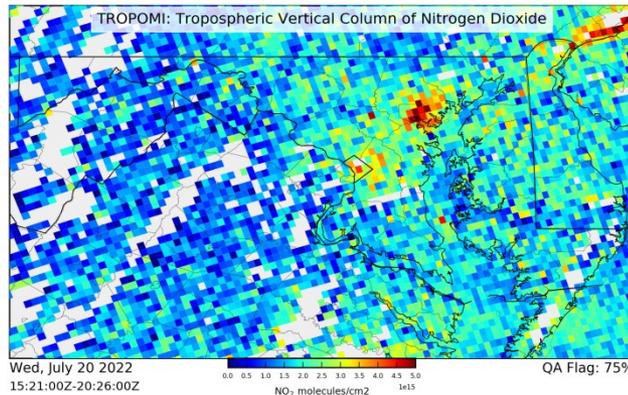
**Forecast: 72 ppb**

**Observed: Essex: 69 ppb**

### Weather

- 95°F High Temperature at BWI
- Avg sfc winds WNW/Bay Influenced @ ~5mph
- Mostly Sunny

**Did Not Verify**  
**Did EGUs do anything?**





# August 3 Operational Data

## Units That Did Not Run

Unit	Comment
Wagner Units 1, 2, 3 & 4	Did Not Operate
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5 & 6	Did Not Operate
Chalk Unit 4	Did Not Operate
Chalk Point GT2, 5 & 6	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
Wheelabrator Unit 2	Did Not Operate
MCRFF Unit 1	Did Not Operate

**- 19 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**



# August 3 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	?	0.05 lb/mmBTU	Incomplete data
Brandon Unit 2	?	0.06 lb/mmBTU	Incomplete data
Chalk Unit 3	19 hours	0.09 lb/mmBTU	Unit began the day in startup
Chalk Point GT3	3 hours	0.08 lb/mmBTU	0.0011 tons of NOx
Chalk Point GT4	3 hours	0.08 lb/mmBTU	0.0630 tons of NOx
Dickerson GT2	4 hours	0.11 lb/mmBTU	0.225 tons of NOx
Dickerson GT3	4 hours	0.08 lb/mmBTU	0.157 tons of NOx
Vienna 8	14 hours	0.21 lb/mmBTU	Operated for testing purposes



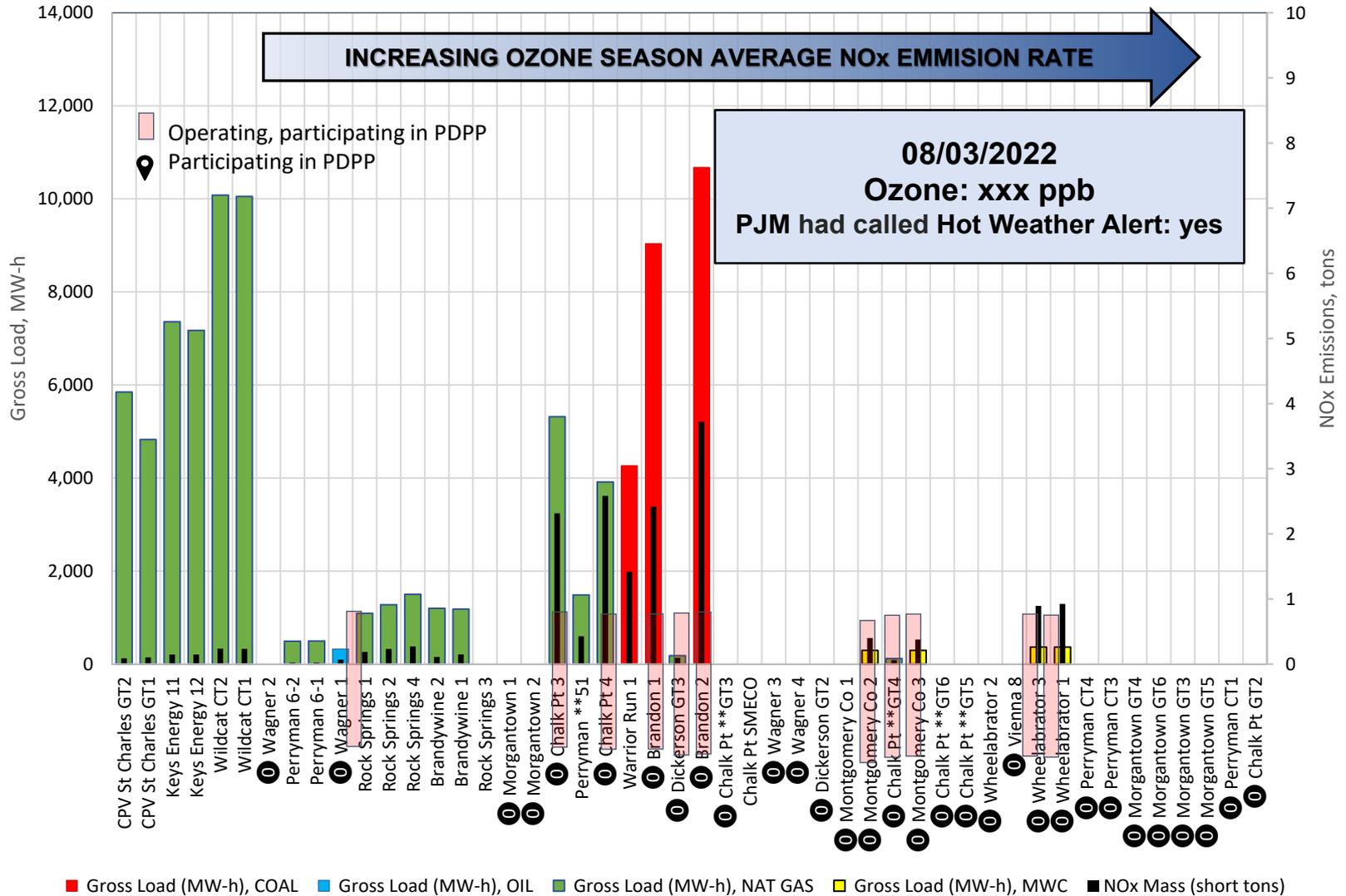
# August 3 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 3	24 hours 24 hours	140 ppm 140 ppm	Facility-wide total:  1.81 tons of NOx
MCRFF Unit 2 Unit 3	24 hours 24 hours	75 ppm 65 ppm	Facility-wide total:  0.78 tons of NOx



# August 3 - Are the Right Units Running?





# Peak Day Ozone: Day Ahead

## August 3<sup>rd</sup> (Wednesday)

## Did Not Verify Did EGUs do anything?



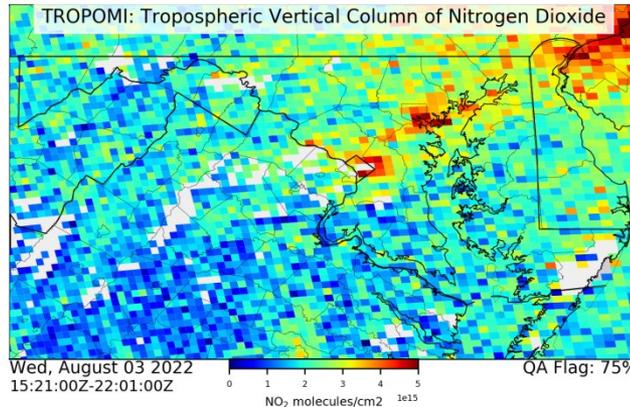
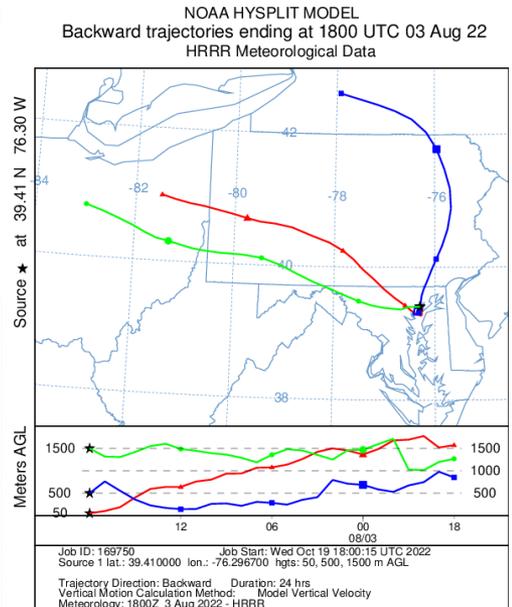
### Summary

**Forecast: 71 ppb**

**Observed: Edgewood: 64 ppb**

### Weather

- 94°F High Temperature at BWI
- Avg sfc winds W / Bay Influenced @ 3-5mph
- Partly Sunny



Day two of intense heat across the Maryland and the Mid-Atlantic with near record highs recorded. Surface high pressure at this point in time was across the Southeastern US which provided Maryland with a ideal NW arching trajectory in terms of transport. Surface winds weak enough to develop Bay Breezes and recirculation from Baltimore. Regionally, in terms of ozone, the air mass was still fairly clean at this point in time. High elevation ozone monitors were generally in the low 40s ppb. Ozone was certainly more locally driven around Baltimore. A hot spot in vertical column NO<sub>2</sub> was noted on the TROPOMI satellite around the Baltimore port area. It should be noted that the Hazard Mapping System did analyze smoke over Maryland but similar to other episodes this year, it either remained aloft or had minimal impact on surface concentrations. In the end, most locations remained fairly clean with the exception being downwind of the Baltimore plume (Edgewood @ 64ppb). It was still not enough however to push ozone to USG threshold. Only one monitor in OTC saw USG (CT).



# August 4 Operational Data

## Units That Did Not Run

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Unit	Comment
Wagner Units 1, 2, 3 & 4	Did Not Operate
Morgantown Units 1 & 2	Did Not Operate
Morgantown GT3, 4, 5 & 6	Did Not Operate
Chalk Point GT2, 4, 5 & 6	Did Not Operate
Dickerson GT2	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 & 4	Did Not Operate
Wheelabrator Unit 2	Did Not Operate

**- 20 of 31 units did not operate**

**CSPs did not dispatch demand response customers or call for test operations**



# August 4 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	?	0.05 lb/mmBTU	Incomplete data
Brandon Unit 2	?	0.07 lb/mmBTU	Incomplete data
Chalk Unit 3	24 hours	0.08 lb/mmBTU	Unit began the day in startup
Chalk Unit 4	22 hours	0.10 lb/mmBTU	Unit began the day in startup
Chalk Point GT3	3 hours	0.08 lb/mmBTU	0.062 tons of NOx
Dickerson GT3	4 hours	0.08 lb/mmBTU	0.133 tons of NOx



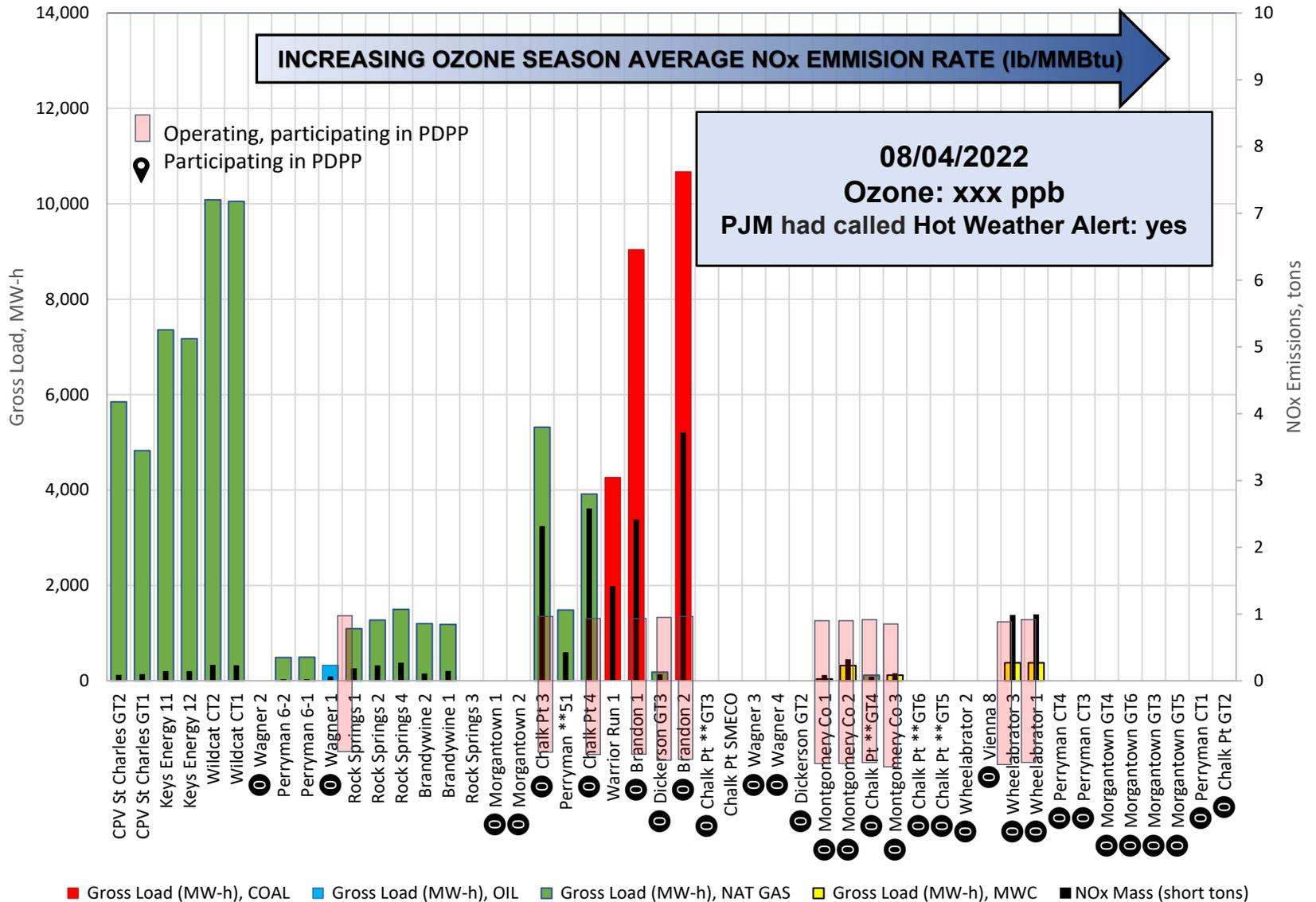
# August 4 Operational Data

## Units That Ran

Unit	Duration	Rate	Comment
Wheelabrator Unit 1 Unit 3	24 hours 24 hours	141 ppm 140 ppm	Facility-wide total:  1.97 tons of NOx
MCRFF Unit 1 Unit 2 Unit 3	3 hours 24 hours 9 hours	119 ppm 62 ppm 55 ppm	Facility-wide total:  0.524 tons of NOx



# August 4 - Are the Right Units Running?





# Peak Day Ozone: Day Ahead

## August 4<sup>th</sup> Near Exceedance (Thursday)



### Summary

**Forecast:** 75 ppb

**Observed:** Lake

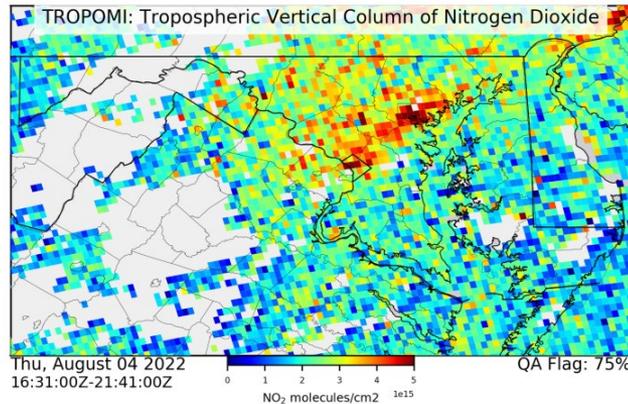
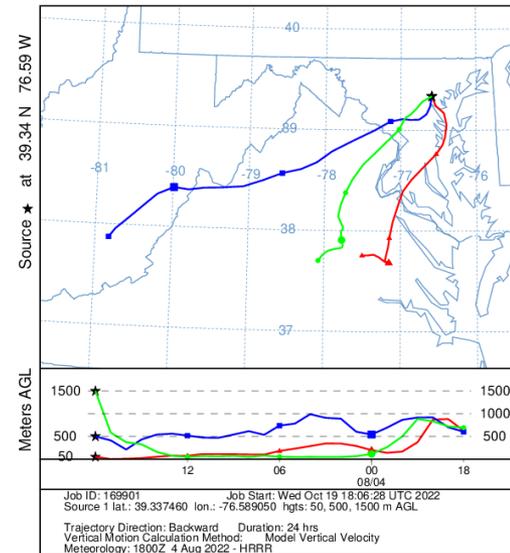
Montebello: 69 ppb

### Weather

- 99°F\* High Temperature at BWI
- Avg sfc winds S @ ~5mph
- Partly Sunny

**Did Not Verify**  
**Did EGUs do anything?**

NOAA HYSPLIT MODEL  
Backward trajectories ending at 1800 UTC 04 Aug 22  
HRRR Meteorological Data



Third day in a row of intense heat with a record set at BWI of 99F. Strong Bermuda high set up off the coast providing a warm southerly flow. The regional air mass was deteriorating over this time period as daily maximum ozone levels climbed each day across the state. High measurements were noted in the TROPOMI vertical column  $\text{NO}_2$ , particularly Baltimore/DC and the I-95 corridor. Once again, the Hazard Mapping System analyzed smoke over the state but did not correlated to any significant bump in ozone. Surface  $\text{PM}_{2.5}$  concentrations were in the Good range statewide.

Despite favorable meteorology, most of the ozone monitors across the state remained relatively low with the exception of the I-95 corridor and the immediate Baltimore area, specifically Lake Montebello. The Lake Montebello monitor saw a 3-hour period with ozone concentrations well in excess of 80 ppb (87, 89 & 86). Despite this period of high ozone, it was not enough to push ozone to USG for a maximum 8-hour average. No ozone monitors across the Mid-Atlantic saw USG, although several were noted in CT.