



**GEORGIA**  
DEPARTMENT OF NATURAL RESOURCES

ENVIRONMENTAL PROTECTION DIVISION

# GA EPD Perspective on EPA's Proposed PM NAAQS

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Chief, Air Protection Branch

**AAPCA 2023 Spring Meeting**  
Oklahoma City, OK  
April 5, 2023

Chartered CASAC Member: 2017 - present



# PM NAAQS - OUTLINE

- **EPA's Proposed PM NAAQS**
- **State Requirements**
- **PM<sub>2.5</sub> in Georgia**
- **Georgia EPD Comments**



# EPA'S PROPOSED PM NAAQS



# RIDDLE

- It is contained in EPA's proposed annual  $PM_{2.5}$  NAAQS.
- The majority of the CASAC find it high.
- The minority of the CASAC find it low.
  
- What am I?



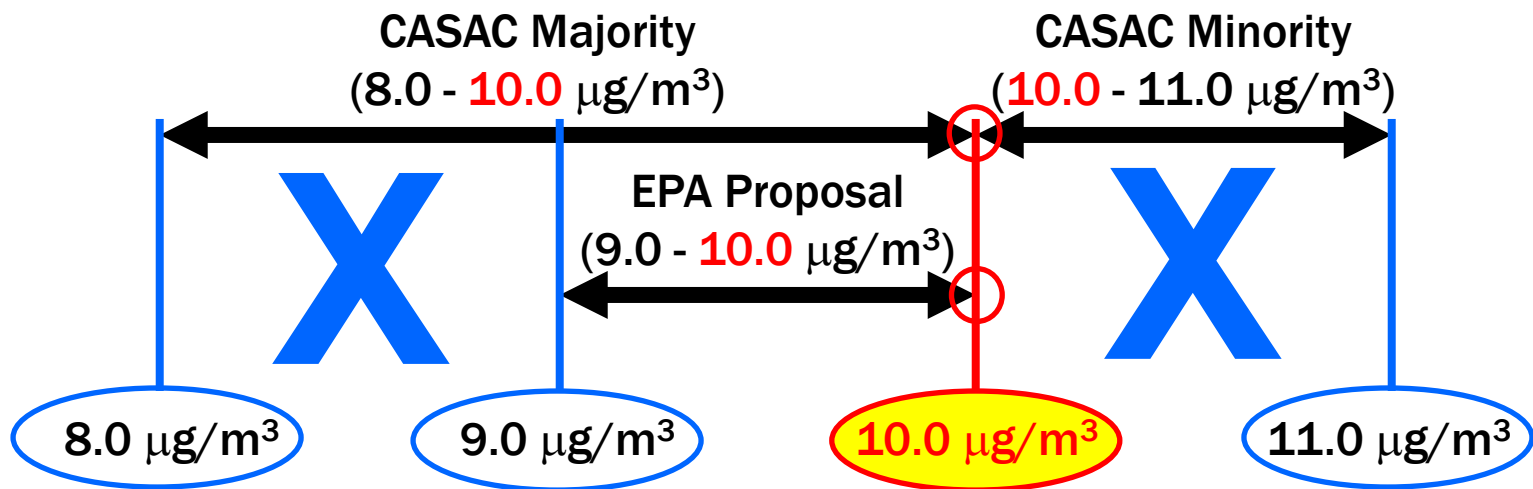
# RIDDLE

- It is contained in EPA's proposed annual  $\text{PM}_{2.5}$  NAAQS.
- The majority of the CASAC find it high.
- The minority of the CASAC find it low.
  
- What am I?

**$10 \mu\text{g}/\text{m}^3$**



# CASAC RECOMMENDATION



- 10.0  $\mu\text{g}/\text{m}^3$  is the only value in the range of 9.0 – 10.0 that was supported by all seven members of the chartered CASAC.
- Setting the annual  $\text{PM}_{2.5}$  concentration any lower than 10.0  $\mu\text{g}/\text{m}^3$  would not have consensus support from the full chartered CASAC.



# STATE REQUIREMENTS



# DESIGNATIONS SCHEDULE

- **State's Designation Recommendations**
  - One year after effective date of new NAAQS
    - Early 2025?
  - Likely based on **2021-2023** PM<sub>2.5</sub> data
- **EPA's Final Designations**
  - Two years after effective date of new NAAQS
    - Early 2026?
  - Likely based on **2022-2024** PM<sub>2.5</sub> data





# STATE IMPLEMENTATION PLANS (SIPs)

- All areas designated nonattainment must submit an **Attainment SIP to EPA**
  - Base EI, Future EI, Control Strategy, Attainment Modeling, RFP, MVEBs, Quantitative Milestones, Contingency Measures, and Nonattainment NSR Plan
  - “Moderate” attainment date: 6 years after designations
  - **Due 18 months after effective date of designations**
- All states must submit an **Infrastructure SIP**
  - Documents the state’s ability to implement, maintain, and enforce the new NAAQS
  - Includes monitoring, permitting, and enforcement
  - Includes interstate transport, aka “Good Neighbor SIP”
  - **Due 3 years after the effective date of new NAAQS**



# CONFORMITY REQUIREMENTS

- **Transportation Conformity**
  - Demonstrate that federally funded transportation projects will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS
- **General Conformity**
  - Demonstrate that actions taken by federal agencies do not interfere with a state's plans to attain and maintain the NAAQS.
    - Low-income housing (HUD) and airports (FAA)



# PERMITTING REQUIREMENTS

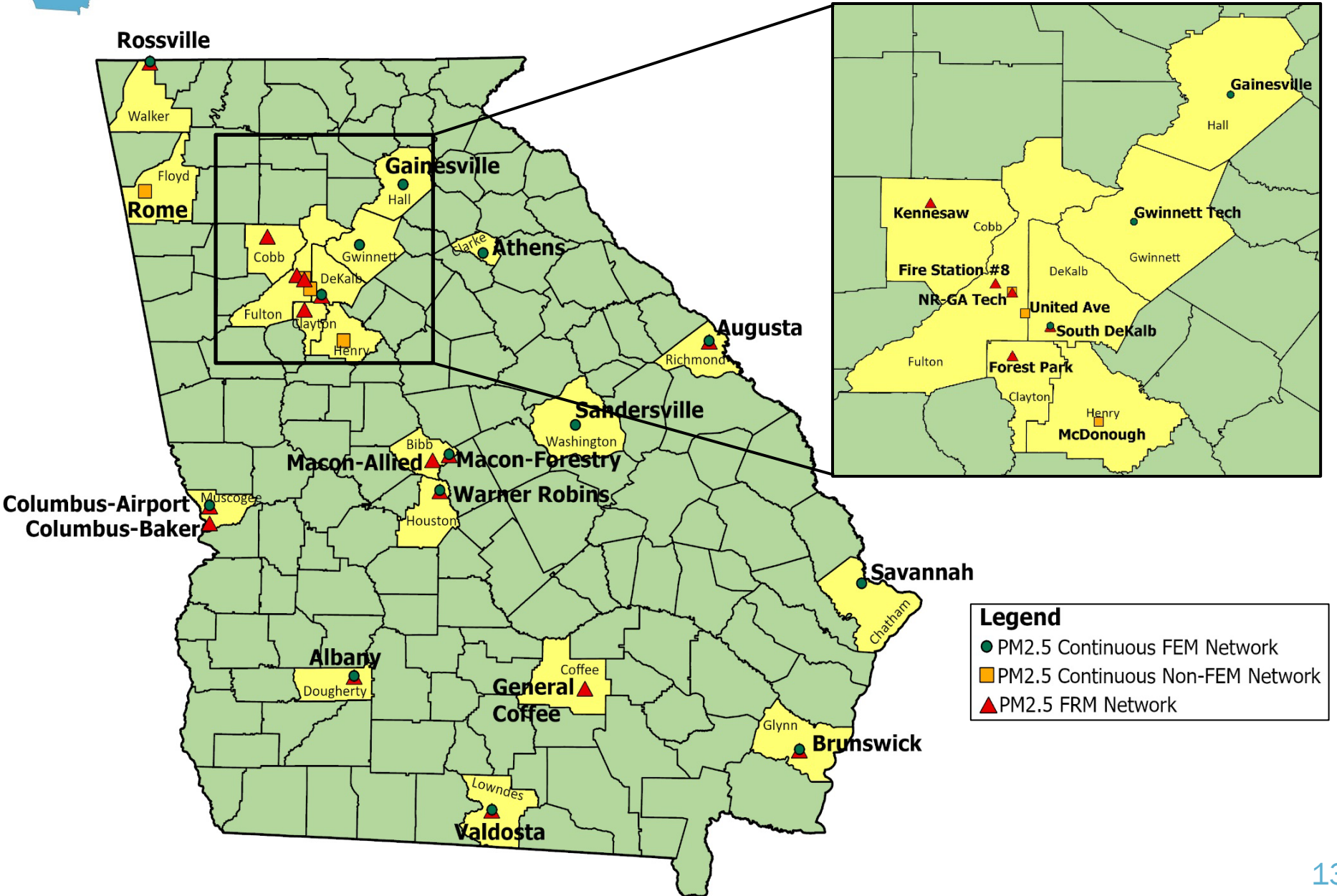
- **Nonattainment Areas**
  - $PM_{2.5}$ ,  $SO_2$ ,  $NO_x$ ,  $VOC$ ,  $NH_3$
  - RACM/RACT (existing sources)
  - LAER (new sources)
  - Emission offsets
- **Attainment Areas**
  - It will be more difficult to pass cumulative PSD permit modeling for  $PM_{2.5}$
- **Can have a significant impact on economic development**



# PM<sub>2.5</sub> IN GEORGIA



# PM<sub>2.5</sub> MONITOR LOCATIONS





# 2021 PM<sub>2.5</sub> DATA

<b>MSA</b>	<b>Annual (µg/m<sup>3</sup>)</b>	<b>Daily (µg/m<sup>3</sup>)</b>
Macon	9.8	24.0
Savannah	10.1	22.0
Athens	10.1	24.7
General Coffee	6.8	15.2
Albany	10.1	30.3
Brunswick	7.7	17.7
Atlanta	9.7	22.5
Gainesville	9.1	20.8
Warner Robins	9.6	25.9
Valdosta	8.5	17.5
Columbus	11.1	35.1
Augusta	12.1	38.2
Chattanooga	10.4	28.0
Sandersville	10.7	25.8

2021 values will be included in 2019-2021 DVs, 2020-2022 DVs, and 2021-2023 DVs.

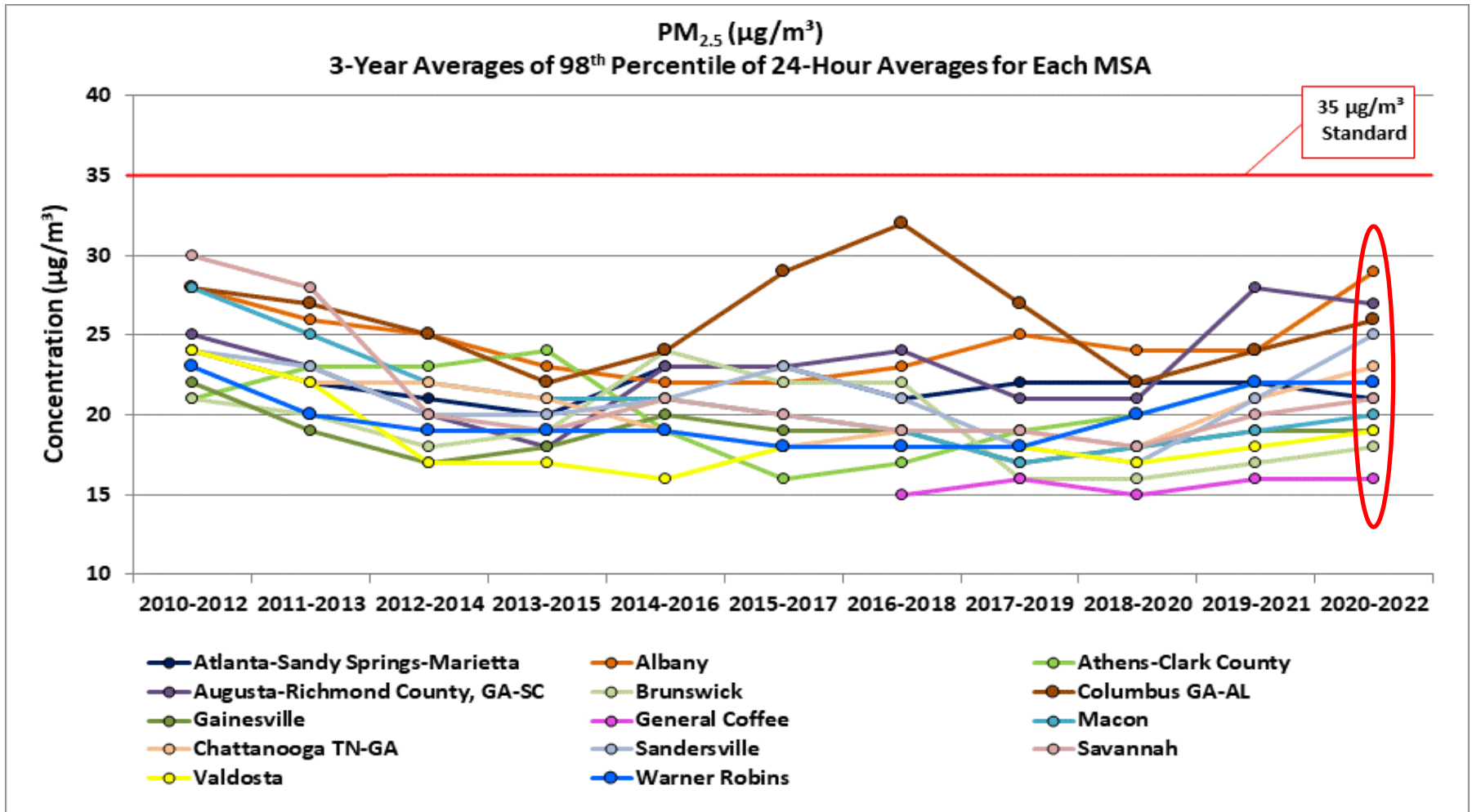


## “PRIMARY” FRM DATA

- In early 2022, we updated our PM<sub>2.5</sub> monitoring network at Albany, Augusta, and Columbus
  - For these PM<sub>2.5</sub> monitors, we are now collecting daily FRM measurements as our “primary” method for comparison to the NAAQS.
  - The co-located FEMs have been reclassified as Special Purpose Monitors which can’t be used for NAAQS attainment determinations.
- Currently considering additional changes to the monitoring network.



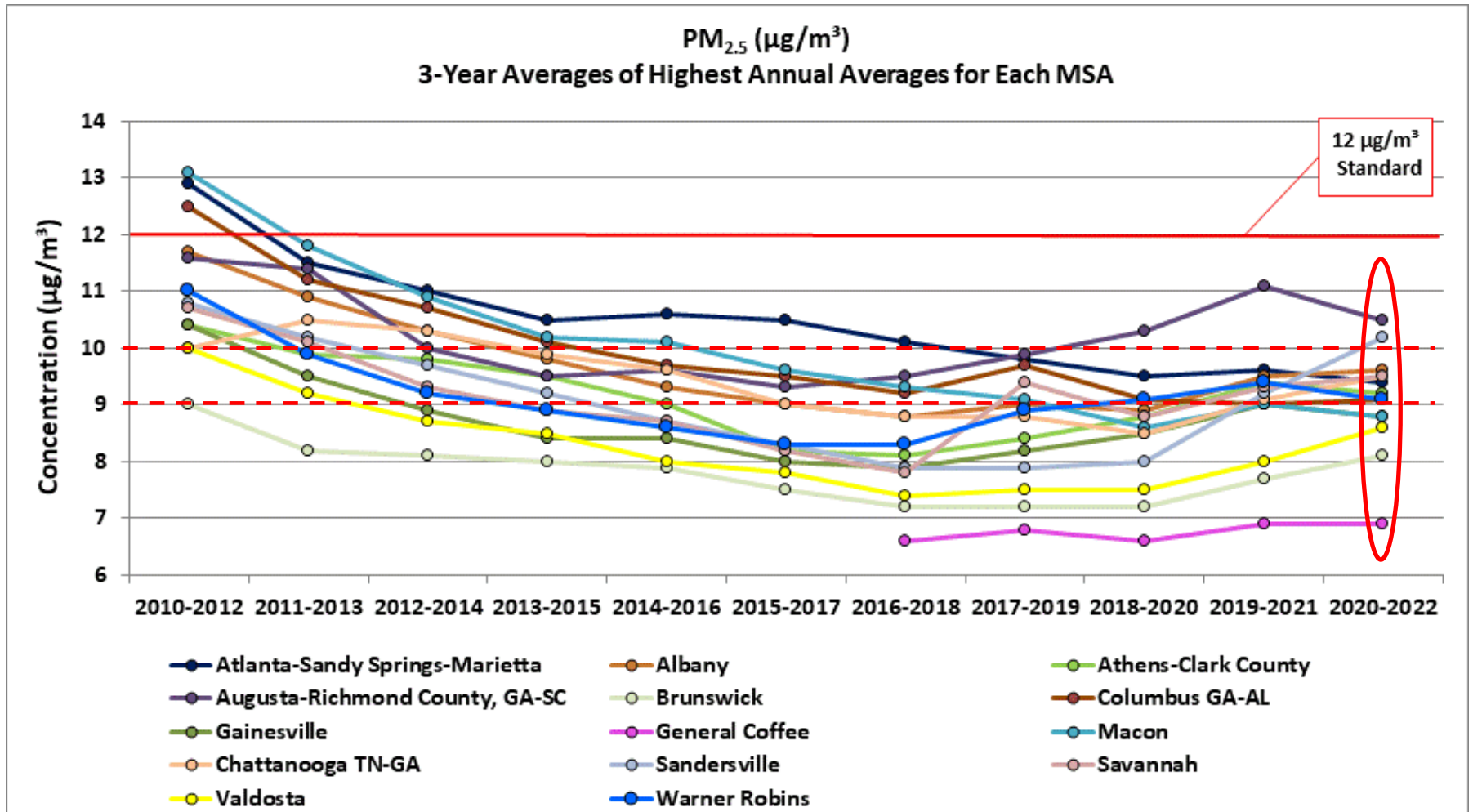
# DAILY PM<sub>2.5</sub> DESIGN VALUE TRENDS





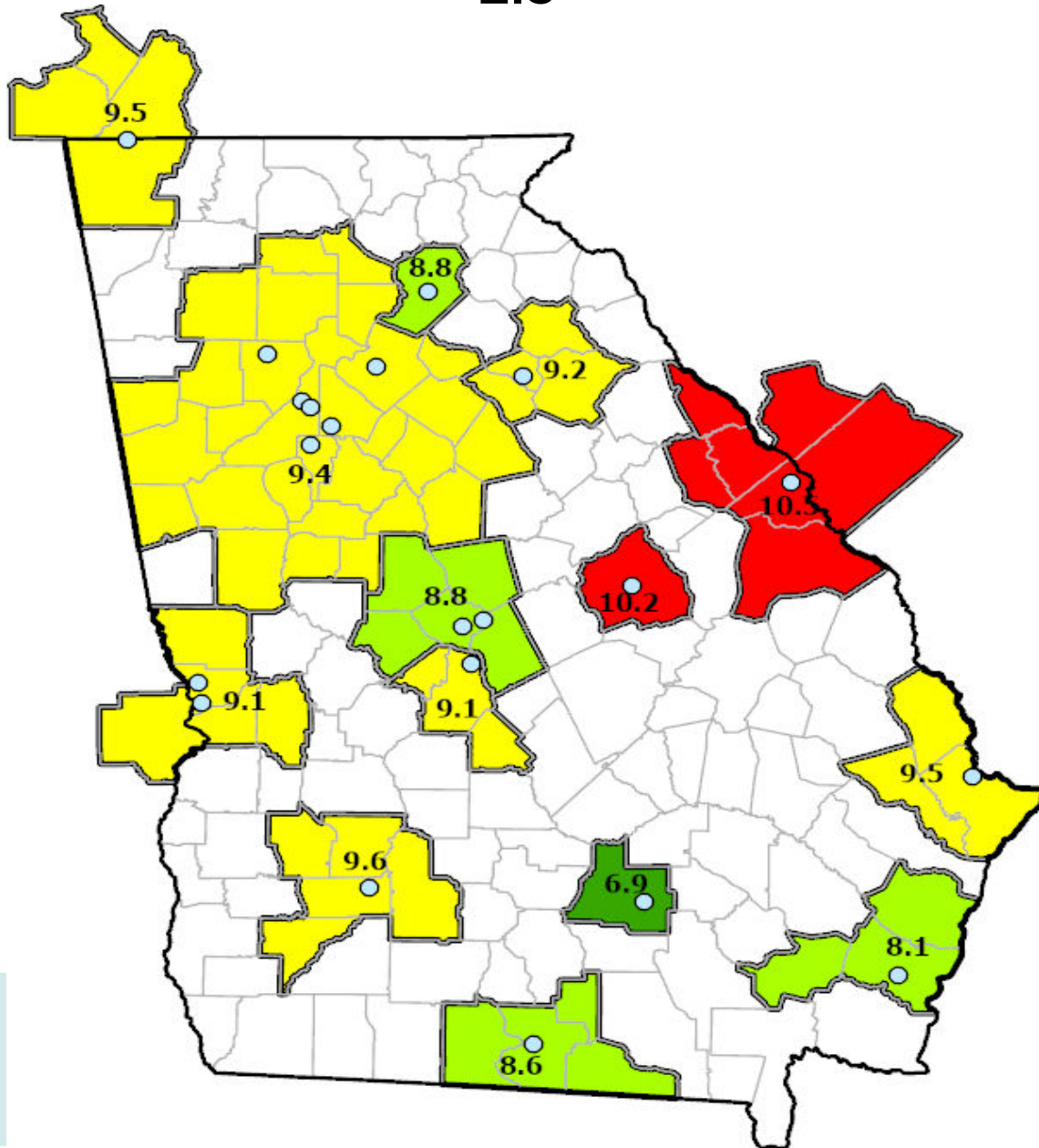


# ANNUAL PM<sub>2.5</sub> DESIGN VALUE TRENDS





# 2022 ANNUAL PM<sub>2.5</sub> DESIGN VALUES





# **GEORGIA EPD COMMENTS**

**(14 pages and 7 Appendices)**



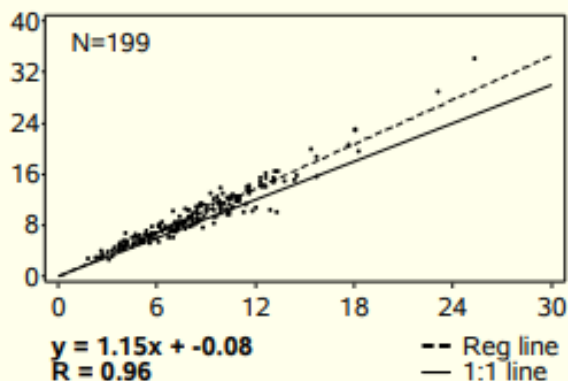
# FEM vs. FRM IN AUGUSTA

## PM<sub>2.5</sub> Continuous Monitor Comparability Assessment

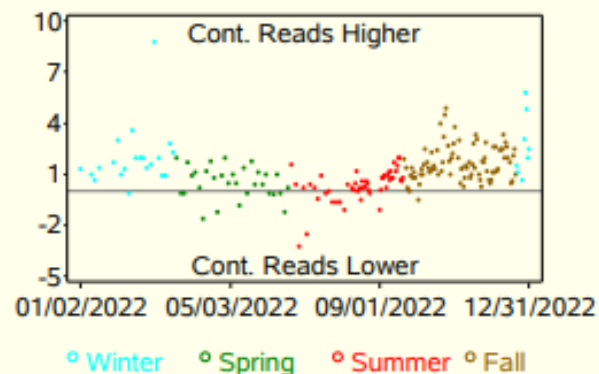
Site 13-245-0091: Augusta, GA

FRM: R & P Model 2025 PM-2.5 Sequential Air Sampler w/VSCC - Gravimetric (120,145), PM2.5 - Local Conditions (88101), POC=1,2  
Cont: Teledyne T640X at 16.67 LPM - Broadband spectroscopy (238), PM2.5 - Local Conditions (88101), POC=4

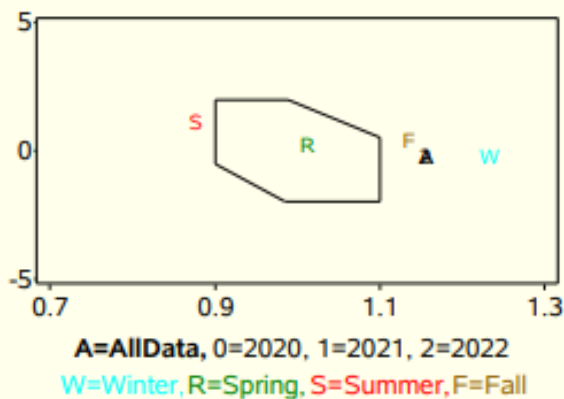
Cont. (y) vs. FRM (x) ( $\mu\text{g}/\text{m}^3$ )



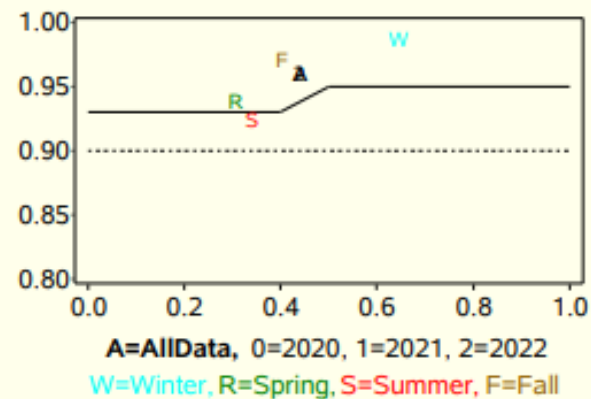
Cont. minus FRM ( $\mu\text{g}/\text{m}^3$ )



Additive (y) vs. Multiplicative (x) Bias



R (y) vs. FRM CCV (x)





# FEM BIAS ADJUSTMENT APPROACHES

- **The Georgia EPD bias adjustment approaches include three steps:**
  - 1. Calculate bias adjustment factors (BAFs)**
    - Method 1 calculates “Annual” BAFs
    - Method 2 calculates “Quarterly” BAFs
    - Method 3 calculates “Hi/Low” BAFs
  - 2. Calculate adjusted 24-hour FEM concentrations using BAFs**
  - 3. Calculate updated design values using adjusted 24-hour FEM concentrations**



# METHOD 1 - ANNUAL BAFs

$$BAF_{Method1} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ in\ 2018-2022}} \right)$$

- For site specific Annual BAFs, only paired concentrations that were measured by both the collocated FRM and FEM on the same day at the specific site were used in the calculation.
- For the statewide network Annual BAF, all paired concentrations that were measured by both the collocated FRM and FEM on the same day at all sites in the state were used in the calculation.



# METHOD 2 - QUARTERLY BAFs

$$BAF_{Method2\_Q1} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ for\ Q1\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ for\ Q1\ in\ 2018-2022}} \right)$$

$$BAF_{Method2\_Q2} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ for\ Q2\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ for\ Q2\ in\ 2018-2022}} \right)$$

$$BAF_{Method2\_Q3} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ for\ Q3\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ for\ Q3\ in\ 2018-2022}} \right)$$

$$BAF_{Method2\_Q4} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ for\ Q4\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ for\ Q4\ in\ 2018-2022}} \right)$$

- Although not presented here, Method 2 could easily be updated to calculate “Seasonal” BAFs rather than “Quarterly” BAFs.



# METHOD 3 – HI/LOW BAFs

$$BAF_{Method3_{<20}} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ where\ paired\ FEM \leq 20\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ where\ FEM \leq 20\ in\ 2018-2022}} \right)$$

$$BAF_{Method3_{\geq 20}} = \left( \frac{\sum_1^n FRM_{all\ collocated\ paired\ data\ where\ paired\ FEM > 20\ in\ 2018-2022}}{\sum_1^n FEM_{all\ collocated\ paired\ data\ where\ FEM > 20\ in\ 2018-2022}} \right)$$

- For site specific Annual BAFs, only paired concentrations that were measured by both the collocated FRM and FEM on the same day at the specific site were used in the calculation.
- For the statewide network Annual BAF, all paired concentrations that were measured by both the collocated FRM and FEM on the same day at all sites in the state were used in the calculation.





# COMPARISON OF BAF RESULTS

Site Name (AQS ID)	Method 1	Method 2				Method 3	
	Annual	Q1	Q2	Q3	Q4	≤ 20	> 20
Albany (13-095-0007)	0.81	0.76	0.81	0.83	0.79	0.81	0.77
Athens (13-059-0002)	0.72	0.63	0.79	0.81	0.69	0.72	N/A**
Augusta (13-245-0091)	0.84	0.78	0.87	0.91	0.82	0.84	0.77
Brunswick (13-127-0006)	0.80	0.77	0.90	0.84	0.78	0.81	0.75
Columbus-Airport (13-215-0008)	0.83	0.76	0.91	0.90	0.79	0.83	0.77
Gainesville (13-139-0003)	0.86	0.83	0.91	0.84	0.71	0.86	N/A**
Gwinnett Tech (13-135-0002)	0.80	0.76	0.85	0.79	0.77	0.80	0.73
Macon-SE (13-021-0012)	0.84	0.81	0.88	0.88	0.78	0.84	0.78
Rossville (13-295-0004)	0.82	0.78	0.89	0.86	0.78	0.83	0.79
Savannah-L&A (13-051-1002)*	0.82	0.78	0.85	0.87	0.79	0.82	0.78
Sandersville (13-303-0001)*	0.82	0.78	0.85	0.87	0.79	0.82	0.78
South DeKalb (13-089-0002)	0.85	0.79	0.86	0.93	0.83	0.85	0.85
Valdosta (13-185-0003)	0.79	0.71	0.83	0.78	0.78	0.77	0.76
Warner Robins (13-153-0001)	0.78	0.76	0.81	0.79	0.75	0.78	0.73
<b>Statewide Network</b>	<b>0.82</b>	<b>0.78</b>	<b>0.85</b>	<b>0.87</b>	<b>0.79</b>	<b>0.82</b>	<b>0.78</b>

\*These sites did not have any FRM measurements and used the “Statewide Network” BAFs.

\*\*N/A: no values greater than 20.



## STEP 2 – ADJUST FEM CONCENTRATIONS

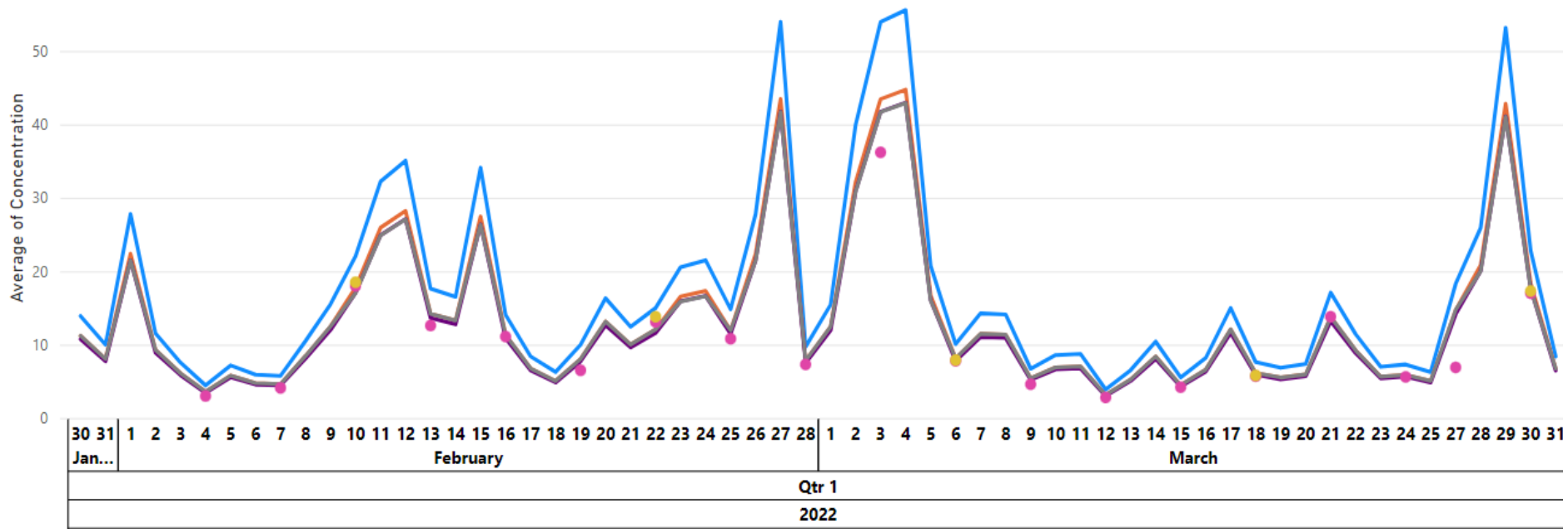
- After BAFs are developed, they can be applied to the original 24-hour FEM PM<sub>2.5</sub> concentration to calculate the adjusted 24-hour FEM PM<sub>2.5</sub> concentrations using the following equation:

$$FEM_{ADJUSTED \text{ daily avg}} = BAF_{Method} \times FEM_{ORIGINAL \text{ daily avg}}$$

- Although not presented here, the BAFs could be applied to the original hourly FEM PM<sub>2.5</sub> concentrations to calculate adjusted hourly FEM PM<sub>2.5</sub> concentrations which could be submitted directly to AQS.



# ALBANY FEM ADJUSTMENTS - 2022





# STEP 3 – UPDATE DESIGN VALUES

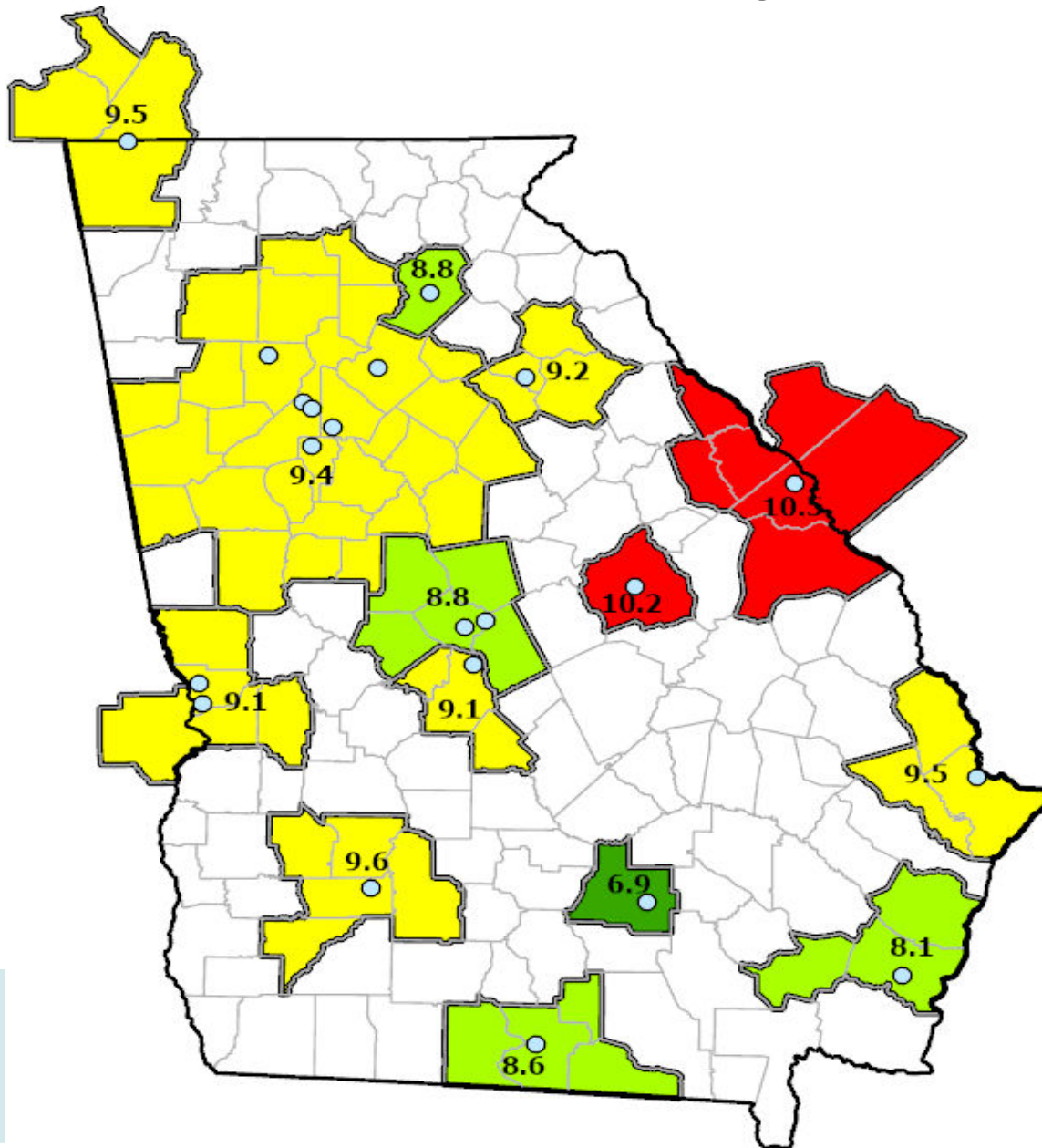
Site Name (AQS ID)	Original 2022 DV	Method 1 2022 DV	Method 2 2022 DV	Method 3 2022 DV
Albany (13-095-0007)	9.6	8.6	8.6	8.6
Athens (13-059-0002)	9.2	7.4	7.4	7.4
Augusta (13-245-0091)	10.5	8.8	8.8	8.8
Brunswick (13-127-0006)	8.1	7.6	7.6	7.6
Columbus-Airport (13-215-0008)	8.5	8.2	8.1	8.1
Gainesville (13-139-0003)	8.8	7.1	7.2	7.2
Gwinnett Tech (13-135-0002)	8.8	7.1	7.2	7.2
Macon-SE (13-021-0012)	8.6	7.2	7.2	7.2
Rossville (13-295-0004)	9.5	8.4	8.5	8.4
Sandersville (13-303-0001)	10.2	8.2	8.3	8.2
Savannah-L&A (13-051-1002)	9.5	7.7	7.7	7.8
South DeKalb (13-089-0002)	9.0	8.1	8.2	8.1
Valdosta (13-185-0003)	8.6	7.5	7.5	7.5
Warner Robins (13-153-0001)	9.1	7.6	7.6	7.6

*\*Georgia EPD has seven sites that only monitor PM<sub>2.5</sub> with FRM samplers. These sites are not included in this table.*

The design values calculated with Methods 1, 2, and 3 should be considered valid DVs for regulatory purposes and States should be allowed to use them in their designation recommendations to EPA.

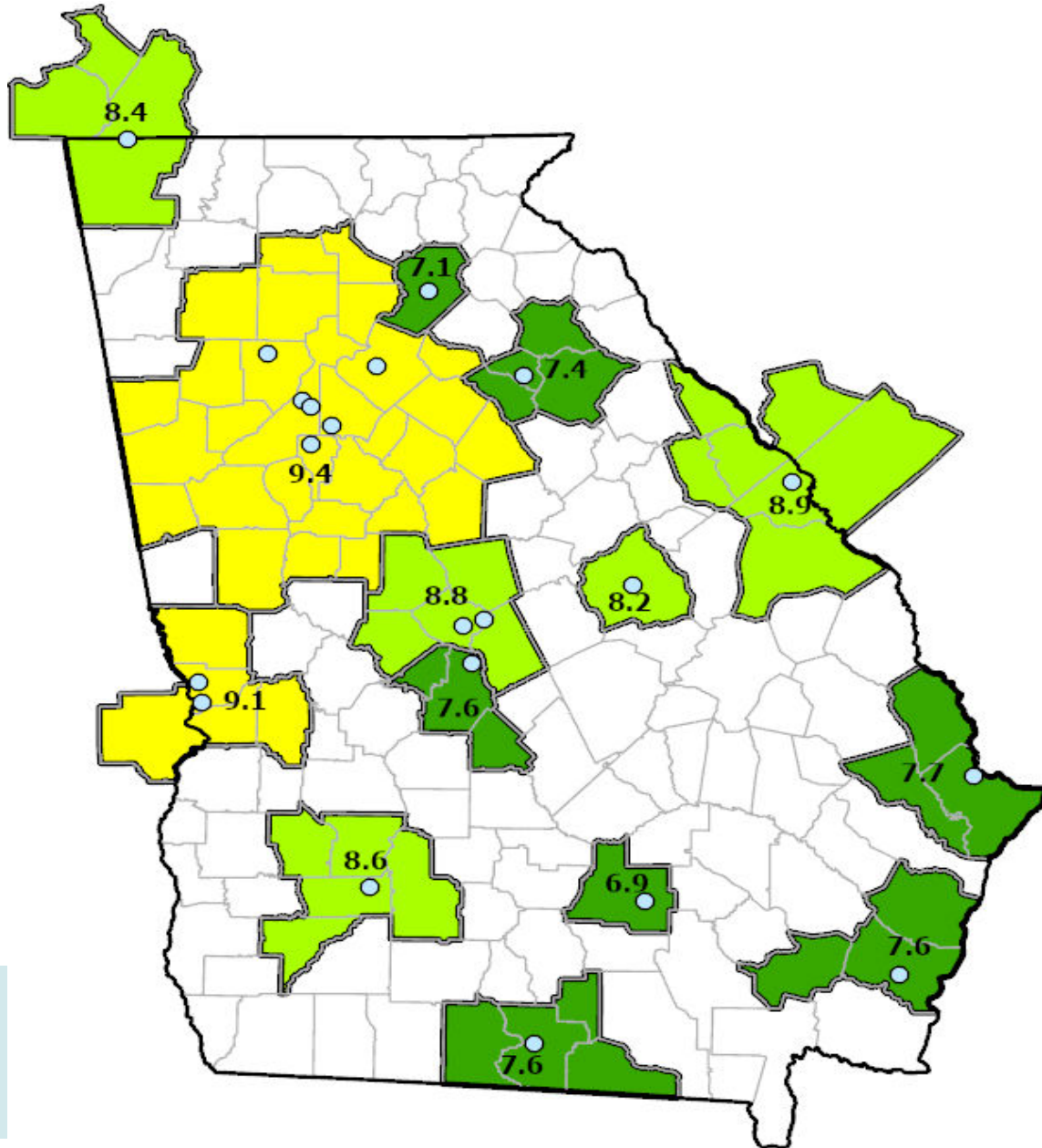


# 2022 ANNUAL PM<sub>2.5</sub> DVs





# 2022 UPDATED ANNUAL PM<sub>2.5</sub> DVs





# EXCEEDANCE REPORTS

- GA EPD writes detailed reports for every exceedance of the NAAQS ( $O_3$ ,  $PM_{2.5}$ ,  $SO_2$ , Pb).
  - INITIAL REPORT
    - Must be completed within 2-3 business days after the exceedance.
  - FINAL REPORT
    - Submitted after all relevant information has been collected. This could be days, weeks, or months.
- Reports include discussions on meteorology, emissions, and air quality.
  - Wind rose, pollution rose, time series plots, location of emission sources, precursor analysis, HYSPLIT back trajectories, satellite images, etc....

“Exceedance” means the 24-hour  $PM_{2.5}$  measurement  $\geq 35.5 \mu\text{g}/\text{m}^3$ .  
We can have multiple exceedances without having a violation of the NAAQS.



# PM<sub>2.5</sub> EXCEEDANCES IN 2019 & 2020

Table 28. Summary of PM<sub>2.5</sub> exceedances in 2019

Date	Site Name	AQS ID	Final PM <sub>2.5</sub> Concentration	Cause of Exceedances
20190308	Gwinnett Tech	13-135-0002	<b>38.9</b>	Prescribed Fires
20190320	Warner Robins	13-153-0001	<b>37.0</b>	Prescribed Fires
20190320	Macon-Forestry	13-021-0012	<b>35.8</b>	Prescribed Fires
20190321	Warner Robins	13-153-0001	<b>58.2</b>	Prescribed Fires
20190321	Macon-Forestry	13-021-0012	<b>50.1</b>	Prescribed Fires
20191205	Sandersville	13-303-0001	<b>41.4</b>	Prescribed Fires

Table 27. Summary of PM<sub>2.5</sub> exceedances in 2020.

Date	Site Name	AQS ID	Final PM <sub>2.5</sub> Concentration	Cause of Exceedances
20200626	Albany	13-095-0007	<b>36.6</b>	Saharan dust
20200626	General Coffee	13-069-0002	<b>38.4</b>	Saharan dust
20200626	Valdosta	13-185-0003	<b>51.9</b>	Saharan dust
20200627	Albany	13-095-0007	<b>39.0</b>	Saharan dust
20200627	Augusta	13-245-0091	<b>40.7</b>	Saharan dust
20200627	Sandersville	13-303-0001	<b>39.8</b>	Saharan dust
20200627	Savannah-L&A	13-051-1002	<b>47.8</b>	Saharan dust
20200627	Warner Robins	13-153-0001	<b>40.9</b>	Saharan dust
20200705	South DeKalb	13-089-0002	<b>37.2</b>	Local Fireworks
20201104	Sandersville	13-303-0001	<b>35.5</b>	Prescribed Fires





# PM<sub>2.5</sub> EXCEEDANCES IN 2021

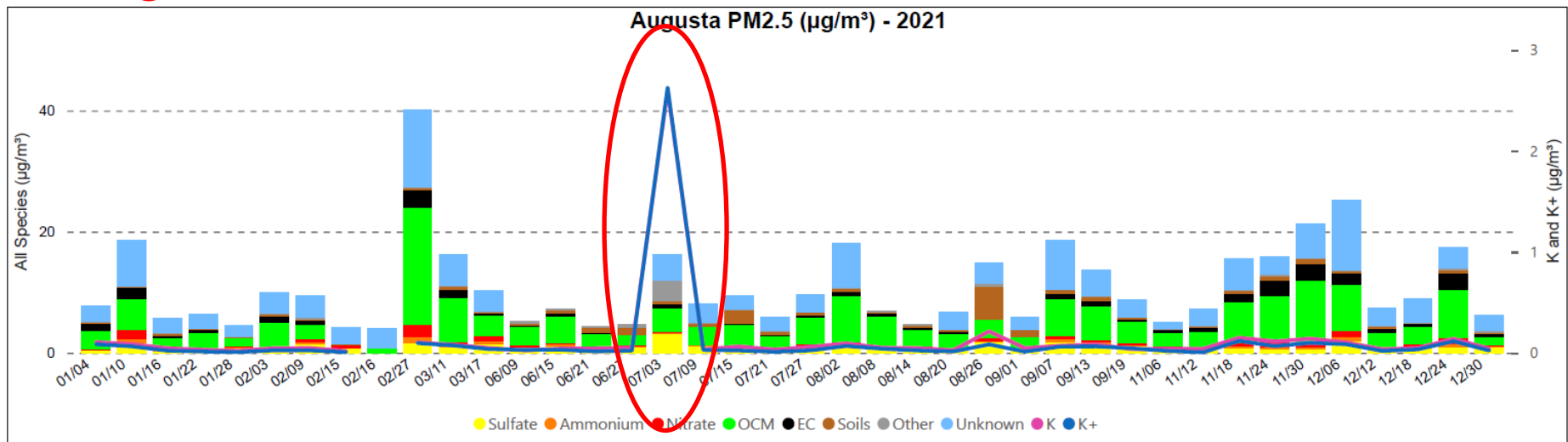
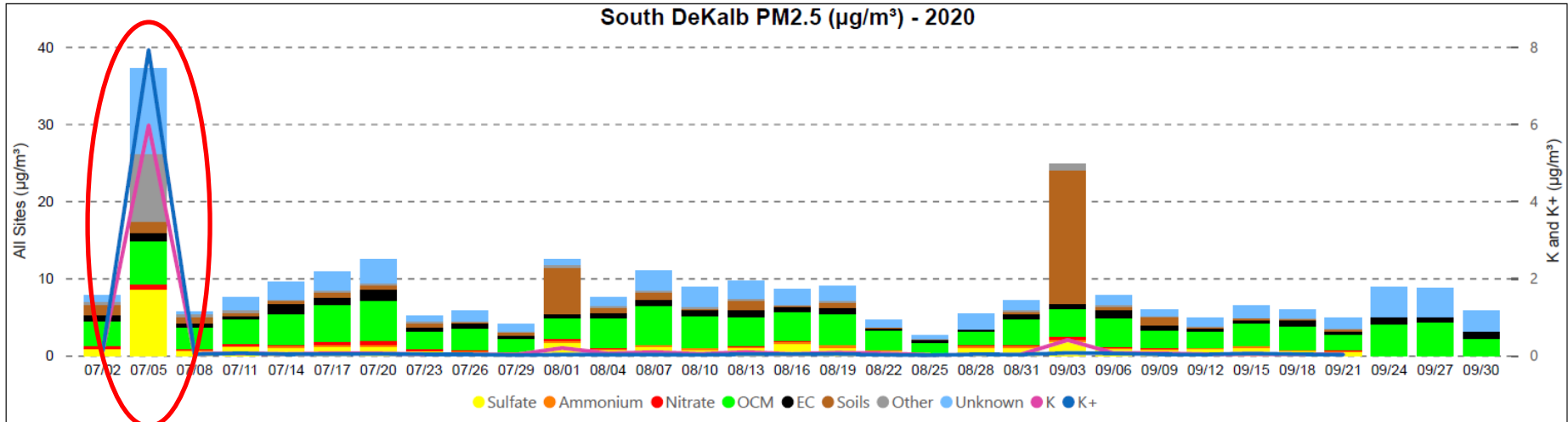
Table 27. Summary of PM<sub>2.5</sub> exceedances in 2021.

Date	Site Name	AQS ID	Final PM <sub>2.5</sub> Concentration	Cause of Exceedances
20210227	Augusta	13-245-0091	<b>40.1</b>	Prescribed Fires
20210228	Augusta	13-245-0091	<b>53.4</b>	Prescribed Fires
20210307	Warner Robins	13-153-0001	<b>36.5</b>	Prescribed Fires
20210308	Columbus-Airport	13-215-0008	<b>42.1</b>	Prescribed Fires
20210308	Columbus-Baker	13-215-0012	<b>60.7</b>	Prescribed Fires*
20210308	Macon-Forestry	13-021-0012	<b>47.7</b>	Prescribed Fires
20210309	Athens	13-059-0002	<b>38.1</b>	Prescribed Fires
20210310	Augusta	13-245-0091	<b>41.2</b>	Prescribed Fires
20210312	Albany	13-095-0007	<b>48.6</b>	Prescribed Fires
20210313	Albany	13-095-0007	<b>43.0</b>	Prescribed Fires
20210313	Sandersville	13-303-0001	<b>35.7</b>	Prescribed Fires
20210313	Warner Robins	13-153-0001	<b>37.9</b>	Prescribed Fires
20210406	Albany	13-095-0007	<b>39.2</b>	Prescribed Fires
20210407	Sandersville	13-303-0001	<b>39.6</b>	Prescribed Fires
20210408	Sandersville	13-303-0001	<b>36.5</b>	Prescribed Fires
20210704	Augusta	13-245-0091	<b>43.5</b>	Local Fireworks
20210705	Augusta	13-245-0091	<b>40.3</b>	Local Fireworks
20210705	Gwinnett Tech	13-135-0002	<b>38.3</b>	Local Fireworks
20211204	Rossville Williams St	13-295-0004	<b>39.3</b>	Prescribed Fires
20211205	Augusta	13-245-0091	<b>43.6</b>	Prescribed Fires
20211216	Augusta	13-245-0091	<b>38.2</b>	Prescribed Fires

\* For the exceedance on March 8, 2021 at the Columbus-Baker monitor, no initial report was developed due to the absence of FEM measurement. However, the exceedance was likely due to prescribed fires as elevated PM<sub>2.5</sub> concentrations were measured at the Columbus-Airport monitor.

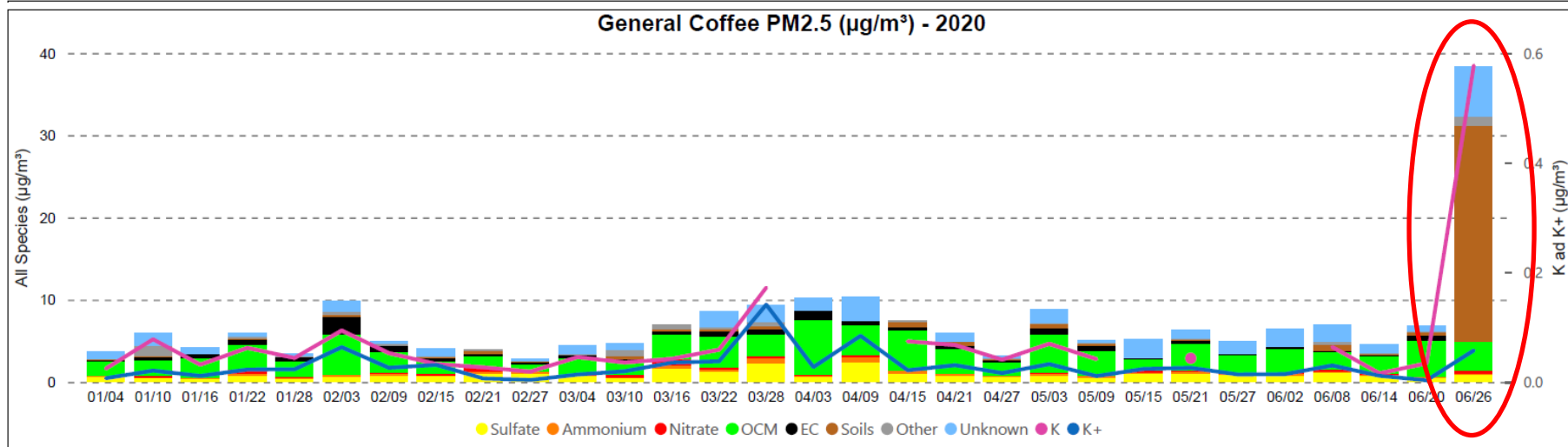
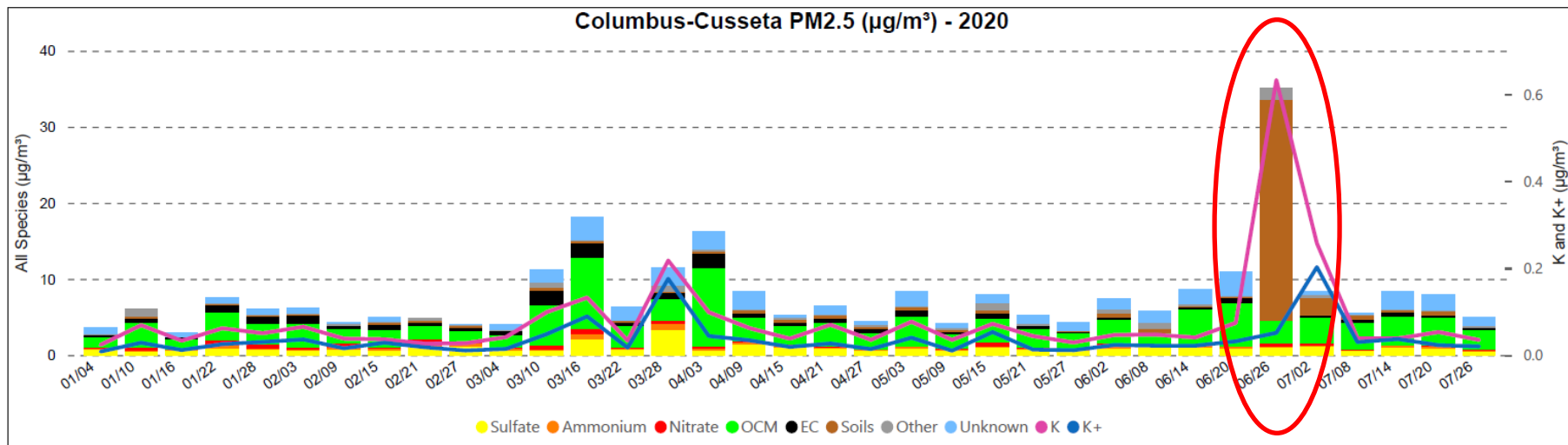


# SPECIATED PM<sub>2.5</sub> DATA - FIREWORKS



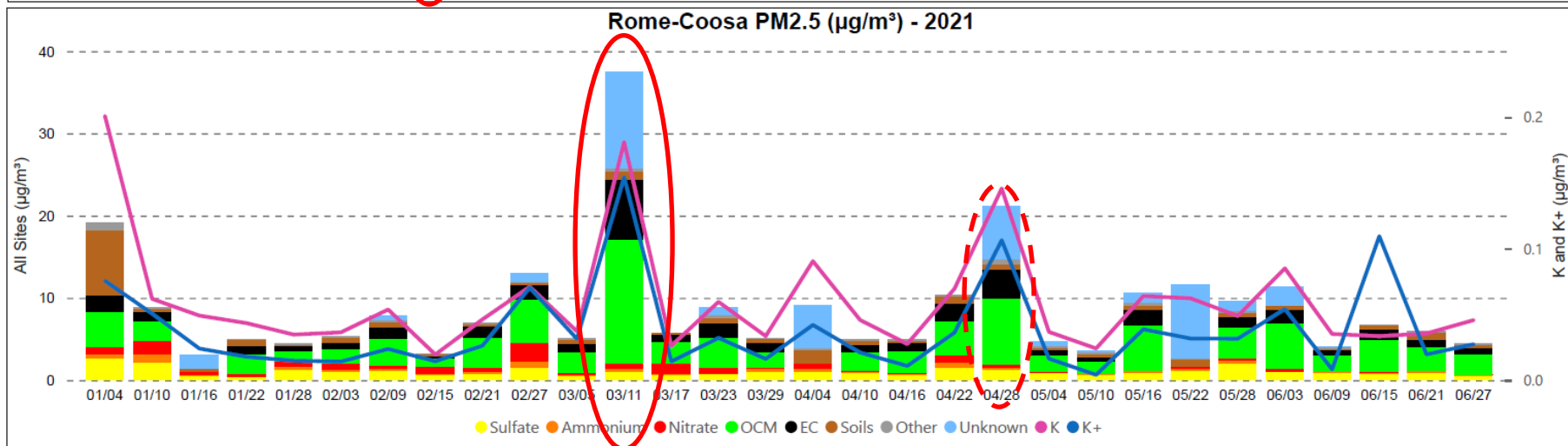
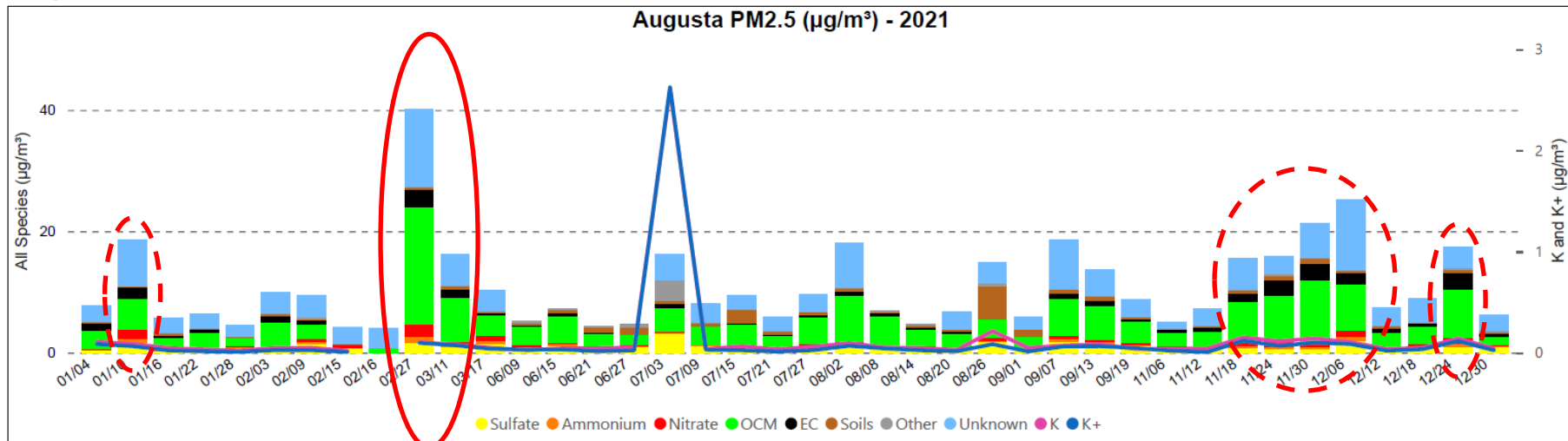


# SPECIATED PM<sub>2.5</sub> DATA - DUST



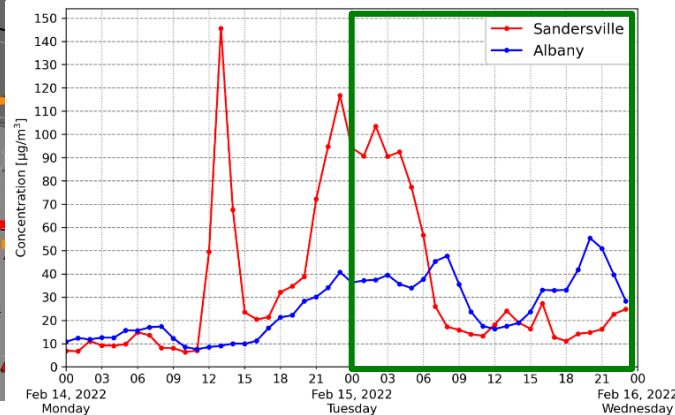
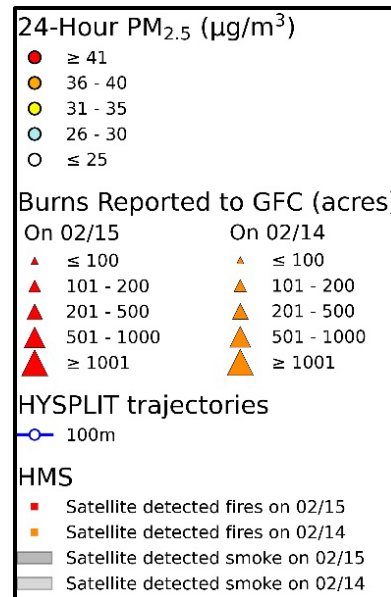
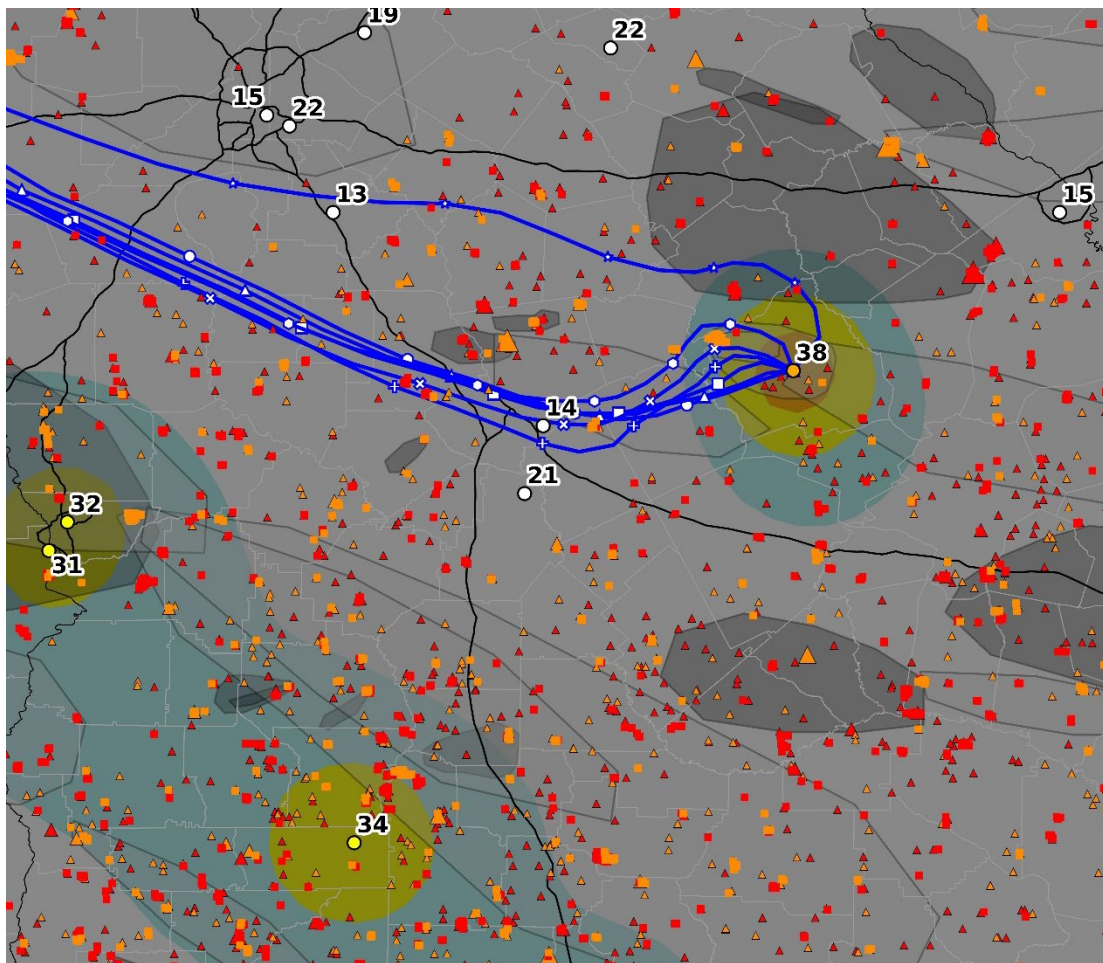


# SPECIATED PM<sub>2.5</sub> DATA - FIRES



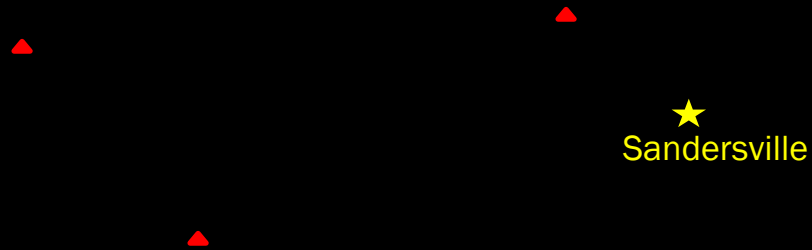


# SANDERSVILLE - FEBRUARY 15, 2022



Sandersville (38 µg/m<sup>3</sup>)

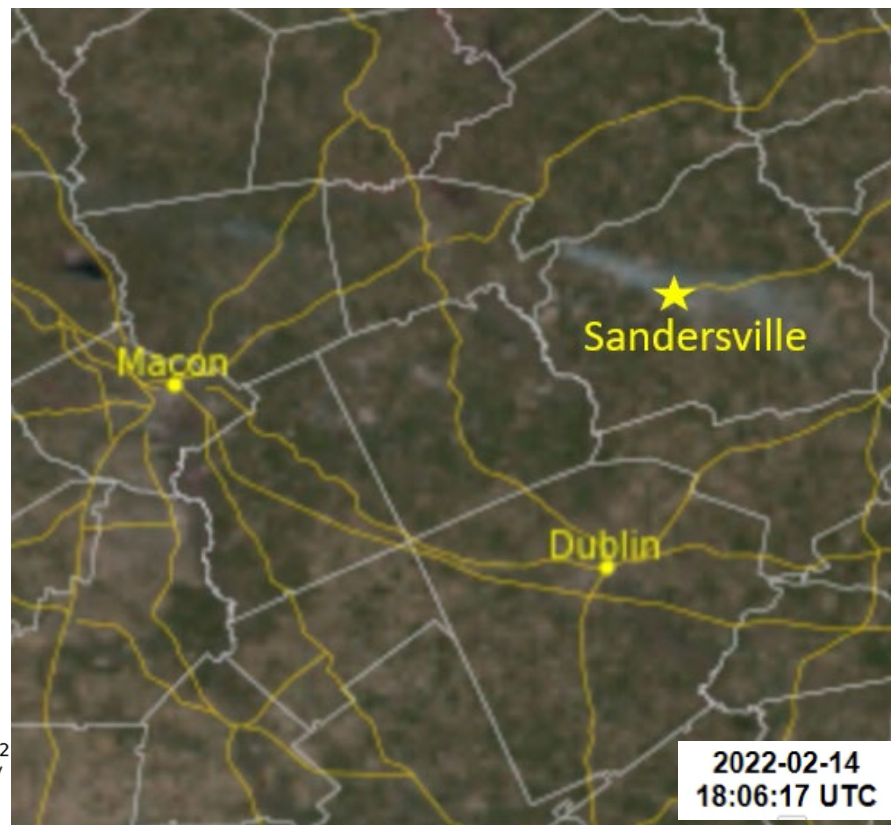
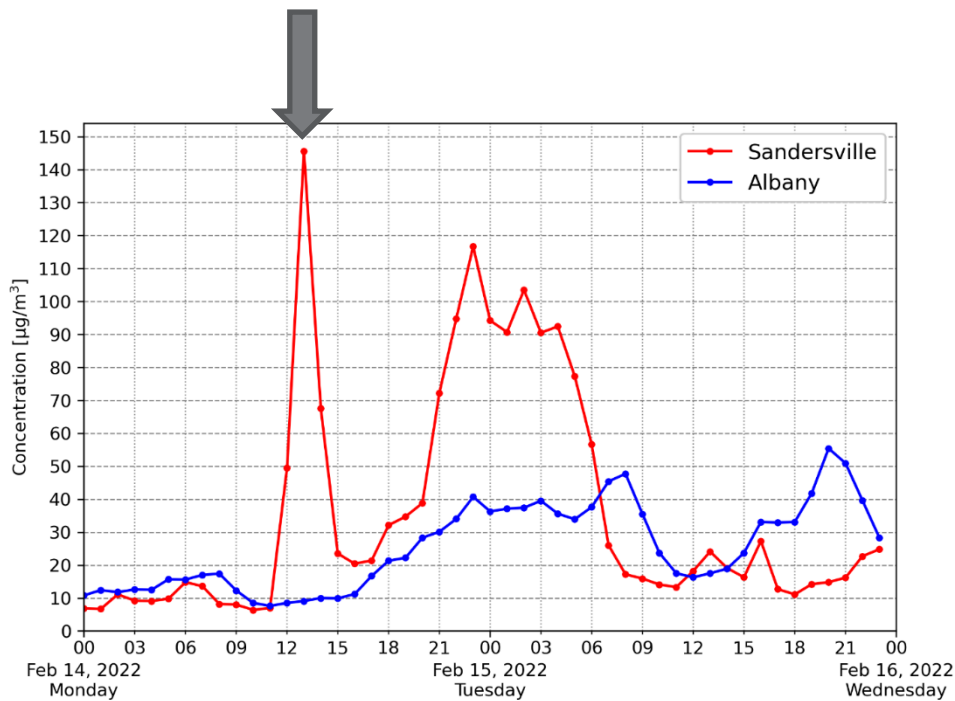
# GOES16 ANIMATION - FEBRUARY 14





# SANDERSVILLE - FEBRUARY 14 , 2022

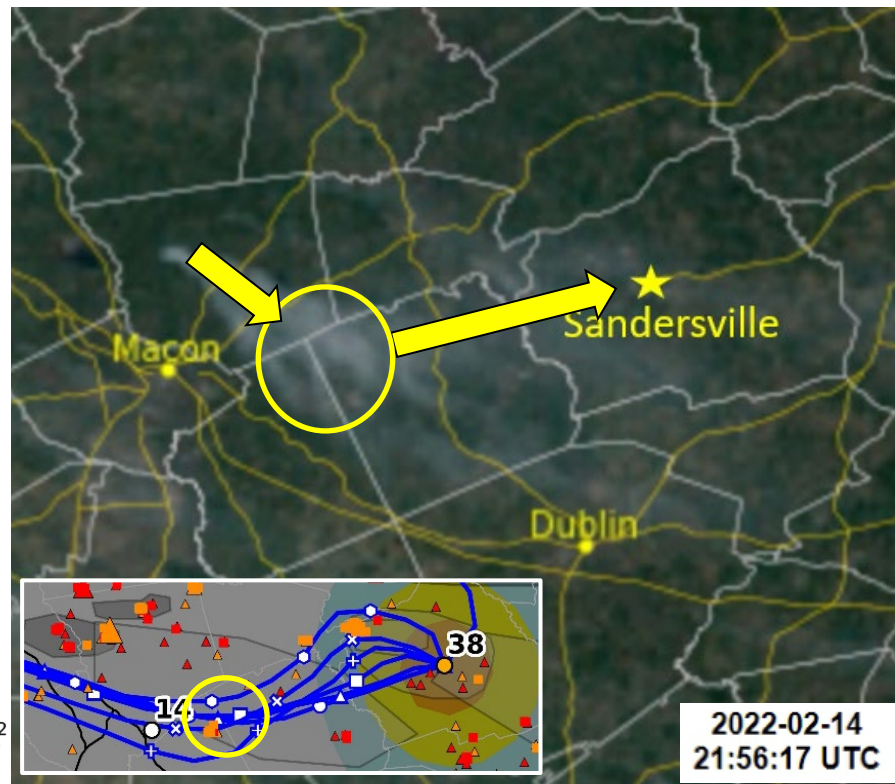
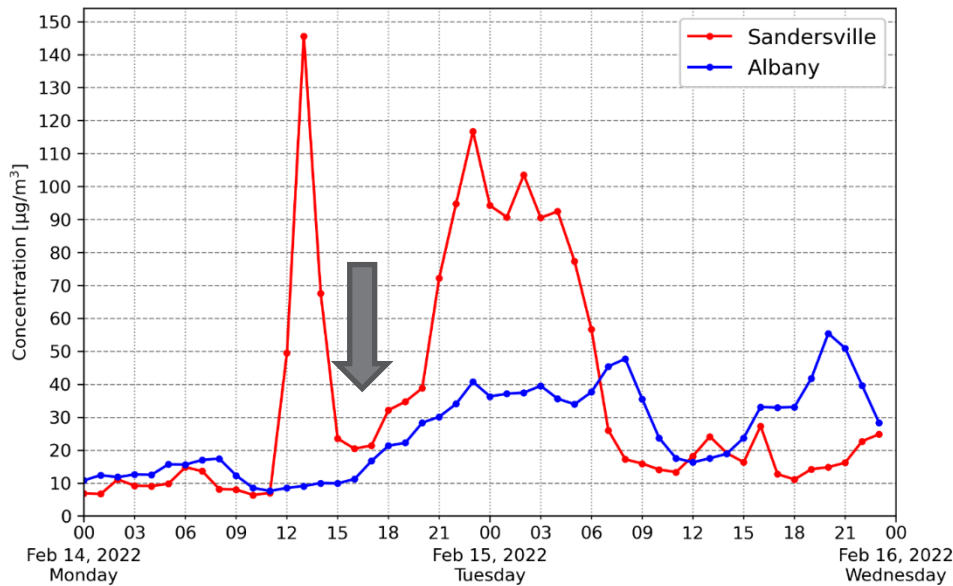
February 14, 1:06 PM





# SANDERSVILLE - FEBRUARY 14 , 2022

February 14, 3:56 PM







# EXCEPTIONAL EVENTS

- All thirty-seven (37)  $PM_{2.5}$  exceedance in Georgia in 2019-2021 were caused by events that are eligible for exclusion under the Exceptions Events Rule.
- Typically, exceptional event demonstrations have been restricted to  $PM_{2.5}$  concentrations over  $35 \mu\text{g}/\text{m}^3$ .
- EPA should allow demonstrations to be submitted for all exceptional events that have regulatory significance regardless of whether the measured  $PM_{2.5}$  concentrations are above or below  $35 \mu\text{g}/\text{m}^3$ .
- Georgia EPD is working with EPA R4 to develop an exceptional events template for prescribed fires.



# OTHER EPD COMMENTS

- **Vendor Approved Calibration Updates**
- **Monitoring Network Design Criteria to Address At-Risk Communities**
- **Timeline for the Designation Process**
- **Grandfathering Pending PSD Permit Applications**



# CONTACT INFORMATION

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