



Draft Exceptional Events Implementation Tools

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Draft Exceptional Events Implementation Tools

- Data Visualization and Comparison Tools
 - To help air agencies identify event-influenced PM_{2.5} data most likely to have regulatory significance.
- PM_{2.5} Wildland Fire Exceptional Events Tiering Document
 - Information on tiering wildland fire/PM events (similar to the tiering approach used for wildfire/ozone events) to help “right-size” demonstrations.
- Wildland Prescribed Fire Demonstration Document
 - EPA collaborated with the State of California, the Northern Sierra Air Quality Management District, Placer County Air Pollution Control District and the US Forest Service to develop an exceptional events demonstration for a prescribed fire on wildland that influenced PM_{2.5} concentrations.
 - This demonstration followed the exceptional events development and submission process.



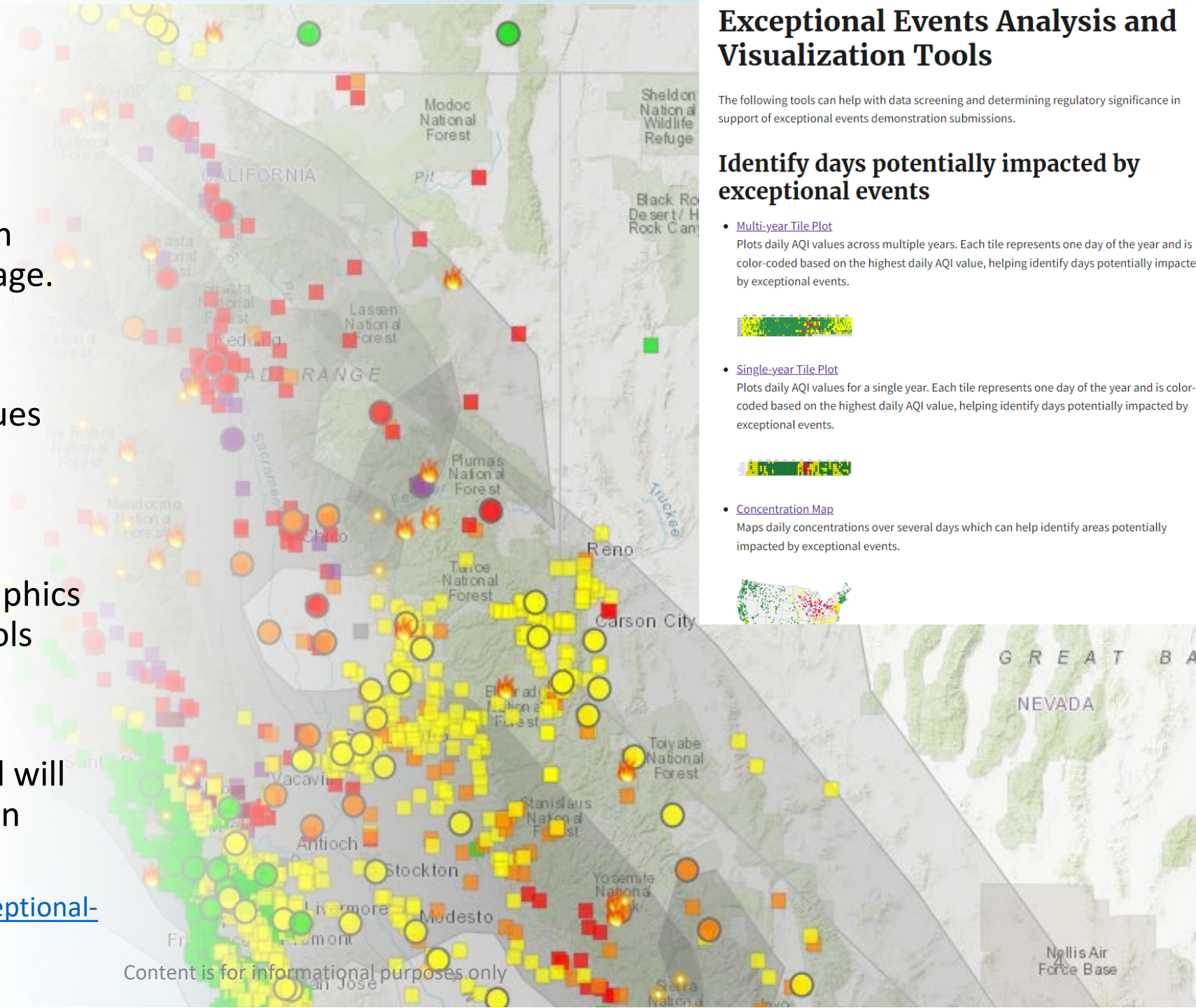
Tool 1: Data Visualization and Comparison Tools

David Mintz, U.S. EPA Office of Air Quality Planning and Standards

Data Visualization

- A suite of draft data visualization tools is available on EPA's webpage.
- Tools are intended to assist air agencies in identifying which impacted days affect design values and whether the selected days/associated events have regulatory significance.
- Air agencies can incorporate graphics and data generated by these tools into exceptional events demonstrations.
- Tools are a "living" resource and will be updated periodically based on feedback.

<https://www.epa.gov/air-quality-analysis/exceptional-events-analysis-and-visualization-tools>



Exceptional Events Analysis and Visualization Tools

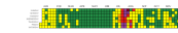
The following tools can help with data screening and determining regulatory significance in support of exceptional events demonstration submissions.

Identify days potentially impacted by exceptional events

- [Multi-year Tile Plot](#)
Plots daily AQI values across multiple years. Each tile represents one day of the year and is color-coded based on the highest daily AQI value, helping identify days potentially impacted by exceptional events.



- [Single-year Tile Plot](#)
Plots daily AQI values for a single year. Each tile represents one day of the year and is color-coded based on the highest daily AQI value, helping identify days potentially impacted by exceptional events.



- [Concentration Map](#)
Maps daily concentrations over several days which can help identify areas potentially impacted by exceptional events.

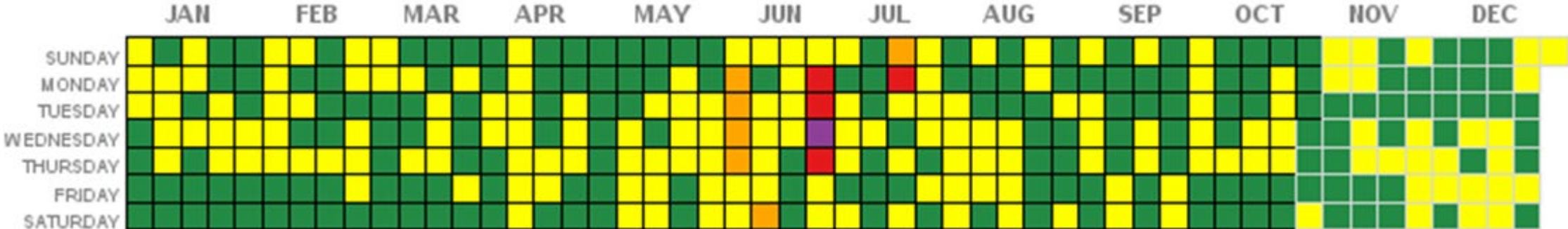


Examples from **Multi-year Tile Plot** and **Single-year Tile Plot**

PM2.5 Daily AQI Values, 2015 to 2023
Cleveland-Elyria, OH

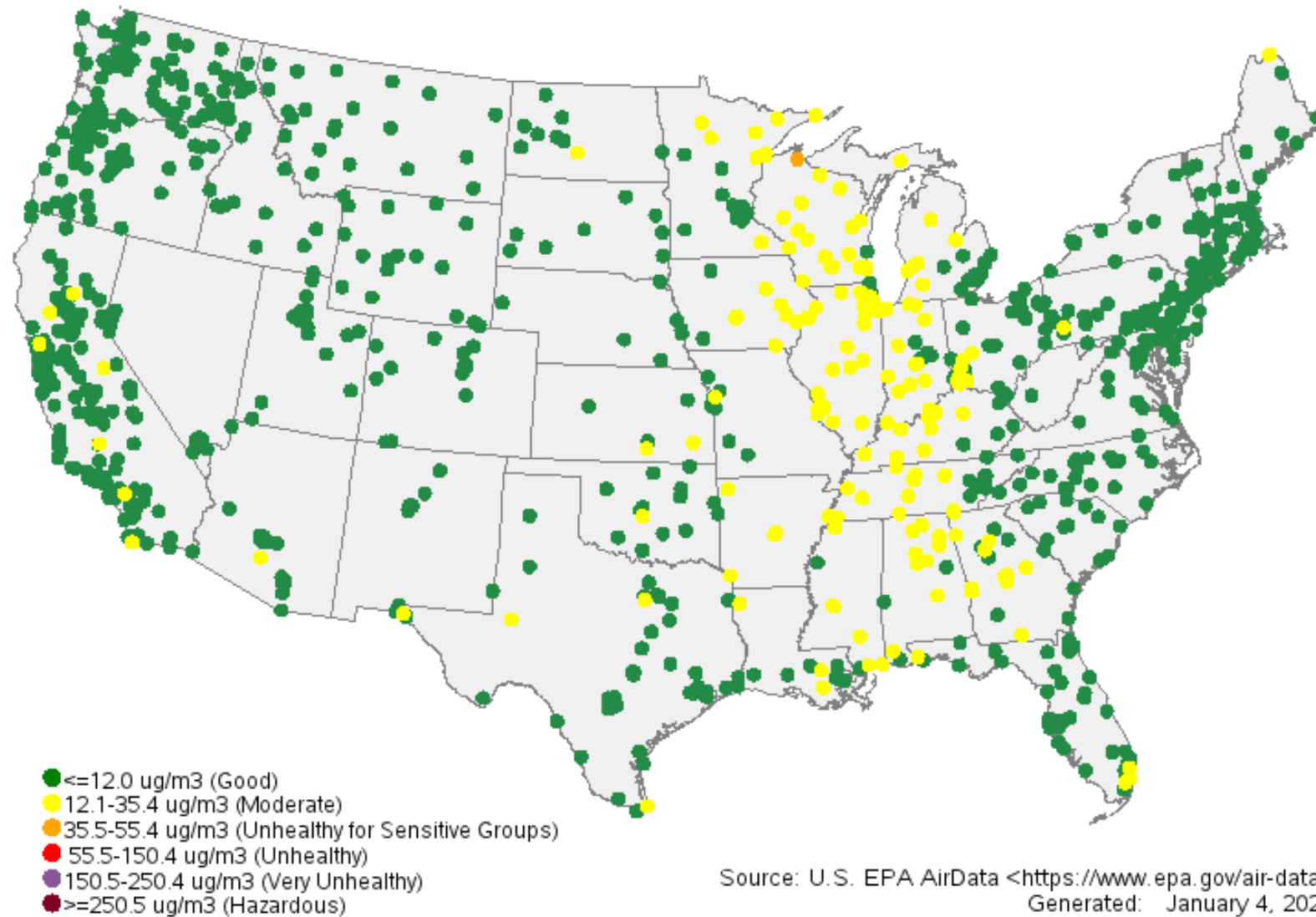


PM2.5 Daily AQI Values in 2023
Cleveland-Elyria, OH



- Good (≤ 12.0 ug/m³) 190 days
- Moderate (12.1-35.4 ug/m³) 164 days
- Unhealthy for Sensitive Groups (35.5-55.4 ug/m³) 6 days
- Unhealthy (55.5-150.4 ug/m³) 4 days
- Very Unhealthy (150.5-250.4 ug/m³) 1 days
- Hazardous (≥ 250.5 ug/m³) 0 days

PM2.5 AQI Values by site on 06/24/2023



Example from Exceptional Events Design Value Tool

Select a Pollutant:
PM2.5

Select a NAAQS:
2024 Annual NAAQS (9 ug/m³)

Select an EPA Region:
National

Select a State:
41 - Oregon

Select a County:
039 - Lane

Select a Site:
2013 - Oakridge - (Oak)

Select a Design Value Period:
2020-2022

Selections include:
 Request Exclusion Flags
 Informational Flags
 NAAQS Exceedance Days

Get Selections Clear Selections

[Download Site Design Value Data \(xlsx\)](#)

2020-2022 Design Value: 9.5 ug/m³ 2020-2022 DV Validity: TRUE

2020 Annual Mean: 7.77 ug/m³ 2020 Complete Quarters: 4
2021 Annual Mean: 9.27 ug/m³ 2021 Complete Quarters: 4
2022 Annual Mean: 11.54 ug/m³ 2022 Complete Quarters: 4

2020 Q1 Mean: 8.81 ug/m³ 2020 Q1 Percent Complete: 100
2020 Q2 Mean: 4.23 ug/m³ 2020 Q2 Percent Complete: 100
2020 Q3 Mean: 6.93 ug/m³ 2020 Q3 Percent Complete: 100
2020 Q4 Mean: 11.10 ug/m³ 2020 Q4 Percent Complete: 100
2021 Q1 Mean: 7.23 ug/m³ 2021 Q1 Percent Complete: 98
2021 Q2 Mean: 4.75 ug/m³ 2021 Q2 Percent Complete: 98
2021 Q3 Mean: 19.32 ug/m³ 2021 Q3 Percent Complete: 100
2021 Q4 Mean: 5.77 ug/m³ 2021 Q4 Percent Complete: 100
2022 Q1 Mean: 10.60 ug/m³ 2022 Q1 Percent Complete: 96
2022 Q2 Mean: 3.76 ug/m³ 2022 Q2 Percent Complete: 100
2022 Q3 Mean: 15.91 ug/m³ 2022 Q3 Percent Complete: 100
2022 Q4 Mean: 15.90 ug/m³ 2022 Q4 Percent Complete: 97

Select days to exclude: Ctrl+click to select multiple

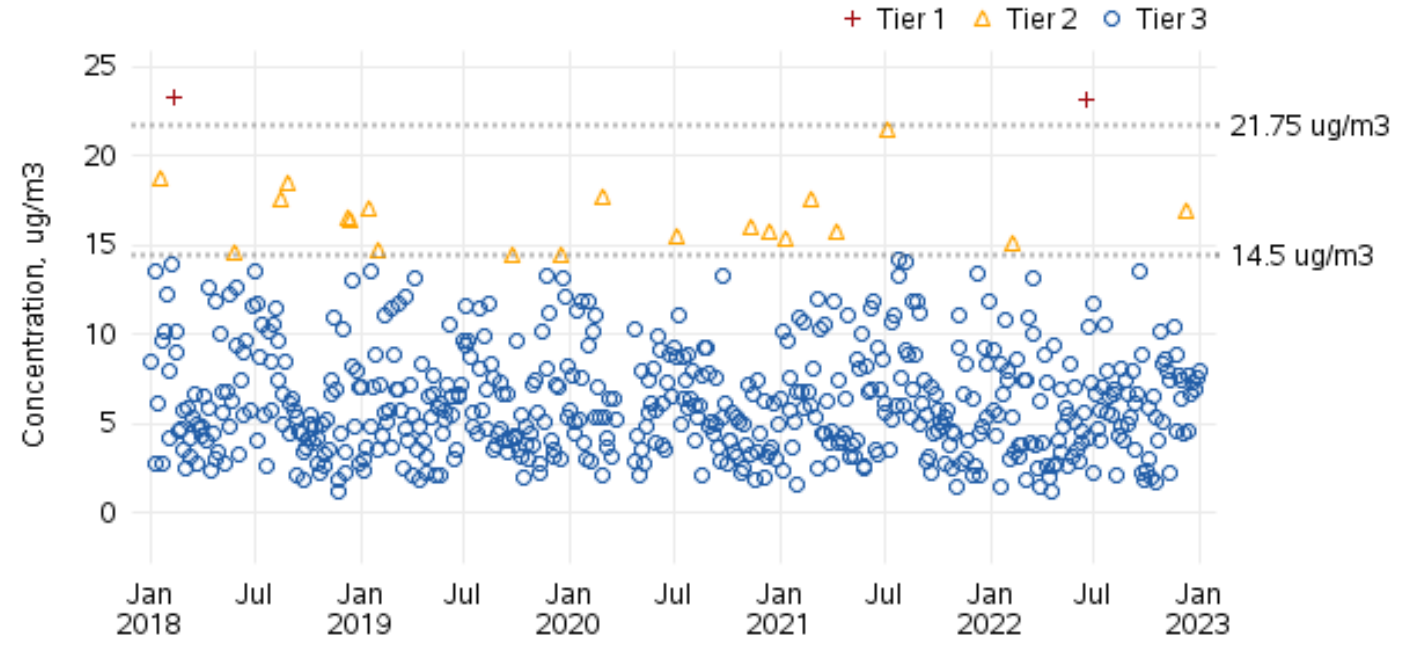
- 2020-09-06 14.4
- 2020-09-07 43.0 IT
- 2020-09-07 43.0 IT
- 2020-09-08 15.1 IT
- 2020-09-08 15.1 IT
- 2020-09-09 189.5 IT
- 2020-09-09 189.5 IT
- 2020-09-10 173.0 IT
- 2020-09-10 173.0 IT
- 2020-09-17 149.5 IT
- 2020-09-17 149.5 IT

Re-Calculate DV

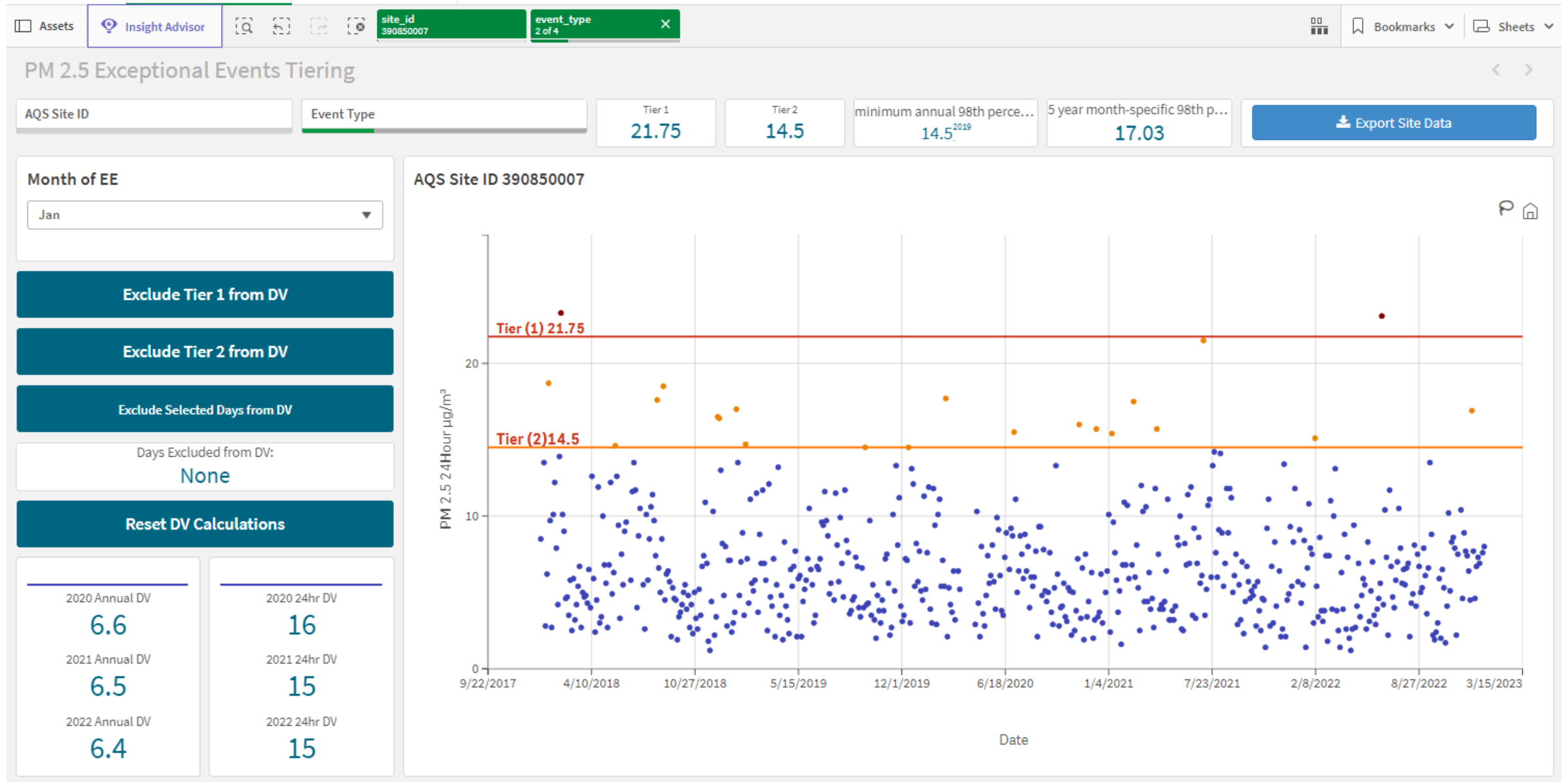
Example from Tiering Plot

Daily Mean PM2.5 Concentrations from 01/01/18 to 12/31/22

Parameter: PM2.5 - Local Conditions
CBSA: Cleveland-Elyria, OH
County: Lake
State: Ohio
AQS Site ID: 390850007, poc 1
Local Site Name: Painesville



Example from NEW Tiering Tool



Updates to Tiering Tool/Document based on Comments

- EPA continues to review the comments received in our non-regulatory docket (comment period closes March 8, 2024).
- Many of the comments are focused on clarifying the tiering threshold calculation.
- We have incorporated the following into our data visualization tiering tool/document:
 - The “most recent 5-year period” refers to the most recent, complete 5-year period.
 - It is a fixed 5-year period, currently 2018-2022
 - Shifts forward one year on April 1st
 - 98th percentile calculations – use same procedure as 24-hour NAAQS
 - Exclusion of R and fire-related I flags
 - Applies to both tier threshold analyses
 - Fire-related “I” flag for ANY hour of the day results in excluding the entire daily value from the calculation of the tiering threshold
 - Tier thresholds are calculated at the site level



Tool 2: PM_{2.5} Wildland Fire Tiering Document

Krista Thomason, U.S. EPA Region 5

Tiering for PM_{2.5} and Wildland Fire Events

- In September 2016, EPA issued a guidance document focused on a tiering structure for wildfire events and ozone impacts.
- EPA's new (draft) document provides a similar tiering structure for wildland fire events influencing PM_{2.5} concentrations. This document is intended to assist air agencies in identifying appropriate evidence to support the “clear causal relationship” criterion within a wildland fire/PM_{2.5} demonstration.
- The document employs a 3-tiered approach (e.g., Tier 1, Tier 2, Tier 3).
 - Lower tier events (i.e., Tier 1) will generally require less support.
- The tiering structure is applicable to wildland fire events affecting PM_{2.5} concentrations (annual or 24-hour standards).

Process to Analyze and Identify Tiering Thresholds

- Nationally applicable
- Reviewed past concurred on PM_{2.5} wildfire demonstrations nationally
- Eastern and Western Cases
 - Eastern - Canadian Wildfire Plumes in 2023 (June and July)
 - Western
 - CA August Complex in 2020
 - CA Camp Fire in 2018
- Estimated tier vs actual tier calculated via the tool, adjusted the tiers as necessary

Process to Analyze and Identify Tiering Thresholds: “R” and “I” Qualifiers

- All “R” qualifiers excluded (regardless of event type)
- Fire/smoke-related “I” qualifiers excluded (optional)
 - IT - Wildfire - U.S.
 - IF - Fire - Canadian
 - IG - Fire - Mexico/Central America
 - IH - Fireworks
 - IM - Prescribed Fire
 - IP - Structural Fire

Process to Analyze and Identify Tiering Thresholds

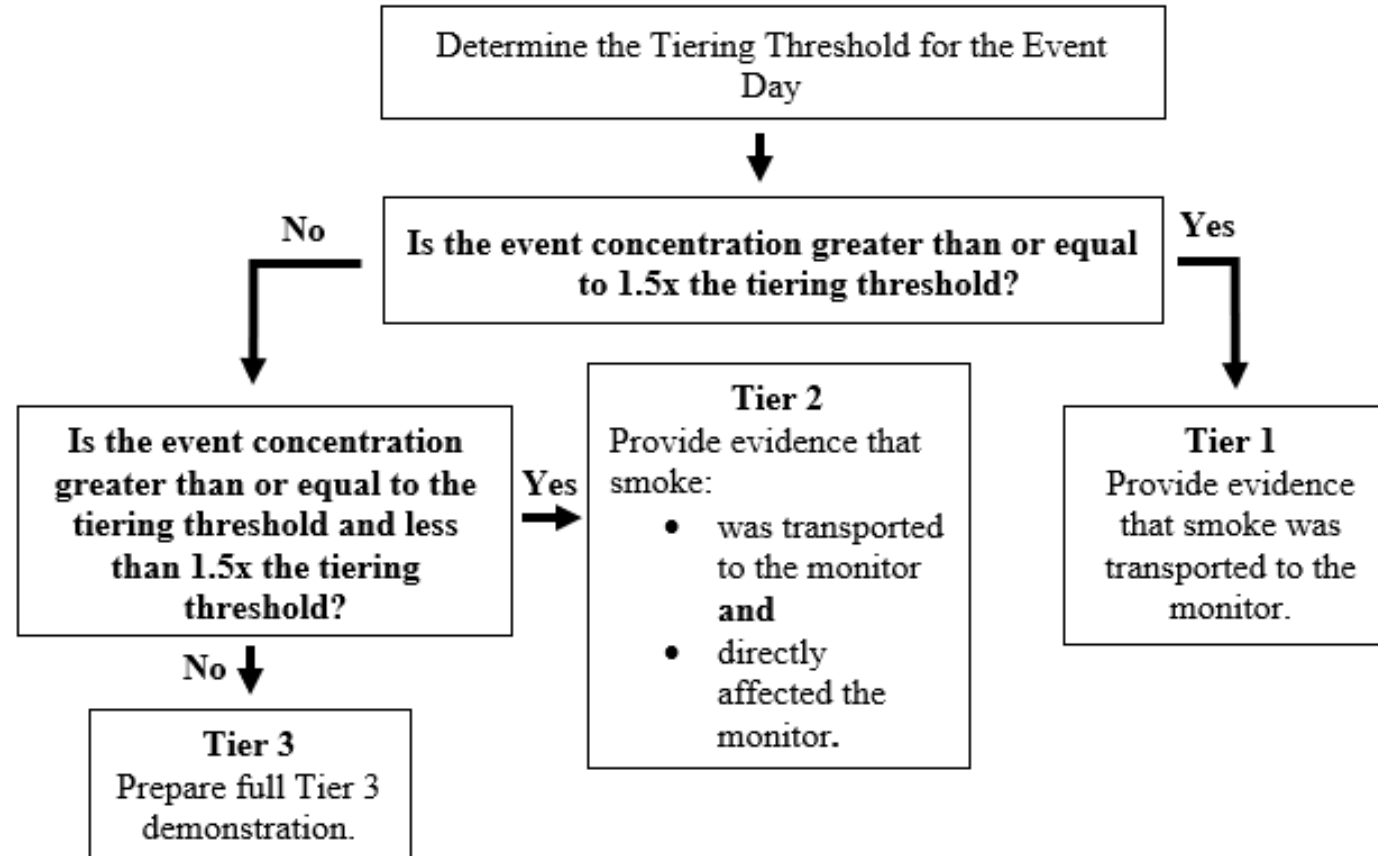
- EPA identified a **Tier Threshold** to compare the measured event concentration to determine the tier
- The resulting tier threshold uses the most recent 5-year period of 24-hour PM_{2.5} data and the lesser value of either:
 - The month-specific 98th percentile value OR
 - The minimum annual 98th percentile value

Table 2. PM_{2.5} Exceptional Events Demonstration Tiers and Thresholds.

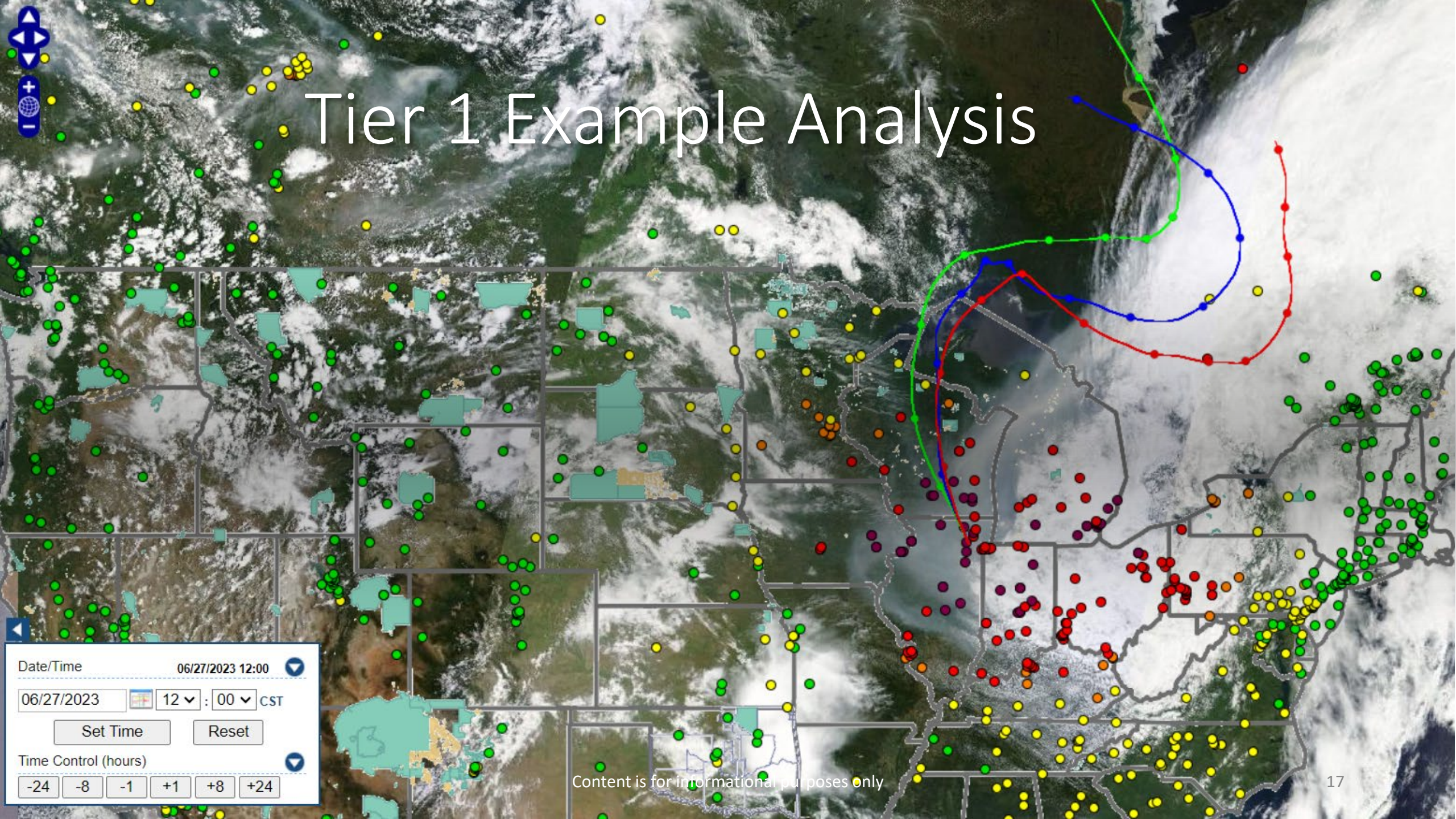
Tier	Measured Concentration vs Tiering Threshold*
Tier 1	Measured value is greater than or equal to 1.5 times the tiering threshold
Tier 2	Measured value is greater than or equal to the tiering threshold and less than 1.5 times the tiering threshold
Tier 3	Measured value is less than the tiering threshold

Tiering Thresholds and Methodology

Figure 1. Process to Determine the Appropriate Tier for the Clear Causal Relationship Criterion



Tier 1 Example Analysis



Date/Time 06/27/2023 12:00

06/27/2023 12 : 00 CST

Set Time Reset

Time Control (hours)

-24 -8 -1 +1 +8 +24

Content is for informational purposes only

Example Tier Threshold Analysis

- **Candidate Event Day:** July 20, 2023, 24-hr PM_{2.5} concentration = 72 µg/m³
- Tier Threshold (a): 98th percentile of all 24-hr PM_{2.5} concentrations from the month of
 - July in 2019-2023 = 54 µg/m³
- Tier Threshold (b): minimum annual 98th percentile 24-hr PM_{2.5} concentration from years
 - 2019-2023 = {35, 29, 34, 32, 42} = 29 µg/m³
- Lesser Value of Tier Threshold (a) and (b) = 29 µg/m³
 - Tier 1 Threshold: 1.5 x 29 µg/m³ = 43.5 µg/m³
 - Tier 2 Threshold: 1 x 29 µg/m³ = 29 µg/m³
- In this simplified example, since the Candidate Event Day concentration of 72 µg/m³ exceeds the Tier 1 Threshold of 43.5 µg/m³, the Candidate Event Day could be considered for a Tier 1 demonstration.



Tool 3: Wildland Prescribed Fire Demonstration

Gina Grier, U.S. EPA Region 7

Prescribed Fire in the 2016 Rule

- The 2016 Rule clarified that prescribed fires on wildland can meet certain criteria of the Exceptional Events Rule in the following ways:
 - **Not reasonably controllable:** By being conducted under a certified Smoke Management Program or through the use of Basic Smoke Management Practices at the time of the burn.
 - **Not reasonably preventable:** By demonstrating the benefits that would be foregone had the prescribed fire not been conducted.
 - **Human Activity Unlikely to Recur:** By demonstrating that recurrence is based on the natural fire return interval or an interval consistent with ecosystem restoration/maintenance.
- EPA is committed to providing a pathway under the Exceptional Events Rule that allows for increases in the use of strategic and coordinated prescribed fire as a tool to mitigate the adverse effects of high severity wildfire.

Wildland Prescribed Fire Demonstration

- Prior to the development of this demonstration, EPA had not received an exceptional events demonstration for a prescribed fire on wildland (for any NAAQS) since the Agency revised the Exceptional Events Rule in 2016 to include provisions for prescribed fires.
- To provide an example demonstration, EPA worked with the US Forest Service, State of California, Placer County Air Pollution Control District, and Northern Sierra Air Quality Management District to develop an exceptional events demonstration for a prescribed fire on wildland.

Exceptional Event Demonstration for an Exceedance of the 2012 Annual PM_{2.5} NAAQS at Grass Valley, California on April 20, 2021 Due to Smoke From a Prescribed Fire

January 2024

Prepared by:

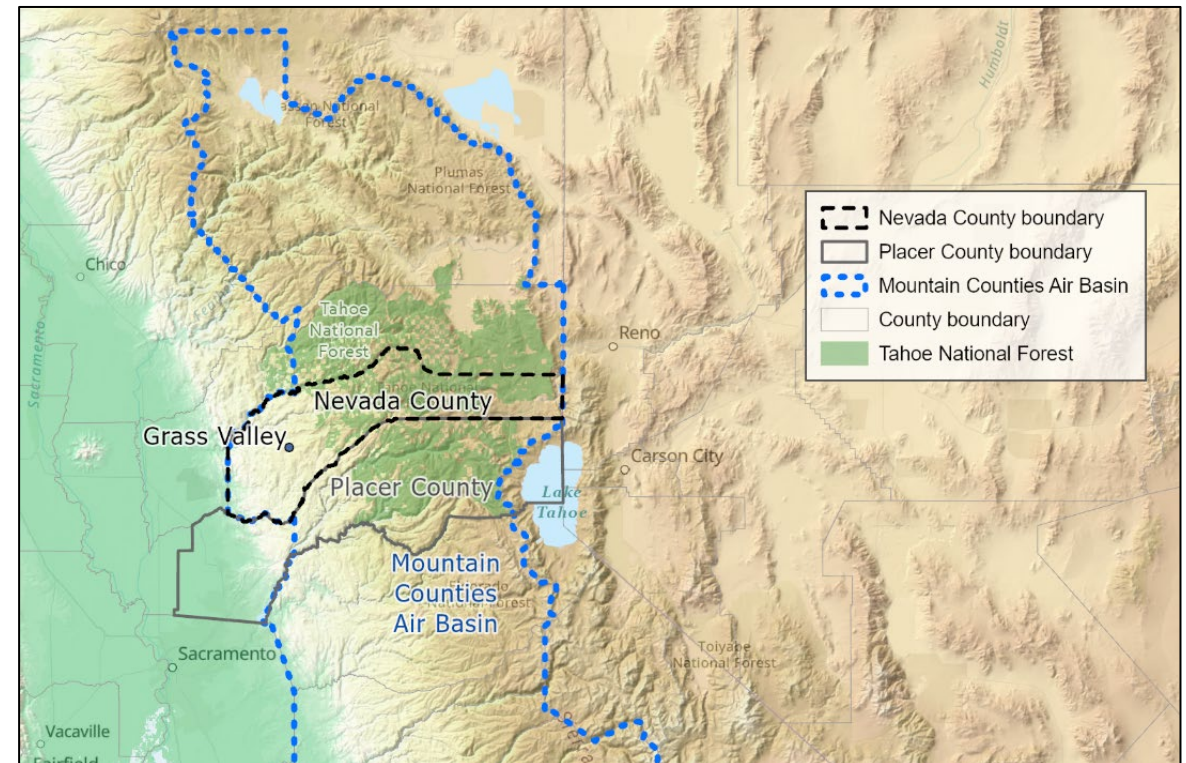
U.S. Environmental Protection Agency
Exceptional Events Prescribed Fire Demonstration Development Team

Submitted to the EPA by:

Northern Sierra Air Quality Management District/
California Air Resources Board

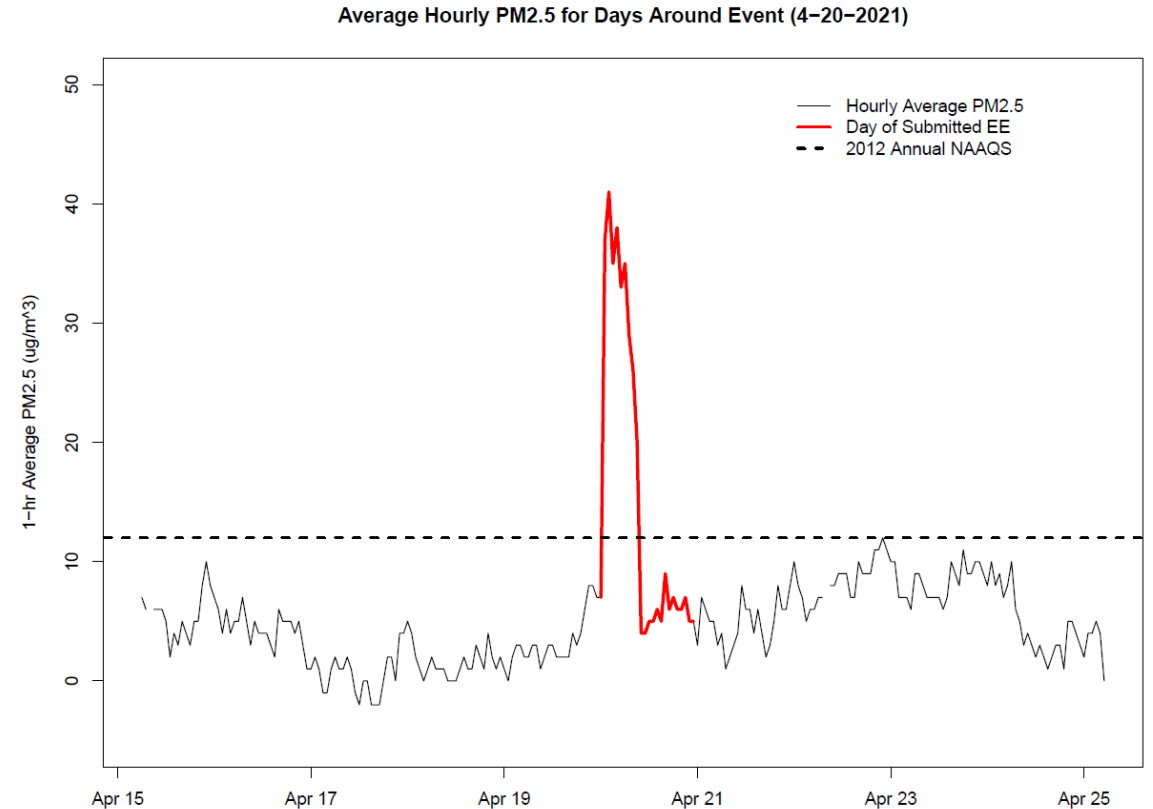
Wildland Prescribed Fire Demonstration

- About the Wildland Prescribed Fire:
 - Conducted by the USFS as a part of a project in the Tahoe National Forest in Placer County, California.
 - Conducted under a certified Smoke Management Program and multi-year land management plan.
 - Influenced $PM_{2.5}$ concentrations in the town of Grass Valley in Nevada County, California.



Wildland Prescribed Fire Demonstration

- About The Demonstration
 - Exceedance of the 2012 Annual PM_{2.5} NAAQS (value between the 24-Hour and annual standards).
 - Undergoing full exceptional events process:
 - Demonstration development
 - Air agency-conducted public comment period
 - EPA review and decision/action



Additional Wildland Prescribed Fire Tools & Resources Under Consideration

- Prescribed Fire Demonstration Development Frequently Asked Questions (FAQ) document
- Prescribed Fire Demonstration Template
- Example Supplemental Analyses for Clear Causal Relationship Demonstrations

Additional Exceptional Events Tools & Resources for Wildland Fire Events

- [EPA's Exceptional Events Guidance: Preparation of Demonstrations for Wildfire Events that may Influence Ozone Concentrations](#) (issued September 2016).
- [EPA's Exceptional Events Guidance: Prescribed Fire on Wildland that may Influence Ozone and Particulate Matter Concentrations](#) (issued August 2019).
- EPA's [Wildfire Resource Document](#) "Analytical Tools for Preparing Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone and Particulate Matter Concentrations" (issued August 2023).
- [Example Demonstrations and EPA Responses Prepared under the 2016 Exceptional Events Rule](#)
- [EPA Fire and Smoke Map](#)
- [EPA AirKnowledge E-Learning](#) (Learning Management System)
- Resources and Tools are available on EPA's webpage: <https://www.epa.gov/air-quality-analysis/treatment-air-quality-monitoring-data-influenced-exceptional-events>

Questions and Comments

- EPA has opened a non-regulatory docket to gather feedback on these tools.
- Comments should be submitted to the non-regulatory docket, identified by Docket ID No. EPA-HQ-OAR-2023-0586.
- Comment Period closes on March 8, 2024.
- EPA intends to finalize the tools discussed in this presentation in Spring 2024.