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November 4, 2026

Ms. Abigale Tardif
Acting Assistant Administrator
Office of Air and Radiation
United States Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Tardif.Abigale@epa.gov

Re: Initial Air Quality Designations for the 2024 Revised Primary Annual Fine Particle ($PM_{2.5}$) National Ambient Air Quality Standards, EPA-HQ-OAR-2024-0078.

Dear Acting Assistant Administrator Tardif:

The Midwest Ozone Group[1] is pleased to offer these comments[2] in response to EPA's Notice of Availability and opportunity for public comment related to EPA's intended approach for area designations for the $PM_{2.5}$ NAAQS (91 Fed. Reg. 63,516, October 6, 2026).

[1] The members of the Midwest Ozone Group includes: Ameren, American Electric Power Company, American Forest & Paper Association, American Iron and Steel Institute, American Wood Council, Appalachian Region Independent Power Producers Association, Associated Electric Cooperative, Berkshire Hathaway Energy, Big Rivers Electric Corp., Citizens Energy Group, City Water, Light & Power (Springfield IL), Cleveland-Cliffs Inc., Council of Industrial Boiler Owners, East Kentucky Power Cooperative, ExxonMobil Corporation, Monongahela Power Company, Indiana Energy Association, Indiana-Kentucky Electric Corporation, Indiana Municipal Power Agency, Hoosier Energy REC, Inc., LGE/ KU, Marathon Petroleum Company, Monongahela Power Company National Lime Association, North American Stainless, Nucor Corporation, Ohio Utility Group, Ohio Valley Electric Corporation, Olympus Power LLC, Steel Manufacturers Association, and Wabash Valley Power Alliance.

[2] These comments were prepared with the technical assistance of Alpine Geophysics, LLC.

MOG is an affiliation of companies and associations that draws upon its collective resources to seek solutions to the development of legally and technically-sound air quality programs that may impact their facilities, their employees, their communities, their contractors, and the consumers of their products.

In its Notice of Availability, EPA invites comments on its intended approach for finalizing area designations related to the 2024 Revised Primary Annual Fine Particulate ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS). EPA describes its intended approach as including the evaluation of ambient air quality monitoring data based on 2021 – 2023 DVs. Additionally, EPA's Notice of Availability states that it plans to evaluate more recent $PM_{2.5}$ air quality monitoring data using 2023 – 2025 DVs and to consider information provided by the states.

EPA has also confirmed in its 120-day letters (see: https://www.epa.gov/particle-pollution-designations/primary-annual-fine-particulate-matter-designations-state-initial) that it intends to assess 2023 – 2025 monitoring data and the significance of the impact of wildfires on air quality across many regions of the country. The 120-day letters also recognize that an additional factor affecting the ability to evaluate the attainment of the $PM_{2.5}$ NAAQS in many parts of the country is the high bias in monitoring data caused by errors in the algorithms used by Teledyne T640 and T640x PM mass monitors. EPA has pointed to both exceptional events and the Teledyne bias as providing a basis for excluding certain monitoring data to be used to make designations.

In these comments MOG will focus on the errors in the monitoring data available to EPA at this time because of the impact of exceptional events, the Teledyne bias, and other factors. These factors are critical elements in determining the monitoring data that will be relied upon by EPA to make its designation decisions. These comments will also address the limited time that is available to offer this data – making it necessary for EPA to designate such areas as "unclassifiable" if additional information is deemed necessary.

I. Designations

Section 107(d)(1)(A)(i)-(iii) of the Clean Air Act (CAA) explicitly states that initial designations following promulgation of a new or revised NAAQS must fit into one of the following categories:

(i) "nonattainment, any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant,

(ii) attainment, any area (other than an area identified in clause (i)) that meets the national primary or secondary ambient air quality standard for the pollutant, or

(iii) unclassifiable, any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant."

To the extent that the information needed to determine whether an area is meeting or not meeting the subject NAAQS is not available, the area should be designation as "unclassifiable".[3]

The meaning of "available information" related to the "unclassifiable" designation was addressed by the 5th Circuit Court of Appeals in *Texas v EPA* (Case No. 17-60088, May 16, 2025). In that case, the Court offered the following interpretations of how the term "available information" should be applied:

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[3] EPA's guidance explains that areas designated as "Unclassifiable" would not be required to take steps to improve air quality but must take steps to prevent air quality from deteriorating to unhealthy levels as would be the case with attainment areas. See: Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2), September 13, 2013. https://www.epa.gov/sites/default/files/2016-02/documents/ozone-designations-guidance-2015.pdf and EPA Fact Sheet – Modifications to State and Tribal Recommendations for areas not meeting [NAAQS]. https://www.epa.gov/lead-designations/fact-sheet-modifications-state-and-tribal-recommendations-areas-not-meeting .

> "Reading the three subparts of Section 7407(d)(1)(A) as a comprehensive explanation of the determinations EPA can make, we conclude that the best reading of this language is that Congress insisted on a finding of "we don't know" when the "available information" does not reliably support a finding of attainment or nonattainment.
> ...
>
> "To put it more generally, EPA is obligated to designate an area as "unclassifiable" if the available evidence does not allow for a meaningfully reliable determination of attainment or nonattainment."
> ...
>
> "As explained earlier, we interpret Section 7407(d)(1)(A)(iii) as requiring EPA to designate an area as "unclassifiable" if the available evidence does not allow for a meaningfully reliable determination of attainment or nonattainment."

Valid monitoring data and capture metrics are critical to assuring that data is not skewed in any way that would result in an EPA determination that an area is either attainment or nonattainment when the only "available information" to EPA is technically inaccurate. A determination based on erroneous available information would result in unnecessary over controlling of sources. This is particularly important as a NAAQS is lowered. As will be pointed out by MOG in these comments, it is essential for EPA to account for exceptional events, the Teledyne bias, and other factors, to assure that the data available to EPA at this time allows for a meaningfully reliable determination of attainment or nonattainment, or otherwise that an area be designated as "unclassified."

II. Exceptional Events

When amending the Clean Air Act in 2005, Congress provided regulatory relief for NAAQS nonattainment resulting from exceptional events negatively affecting air quality that were outside of a state's control. That concern led to enactment of provisions specifically establishing the process by which EPA could exclude air quality monitoring data directly related to an exceptional event. See CAA Section 319 (42. U.S.C. § 7619). Subsequently, EPA promulgated the exceptional events rule. 40 C.F.R. § 50.14.

A state requesting data exclusion under the exceptional events rule must demonstrate "to the Administrator's satisfaction that such event caused a specific air pollution concentration at a particular air quality monitoring location." 40 C.F.R. § 50.14(a)(1)(ii). That demonstration must include the following:

> (A) A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);
>
> (B) A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;
>
> (C) Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section. The Administrator shall not require a State to prove a specific percentile point in the distribution of data;
>
> (D) A demonstration that the event was both not reasonably controllable and not reasonably preventable; and
>
> (E) A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event.
> 40 CFR 50.14(c)(3)(iv).

The requesting state must also comply with pre-request requirements, which include notifying EPA of the intent to request exclusion, flagging data to be excluded, engaging in public comments, and implementing mitigation measures. See 40 C.F.R. § 50.14(c)(2)(i); 40 C.F.R. § 50.14(c)(3)(v); 40 C.F.R. § 51.930. In short, there are three core elements: (1) a clear causal relationship; (2) a showing that the event was not controllable, and (3) a showing that the event was a human activity unlikely to recur at a particular location or was a natural event.

Depending on the circumstances of a particular exceptional event, a particular tier of evidence is required to provide a compelling case to EPA to exclude data under the Exceptional Events Rule. In instances where a state provides sufficient evidence to showcase that a given event is indeed an irregularity, EPA will make a

concurring determination and issue an exclusion of that specific event from the dataset. 40 C.F.R. § 50.14(c)(2)(ii).

EPA has recognized that particular events are exceptional and that states may request to exclude them from the dataset, given that a sufficient evidentiary standard is met. *Id*; see generally, 81 Fed. Reg. 68,216. EPA's guidance on wildfire events that may influence ozone concentrations outlines a tiered approach for addressing the clear causal relationship element within a wildfire/ozone demonstration as follows:

> Tier 1 clear causal analyses should be used for wildfire events that cause clear O3 impacts in areas or during times of year that typically experience lower O3 concentrations, and are thus simpler and less resource intensive than analyses for other events. Tier 2 clear causal analyses are likely appropriate when the impacts of the wildfire on O3 levels are less clear and require more supportive documentation than Tier 1 analyses. Tier 3 clear causal analyses should be used for events in which the relationship between the wildfire and the O3 exceedance or violation is more complicated than the relationship in a Tier 2 analysis, and thus would require more supportive documentation than Tier 2 analyses.

EPA, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* (September 2016)[4] at p. 4.

EPA's 2016 rule and guidance on exceptional event demonstrations represent but one interpretation of what is required under CAA Section 319. Many commenters on the 2016 EPA guidance for ozone exceptional event demonstrations from wildfires criticized the guidance for its prescriptive nature and the burdens it imposes on states, which actually discourage the development of demonstrations. MOG supports further changes to the 2016 rule and related guidance to simplify the required demonstrations and to allow greater discretion in how evidence is produced and assessed.

To the extent that additional information is needed to adequately assess air quality conditions to determine whether an area meets the applicable NAAQS, or not, areas should be designated as "unclassifiable."

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[4] https://www.epa.gov/system/files/documents/2023-12/guidance-on-the-preparation-of-ee-wf-ozone.pdf

EPA's 120-day letters specifically recognize concerns about the limited time that is available to consider exceptional events as mandated by the CAA. The following are relevant excerpts from the letter to Texas:

> "Our preliminary review of the 2023-2025 monitoring data indicates that your State has one or more monitors with design values that may not meet the 2024 annual PM2.5 NAAQS and/or that your State includes portions of a multi-State Core-Based Statistical Area or Combined Statistical Area that has one or more monitors with design values that may not meet the 2024 annual PM2.5 NAAQS. Without any further information or processing, such as a determination that air quality data was influenced by an exceptional event, these data could indicate that the area is not meeting the NAAQS and the area, including nearby areas that contribute to the area not meeting the NAAQS, may be designated as nonattainment. ..."
>
> "Certain events, including prescribed fires and wildfires, have the potential to impact air quality monitoring data across many regions of the country. Based on a screening analysis using the EPA's exceptional events technical tools, there are over 9,000 site days that could be submitted as Tier 1 or Tier 2 exceptional events, potentially affecting the design value at every monitor with a current 2023-2025 design value over 9 ug/m3. ..."
>
> "Given the expedited deadline that the EPA is operating under, the Agency acknowledges that the EPA may be lacking relevant information or demonstrations that would lead to a different designation. ..."
>
> "Further, the Agency also recognizes the difficulties associated with gathering and processing the information necessary for the designation process within such an abbreviated timeline. As a result, it is possible that the Agency would determine that areas in your State cannot be classified on the basis of available information as meeting or not meeting the NAAQS, which would result in a designation of unclassifiable for areas in your State. This outcome would be a modification of the State's initial area designation submitted February 6, 2025."
>
> "If you have additional information that you would like the EPA to consider for final designations, including information related to exceptional events,

please submit it to the public docket for these designations, EPA-HQ-OAR-2024-0078, located at www.regulations.gov."

Given the limited amount of time involved to respond to EPA's Notice of Availability and request for comments, MOG requested Alpine Geophysics to provide a series of assessments of exceptional events for several areas which have monitoring data for 2023-2025 that measures $PM_{2.5}$ above 9.0 $\mu g/m^3$.

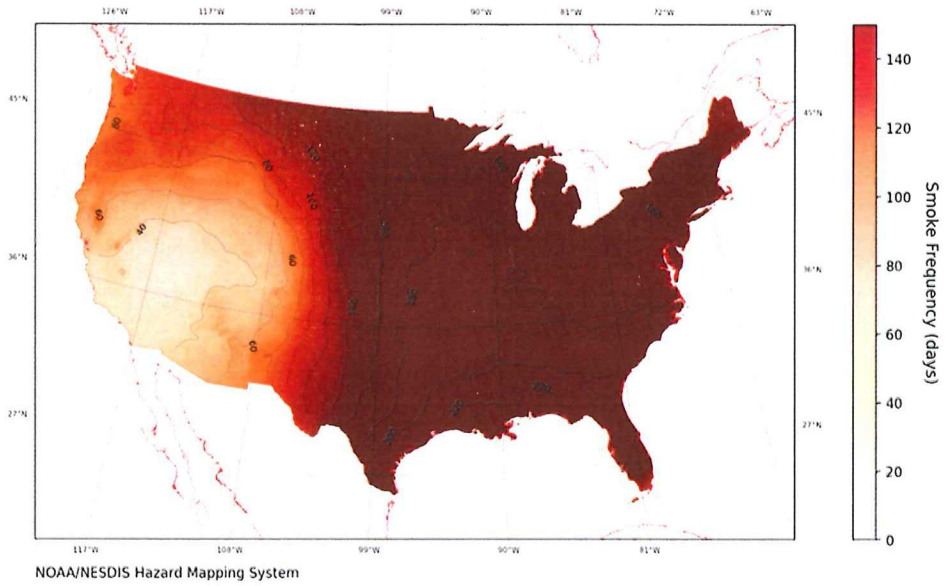
One such effort was an extensive assessment of exceptional events in the Chicago area. While time did not permit Alpine Geophysics to perform similar assessments of exceptional events in other affected areas, Alpine Geophysics was able to perform initial assessments of exceptional events for the entirety of the state of Illinois, and the states of Indiana, Ohio, Michigan, Minnesota, and Pennsylvania. All of these reports are being provided as exhibits to these comments and are incorporated by reference into these comments.

Each of these additional reports summarize the wildfire seasons, the Tier 1 / Tier 2 identified days of importance on design values, and recommendations on how the data can be used to confirm the impact of exceptional events during the final designation process. The focus of all of these reports is on monitors with 2023-2025 DVs > 9.0 $\mu g/m^3$. This data is offered to demonstrate the significance of consideration of exceptional events in the context of final designations and the need to allow an appropriate amount of time to assure that this qualifies as "available information" at the time of the making a determination as to whether an area can be classified as meeting or not meeting the NAAQS.

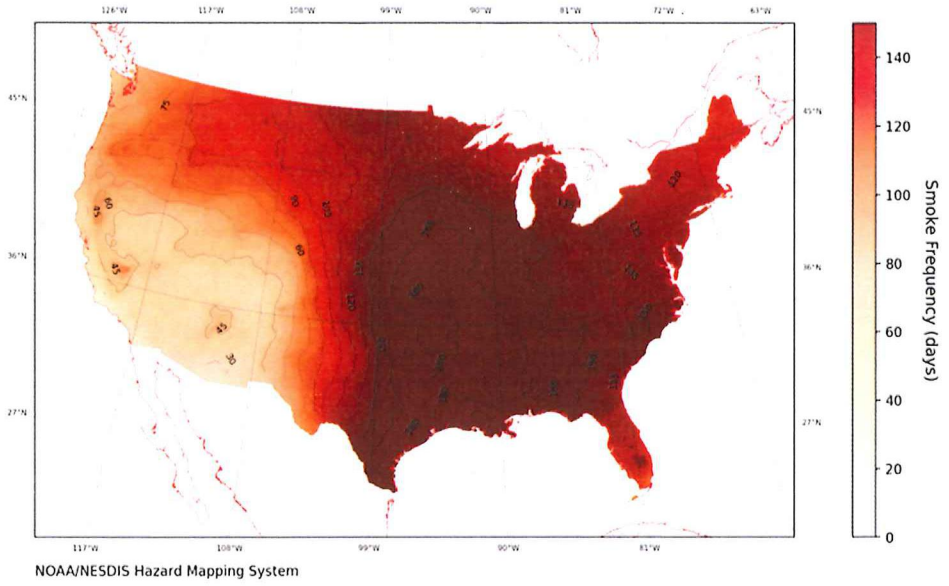
As is stated in each of the Alpine Geophysics reports, given the widespread impact of wildfire and prescribed fire smoke on monitors throughout the study areas, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected $PM_{2.5}$ data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

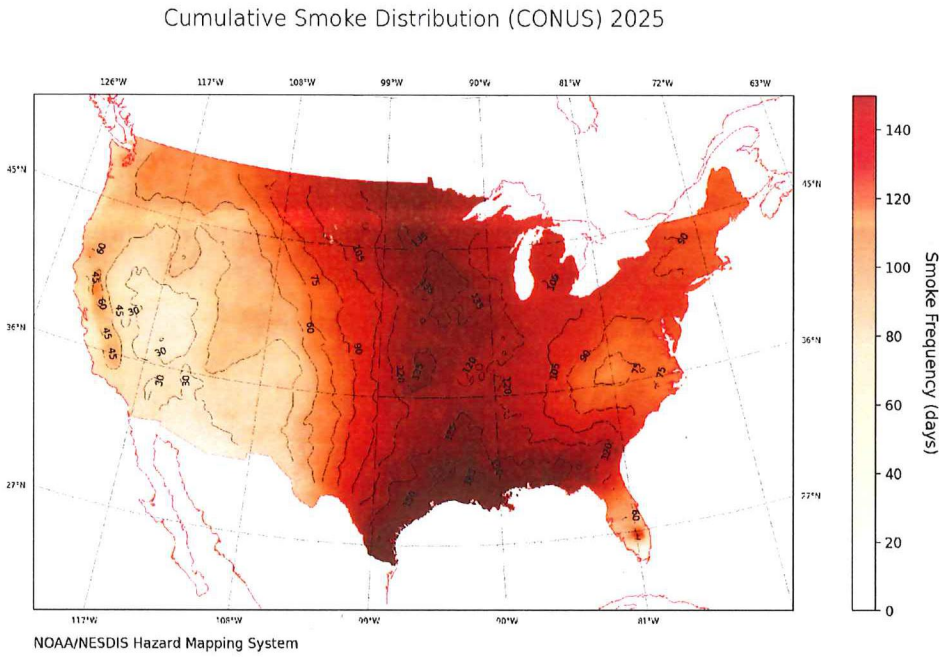
The broad scope of these wildfires in 2023, 2024, and 2025 is illustrated by the following maps that represents the cumulative number of days in each of the years 2023, 2024, and 2025 where smoke was present over the region during the calendar year.

Cumulative Smoke Distribution (CONUS) 2023



Cumulative Smoke Distribution (CONUS) 2024





Each of the Alpine Geophysics reports state that each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where $PM_{2.5}$ concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and attainment determinations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs.

The following are area specific excerpts from each of the Alpine Geophysics reports:

A. Chicago (Exhibit A) entitled Supporting Materials Demonstrating Enhanced $PM_{2.5}$ Concentrations in the Chicago Area Resulting from Canadian Wildfire Influence in 2023-2025," prepared by Alpine Geophysics, October 2026. Because of its size, Exhibit A has been

placed on a thumb drive and delivered to the EPA Docket Center by express mail and posted on the Midwest Ozone Group website here: https://www.midwestozonegroup.com/_files/ugd/7ec07f_14f450664ecf4a0d95543d54b28bfffd.pdf

Using EPA tools, dates were identified when Canadian wildfire smoke affected $PM_{2.5}$ observations. [W]hen these dates and associated Tier 1 observations were removed from the record and annual design values were recalculated, every analyzed monitor in the Chicago metropolitan area fell below the annual $PM_{2.5}$ standard of 9.0 $\mu g/m^3$.

Removing Tier 1 concentrations lowered design values by an average of 0.7 $\mu g/m^3$ across these monitors. When Tier 2 dates were also removed, design values were an average of 1.1 $\mu g/m^3$ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

B. Illinois (Exhibit B) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN ILLINOIS RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," Prepared by Alpine Geophysics, October 2026 which is attached to the comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_f115d81a9c01404e88488f6197eb64e6.pdf

The significance of this issue is illustrated clearly by monitor 170313103 (Illinois EPA Trailer) in Cook County, Illinois, from the Chicago metro area. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 9.8 $\mu g/m^3$, removal of all identified smoke-influenced[5] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.8 $\mu g/m^3$) with the current annual $PM_{2.5}$ NAAQS. …

[5] https://www.ospo.noaa.gov/products/land/hms.html

In fact, for all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations brings all Chicago metro monitors below the level of the 2024 annual $PM_{2.5}$ NAAQS and brings both monitors from Illinois in the St. Louis metro area to within 0.1- 0.2 $\mu g/m^3$ of the standard.

C. Indiana (Exhibit C) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN INDIANA RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," prepared by Alpine Geophysics, October 2026 which is attached to these comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_25fe622c279f4c368a7200f82595e98c.pdf

The significance of this issue is illustrated clearly by monitor 180970081 (Indpls- W. 18th St./ Ernie Pyle School 90) in Marion County, Indiana. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 11.5 $\mu g/m^3$, removal of all identified smoke-influenced[6] Tier 1 dates would reduce the annual design value to 10.7 $\mu g/m^3$. …

In fact, for monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations bring all Chicago metro monitors in Lake County below the level of the 2024 annual $PM_{2.5}$ NAAQS and decreases concentrations at monitors in the Indianapolis metro area by an average of 0.7 $\mu g/m^3$.

[6] Id.

D. Michigan (Exhibit D) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN MICHIGAN RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," prepared by Alpine Geophysics, October 2026 which is attached to these comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_a9e77fa111604d27b280078572020e8a.pdf

The significance of this issue is illustrated clearly by monitor 260770008 (Kalamazoo Fairgrounds) in Kalamazoo County, Michigan. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 10.1 $\mu g/m^3$, removal of all identified smoke-influenced[7] Tier 1 dates would reduce the annual design value at the monitor to 9.1 $\mu g/m^3$.

In fact, for all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations decreases concentrations across the state by an average of 1.1 $\mu g/m^3$.

E. Minnesota (Exhibit E) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN MINNESOTA RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," prepared by Alpine Geophysics, October 2026 which is attached to these comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_004f8a5d48b1464a8a4c6de86c200e05.pdf

The significance of this issue is illustrated clearly by this monitor in Minnesota, currently the only one with a design value above the level

[7] https://www.ospo.noaa.gov/products/land/hms.html

of the annual $PM_{2.5}$ NAAQS. This monitor in Dakota County experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 9.1 µg/m3, removal of all identified smoke-influenced Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 7.8 $\mu g/m^3$) with the current annual $PM_{2.5}$ NAAQS.

In fact, Minnesota Pollution Control Agency has submitted an exceptional events demonstration[8] addressing one event occurring on July 12, 2025, at this monitor which upon EPA concurrence, would bring the monitor into attainment with the NAAQS.

F. Ohio (Exhibit F) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN OHIO RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," Prepared by Alpine Geophysics, October 2026 which is attached to these comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_cb76072651174b939010280297e1bd10.pdf

The significance of this issue is illustrated clearly by monitor 390170015 (Ohio Bell) in Butler County, Ohio, from the Cincinnati metro area. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 9.4 $\mu g/m^3$, removal of all identified smoke-influenced[9] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.9 $\mu g/m^3$) with the current annual $PM_{2.5}$ NAAQS. …

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[8] https://comment.pca.state.mn.us/33980/widgets/120906/documents/85162

[9] https://www.ospo.noaa.gov/products/land/hms.html

In fact, across all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual means decreased the resulting 3-year design value by 0.4 $\mu g/m^3$ on average. This also brought key monitors in Butler and Hamilton Counties to the level of the annual standard.

G. Pennsylvania (Exhibit G) entitled "Supporting MATERIALS DEMONSTRATING INCREASED $PM_{2.5}$ CONCENTRATIONS IN PENNSYLVANIA RESULTING FROM CANADIAN WILDFIRE INFLUENCE IN 2023-2025," prepared by Alpine Geophysics, October 2026 which is attached to these comments and can be found on the Midwest Ozone Group website with this link: https://www.midwestozonegroup.com/_files/ugd/7ec07f_3b276852a78b43419302a74e736b7e5f.pdf

The significance of this issue is illustrated clearly by monitor 421010057 (Fire Administration Building monitor) in Philadelphia County, Pennsylvania. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at 9.4 $\mu g/m^3$, removal of all identified smoke-influenced[10] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.8 $\mu g/m^3$) with the current annual $PM_{2.5}$ NAAQS. …

When these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, design values were lowered by an average of 0.5 $\mu g/m^3$ across all analyzed monitors.

Even in the absence of a specific state petition, EPA is obligated to correct monitoring data particularly in multi-state areas. Because many of the highest $PM_{2.5}$ readings are likely driven by significant wildfire events that affected multiple states

[10] https://www.ospo.noaa.gov/products/land/hms.html

across the Midwest and even in the northeast, EPA is urged to extend its approval of exceptional events demonstrations to other monitors in the same area, even if in different states, such as is the case with East St. Louis and Chicago as informed by the exceptional events demonstrations of Missouri Department of Natural Resources[11] and Indiana Department of Environmental Management[12], respectively, for proximate monitors located in the same metropolitan areas, just across state lines).

MOG recognizes that historically EPA has applied the concept of "regulatory significance" to its approval of exceptional events. However, regulatory significance is not a factor set forth in either the Clean Air Act or EPA's regulations for application to the exclusion of monitoring data impacted by exceptional events. MOG urges EPA not to impose the regulatory significance factor as applying to exceptional events approval, or, at a minimum, not to interpret the regulatory significance factor as applying only to exclusions that change an area's designation from nonattainment to attainment. Rather, EPA must recognize the fact that removal of monitoring data influenced by exceptional events is of regulatory significance in areas already in attainment (i.e. impact on headroom available under the PSD program) or in nonattainment areas where removal of such data would lower the DV without bringing the area into attainment (i.e. the need for imposition of controls on upwind states related to Good Neighbor Plans).

Two excellent examples of states with 2023-2025 Annual Design Values for $PM_{2.5}$ that demonstrate attainment are the states of Kentucky and West Virginia that are immediately adjacent to the areas addressed in these comments and that have been affected by Canadian wildfires that qualify as exceptional events. Kentucky's data is shown in Table 1 and West Virginia's data is shown in Table 2.

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[11] "2015 Ozone 8-Hour NAAQS and 2024 PM2.5 Annual NAAQS, Exceptional Event Demonstration for St. Louis Area", September 16, 2025. Excluding data for 43 impacted days reduces St. Louis Blair Street monitor design value from 9.1 to 8.7 ug/m3. https://dnr.mo.gov/document/exceptional-events-demonstration-st-louis-area

[12] "Exceptional Events Demonstration Addressing the 2024 Annual Primary Fine Particles (PM2.5) NAAQS for the Lake County, IN Area", August 14, 2025. Excluding data for 21 impacted days reduces Gary-Madison design value from 9.7 to 8.7 ug/m3. https://www.in.gov/idem/sips/air-quality-designations/particulate-matter-pm-25-air-quality-designations/

County Name	CBSA Name	AQS Site ID	Local Site Name	2023-2025 Annual Design Value ($\mu g/m^3$)
Bell	Middlesborough, KY	210130002	Middlesboro	8.5
Boyd	Huntington-Ashland, WV-KY-OH	210190017	Ashland Primary (Fivco)	7.2
Campbell	Cincinnati, OH-KY-IN	210373002	Northern Kentucky University (Nku)	7.2
Carter		210430500	Grayson Lake	5.9
Christian	Clarksville, TN-KY	210470006	Hopkinsville	7.7
Jefferson	Louisville/Jefferson County, KY-IN	211110051	Watson Lane	8.7
Jefferson	Louisville/Jefferson County, KY-IN	211110067	Cannons Lane	7.9
Jefferson	Louisville/Jefferson County, KY-IN	211110075	Durrett Lane (Near Road)	8.8
Jefferson	Louisville/Jefferson County, KY-IN	211110080	Carrithers Middle School	8.1
Jefferson	Louisville/Jefferson County, KY-IN	211111041	Algonquin Parkway	8.7
McCracken	Paducah, KY-IL	211451027	Paducah Transit	7.5
Perry		211930003	Hazard	7.3
Pike		211950002	Pikeville Primary	6.3
Pulaski	Somerset, KY	211990003	Somerset	7.1
Warren	Bowling Green, KY	212270009	Ed Spear Park (Smiths Grove)	6.9

Table 1. Kentucky $PM_{2.5}$ Design Values for 2023-2025

County Name	CBSA Name	AQS Site ID	Local Site Name	2023-2025 Annual Design Value ($\mu g/m^3$)
Berkeley	Hagerstown-Martinsburg, MD-WV	540030003	Martinsburg Ball Field	8.4
Brooke	Weirton-Steubenville, WV-OH	540090005		7.7
Brooke	Weirton-Steubenville, WV-OH	540090011		7.6
Cabell	Huntington-Ashland, WV-KY-OH	540110007		7.6
Hancock	Weirton-Steubenville, WV-OH	540290009		7.4
Harrison	Clarksburg, WV	540330003	Washington Irving Junior High School	7.2
Kanawha	Charleston, WV	540390020	Dixie St.	7.1
Kanawha	Charleston, WV	540391005		7.7
Marion	Fairmont, WV	540490006	Marion Health Care Hospital	7.2
Marshall	Wheeling, WV-OH	540511002		7.8
Monongalia	Morgantown, WV	540610003		7.0
Ohio	Wheeling, WV-OH	540690010		7.8
Wood	Parkersburg-Vienna, WV	541071002	Neale Elementary School	7.7

Table 2. West Virginia $PM_{2.5}$ Design Values for 2023-2025

While this data demonstrates that all portions of Kentucky and West Virginia should be designated attainment with respect to $PM_{2.5}$, we urge that EPA apply the exceptional events data offered in these comments to remove monitoring data for those dates in Kentucky and West Virginia to lower their applicable design values even further, creating additional headroom for application to the PSD program.

Canadian wildfires are not isolated and instead impacted large swaths of the United States. EPA is urged to use its authority to exclude data influenced by wildfires particularly where such has been demonstrated at monitors just across the state line.

III. FEM monitor biases

Over the last decade, states have shifted from relying on Federal Reference Methods (FRMs) monitors to Federal Equivalent Methods (FEMs) monitors due to their continuous monitoring capability and their low capital and operational cost. Unfortunately, these monitors also came with a significant regulatory penalty due to their persistent positive bias in measuring $PM_{2.5}$ concentrations, particularly during periods of high smoke. And while EPA finalized a rushed correction factor developed by the manufacturer for the Teledyne T640/T640X FEM monitors shortly after the new $PM_{2.5}$ standard was promulgated, many states found the correction factor to be inadequate.

As MOG has previously stated, with respect to EPA's proposed update of $PM_{2.5}$ data from T640/T640X FEM monitors, the PM air quality results measured by Teledyne monitors are not comparable with the results measured by FRM and could result in not only inaccurate calculations of $PM_{2.5}$ design values but also erroneous designation of $PM_{2.5}$ nonattainment areas.[13]

In a December 2024 letter to EPA, the Association of Air Pollution Control Agencies (AAPCA) summarized the results of an analysis by the Georgia Environmental Protection Division of 68,000 FRM/FEM measurements at over 200 sites nationwide that had FRM monitors collocated with T640/X monitors.[14] After

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[13] EPA-HQ-OAR-2023-0642-0015.

[14] Association of Air Pollution Control Agencies, December 20, 2024 Letter to EPA, p.2. https://cleanairact.org/wp-content/uploads/2024/12/AAPCA-Letter-Regarding-Teledyne-Bias-FINAL-12-20-24.pdf

implementing the Teledyne adjustment algorithm, the Georgia EPD found that the Teledyne monitors at 31 percent of the locations from 2018 to 2023 had a bias that exceeded 10 percent, with the average overall normalized mean bias of 6.4 percent for all sites. However, AAPCA's average estimates may still underreport the true bias in data due to the unaddressed positive bias reported by EPA during periods of smoke.[15] Recent research, relying on NASA's hazard mapping system (HMS), shows that many states experience more than 40 days of smoke annually.[16] It is apparent that the actual bias could be much higher than the AAPCA's averages – a significant cause of uncertainty which could be pivotal to a designation determination. Failure to fully correct the Teledyne bias on normal and smoke-filled days, means that the monitors may also be eliminating what little headroom the state has in attainment areas to permit expansion of its productive capacity.

EPA's 120 – day letters specifically recognize the high bias of the Teledyne data involved and make it clear that such data cannot be relied upon to make designations.

IV. Source and Near-road monitors

In making $PM_{2.5}$ designations, it is important to exclude monitors that are not representative of general public exposures. For instance, the location of many source and near-road monitors in locations where the public does not reside is likely to provide an inaccurate assessment of public exposure to $PM_{2.5}$. Similarly, locations where the general public cannot stay for more than a small portion of the averaging time of this NAAQS should not be considered in estimating design values.

Important examples of this concern are illustrated by the following monitors located in Illinois: (a) Monitor 17-031-3103, "IEPA Trailer" located at the end of a

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[15] EPA, *Supplemental Information on the EPA's Update of PM2.5 Data from T640/T640X PM Mass Monitors*, May 13, 2024. On page 2, EPA notes "Even higher positive biases have been reported for sites with smoke impacts from fires". https://www.epa.gov/system/files/documents/2024-05/2_supplemental-info_t640-data-update_final-05-13-2024.pdf

[16] University of Illinois, Gies College of Business Wildfires affecting lives even a thousand miles away. https://giesbusiness.illinois.edu/news/2025/02/03/wildfires-affecting-lives-even-a-thousand-miles-away

runway at O'Hare Airport and a Tollbooth for I-294, and (b) Monitor 17-031-0119, "Kingery Near Road" monitor located immediately adjacent to a major highway.

Similar examples in Pennsylvania include (a) the Liberty monitor in Allegheny County that is primarily affected by a local industrial plant and roadways, (b) the Johnstown monitor that is in the river valley and experiences inversions very frequently and, (c) the monitors in the proximity of the Philadelphia airport.

MOG urges that EPA work with states to carefully evaluate their monitoring networks to ensure that monitors that are representative of public exposure based upon local sources include the identification of solutions based upon the local sources primarily affecting those monitors. The concentrations and durations of exposure at these monitoring sites should not be used to define larger area designations or be used as the basis for adoption of national or regional emissions control programs which are likely to provide little or no benefit to these monitoring locations.

In EPA's March 9, 2026, letter to the Texas Commission on Environmental Quality[17], EPA applied the provisions of 48 C.F.R. § 58.30 to approve a request to deem monitoring data from four monitors as not eligible for comparison to the $PM_{2.5}$ annual NAAQS.

Accordingly, MOG urges EPA to work with the states on a nation-wide basis to review and remove all "source-oriented", "near-road" and "highest concentration" monitors as appropriate from decision-making with respect to the $PM_{2.5}$ annual NAAQS.

V. Five-Factor Ozone Framework Analysis for PM2.5 Designations

EPA's February 7, 2024 "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" memorandum[18] incorrectly directs states to employ a five-factor analysis that was derived in part from Section 107(d)(4) of the CAA for determining ozone

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[17] https://www.epa.gov/system/files/documents/2024-05/2_supplemental-info_t640-data-update_final-05-13-2024.pdf

[18] https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

nonattainment areas, not $PM_{2.5}$ nonattainment areas: "As a framework for area-specific analyses, the EPA intends to use, and recommends that states and Tribes base their nonattainment area boundary recommendations on, an evaluation of information relevant to five factors..."[19]

Compounding this mistake, the memorandum also states that the Agency will begin its analysis by considering counties in the entire Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA) in which the violating monitor(s) is (are) located without explaining why this approach is needed to address $PM_{2.5}$ exceedances. It is inappropriate to default to the CBSA boundaries because they are defined based on population and economic integration and not by such Clean Air Act factors as contribution to ambient air quality in a nearby area. In assessing the referenced five factors, air quality monitoring data, exclusive of data impacted by exceptional events such as wildfires, should be the primary factor considered.

VI. Assumed Designations

In some state proposed designations under the 2024 $PM_{2.5}$ Standard there is reference to the similarity of their recommended $PM_{2.5}$ designations for the 2024 standard to the nonattainment designations for the 1997 standard as an additional reason for acceptance. This logic is flawed. The $PM_{2.5}$ pollutant composition and sources contributing to $PM_{2.5}$ concentrations have changed significantly over the last 30 years, such that any historic comparison will have little value to assessing current air quality. Attention to local sources and smaller nonattainment boundaries can be derived without sacrificing air quality improvement and attainment. Such efforts will result in more effective regulation and better public health outcomes.

VII. Conclusion

Given EPA's statutory obligation to ensure accurate monitoring data, the high incidence of smoke-affected data, the significant use of FEM monitors, and other factors challenging the reliability of monitoring data, EPA should delay finalizing the $PM_{2.5}$ designations until it has conducted a thorough review of the accuracy of the air quality monitoring data.

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[19] *Id.* p. 5

Based on research conducted by MOG, we believe there is a high likelihood that the potential nonattainment areas will shrink dramatically or be eliminated by correcting the persistent FEM monitoring bias, removing exceptional events from air quality data, and addressing the other factors set forth in these comments. This is especially important, given USEPA's statutory duty to ensure the accuracy of air quality monitoring data and the importance of this region to US energy dominance and economic growth.

Given the fact that time does not permit these factors to be addressed, the Midwest Ozone Group urges EPA to conclude that available information does not exist that would allow for a meaningfully reliable demonstration of attainment or nonattainment resulting in a designation of "unclassifiable" for the areas involved.

Very truly yours



David M Flannery
Legal Counsel for the
Midwest Ozone Group

Exhibit A

Supporting Materials Demonstrating Enhanced PM2.5 Concentrations in the Chicago Area Resulting from Canadian Wildfire Influence in 2023-2025

[Because of its size, Exhibit A has been placed on a thumb drive and delivered to the EPA Docket Center by express mail and has also been posted on the website of the Midwest Ozone Group and can be found here: https://www.midwestozonegroup.com/_files/ugd/7ec07f_14f450664ecf4a0d95543d54b28bfffd.pdf]

Exhibit B

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Illinois Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Illinois Resulting from Canadian Wildfire Influence in 2023-2025

Prepared by:
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387 Pollard Mine Road
Burnsville, NC 28714

October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Illinois, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

The significance of this issue is illustrated clearly by monitor 170313103 (Illinois EPA Trailer) in Cook County, Illinois, from the Chicago metro area. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 9.8 $\mu g/m^3$, removal of all identified smoke-influenced[1] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.8 $\mu g/m^3$) with the current annual PM2.5 NAAQS. Figure 1 below shows these dates using EPA's PM2.5 Tiering Tool[2] while Table 1 provides the recalculated annual mean and design values absent these Tier 1 dates and noted overhead smoke.

In fact, for all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations bring all Chicago metro monitors below the level of the 2024 annual PM2.5 NAAQS and brings both monitors from Illinois in the St. Louis metro area to within 0.1-0.2 $\mu g/m^3$ of the standard. These values for all monitors are presented in Table 1.

[1] https://www.ospo.noaa.gov/products/land/hms.html
[2] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

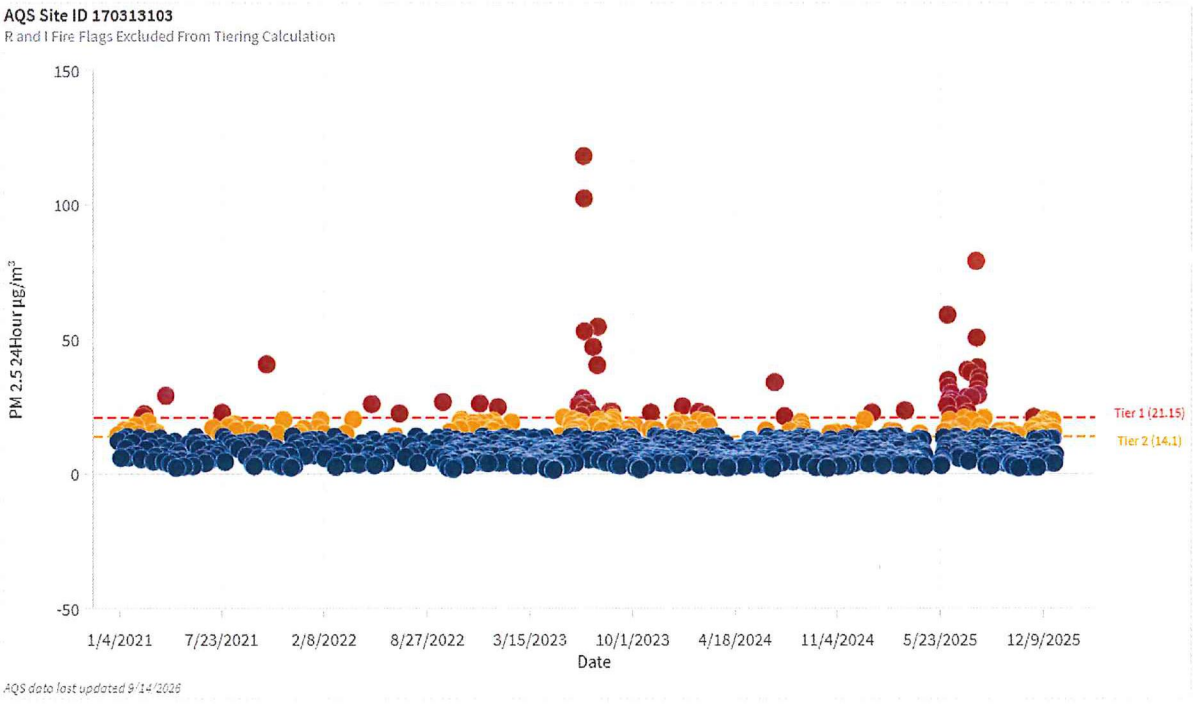

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the IEPA Trailer monitor (170313103).

Table 1. Unadjusted and excluding smoke-influenced Tier 1 adjusted Illinois PM2.5 monitor annual mean and design values.

				Excluding All Smoke-Influenced Tier 1 Date Concentrations			
County	**Site ID**	**Local Site Name**	**2023-2025 Annual DV (ug/m3)**	**2023 Annual Mean (ug/m3)**	**2024 Annual Mean (ug/m3)**	**2025 Annual Mean (ug/m3)**	**2023-2025 Annual DV (ug/m3)**
Cook	170310022	Washington HS	9.3	9.82	7.57	9.13	8.8
Cook	170310052	Mayfair Pump Station	9.2	9.64	7.73	8.56	8.6
Cook	170310057	Springfield Pump Station	9.5	9.25	7.87	8.91	8.7
Cook	170310119	Kingery Near Road #1	9.4	9.76	7.76	8.55	8.7
Cook	170313103	IEPA Trailer	9.8	9.11	8.15	9.14	8.8
Cook	170313301	Graves ES	9.4	9.97	7.62	8.89	8.8
Cook	170316005	Liberty School	9.4	9.28	7.48	8.47	8.4
DuPage	170434002	City Hall	9.3	9.13	8.13	7.98	8.4
Madison	171191007	Firestation #1	9.4	10.16	8.79	8.75	9.2
Saint Clair	171630010	IEPA-Raps Trailer	9.4	9.86	8.61	8.70	9.1
Will	171971002	Pershing School	9.3	9.02	7.83	8.30	8.4

These examples demonstrate the substantial regulatory implications associated with smoke-influenced concentrations and underscores the magnitude of fully evaluating and excluding affected data where supported by technical evidence. The importance of proper data management increases as standards become increasingly stringent and closer to background levels. Beyond attainment determinations alone, retaining these concentrations within the regulatory record could influence future permitting requirements, transportation conformity analyses, State Implementation Plan obligations, emissions reduction strategies, and broader regulatory planning efforts tied to both PM2.5 and ozone programs.

Consideration should also be given to monitors located outside designated counties and CBSAs but within the same regional airshed that experienced impacts from the same smoke plumes during the 2023-2025 episodes. In many cases, smoke transport is regional in scale and crosses jurisdictional and programmatic boundaries. Therefore, states should be encouraged to reference and leverage existing exceptional events demonstrations prepared by neighboring states where proximal monitors were impacted by the same smoke episodes on the same dates. Such coordination would improve consistency, reduce redundant analytical burdens, and better reflect the regional nature of the wildfire and prescribed fire impacts observed during these events.

Finally, consideration should be given to allowing states, including Illinois, flexibility in satisfying the clear causal relationship criterion for wildfire and prescribed fire dates associated with smoke episodes. The collective body of evidence developed here through satellite imagery, air mass trajectory analyses, smoke modeling, surface observations, and widespread concentration enhancements has already demonstrated that Canadian wildfire smoke and domestic prescribed fires significantly impacted PM2.5 concentrations across the region.

Given the extensive number of demonstrations currently being prepared nationwide for these episodes, it would be reasonable and appropriate for regulatory agencies to permit states to adopt and reference other state technical analyses and supporting evidence and related demonstrations to satisfy Tier 1 obligations. Such an approach would maintain technical rigor while promoting regulatory consistency and administrative efficiency in addressing these unprecedented regional smoke events.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[3].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

Figure 2 shows the 24-hour PM2.5 concentrations for the Washington High School monitor (170310022) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

PM2.5 concentrations were elevated at all remaining reviewed sites in Illinois during these dates (Figure 2 through Figure 11), demonstrating that the region was impacted by area-wide events.

All the reviewed monitors recorded multiple 24-hour PM2.5 concentrations above their Tier 1 threshold values during the period of 2023 through 2025, indicating rare PM2.5 episodes. At all monitors, the observations from many of these days were in the top five days of the five-year period between 2023 and 2025, in many locations they were the single top value.

[3] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

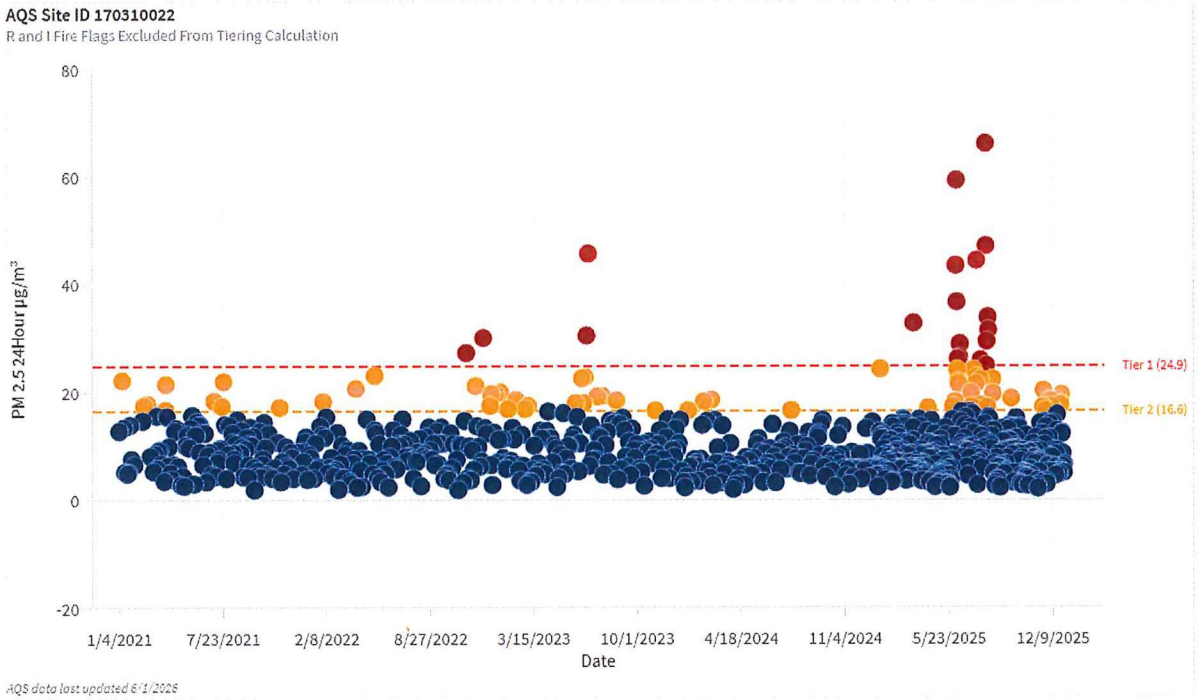

Figure 2. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Washington HS monitor (170310022).

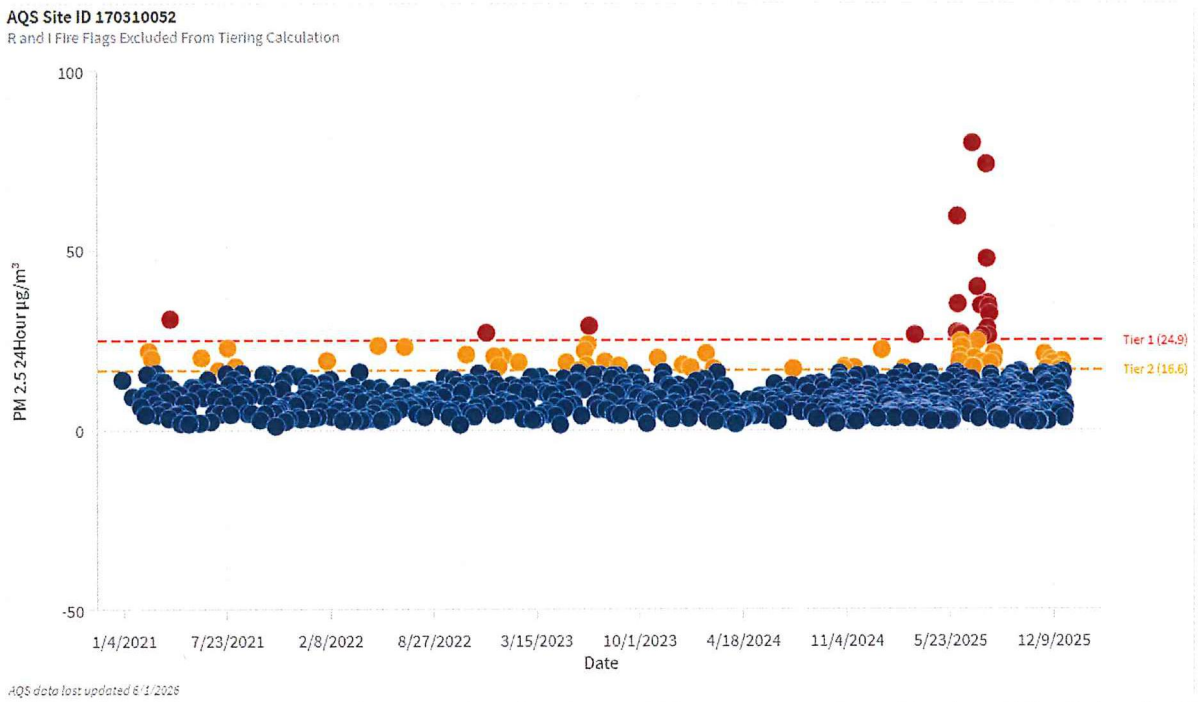

Figure 3. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Mayfair Pump Station monitor (170310052).

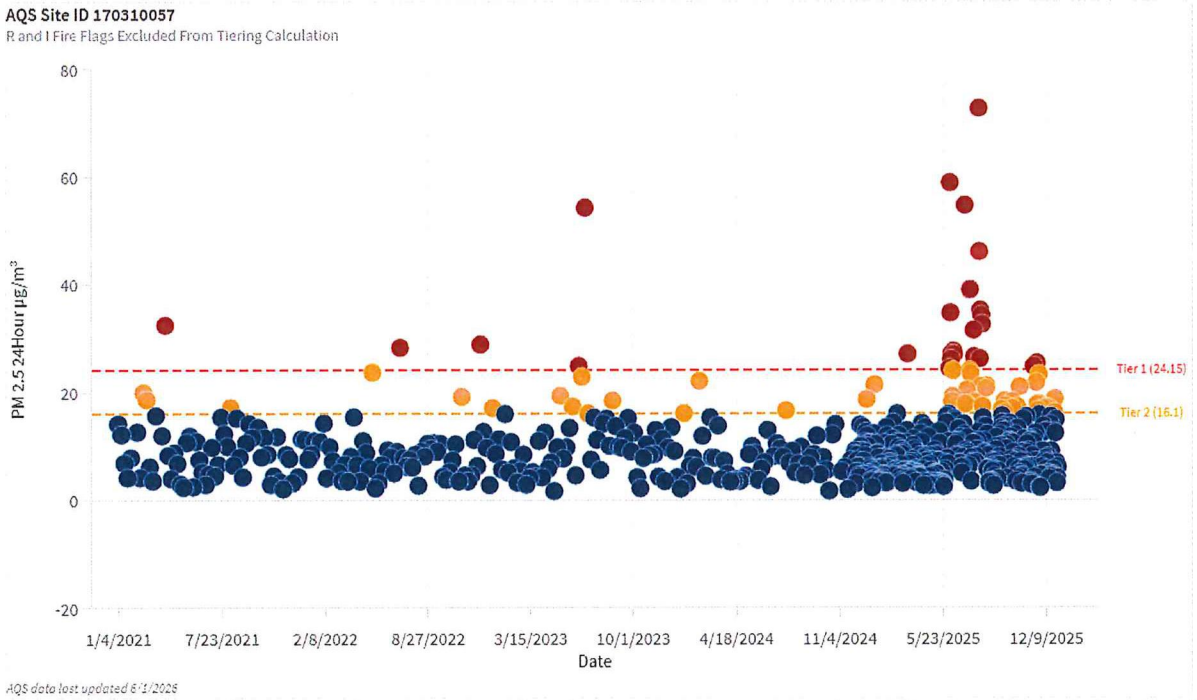

Figure 4. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Springfield Pump Station monitor (170310057).

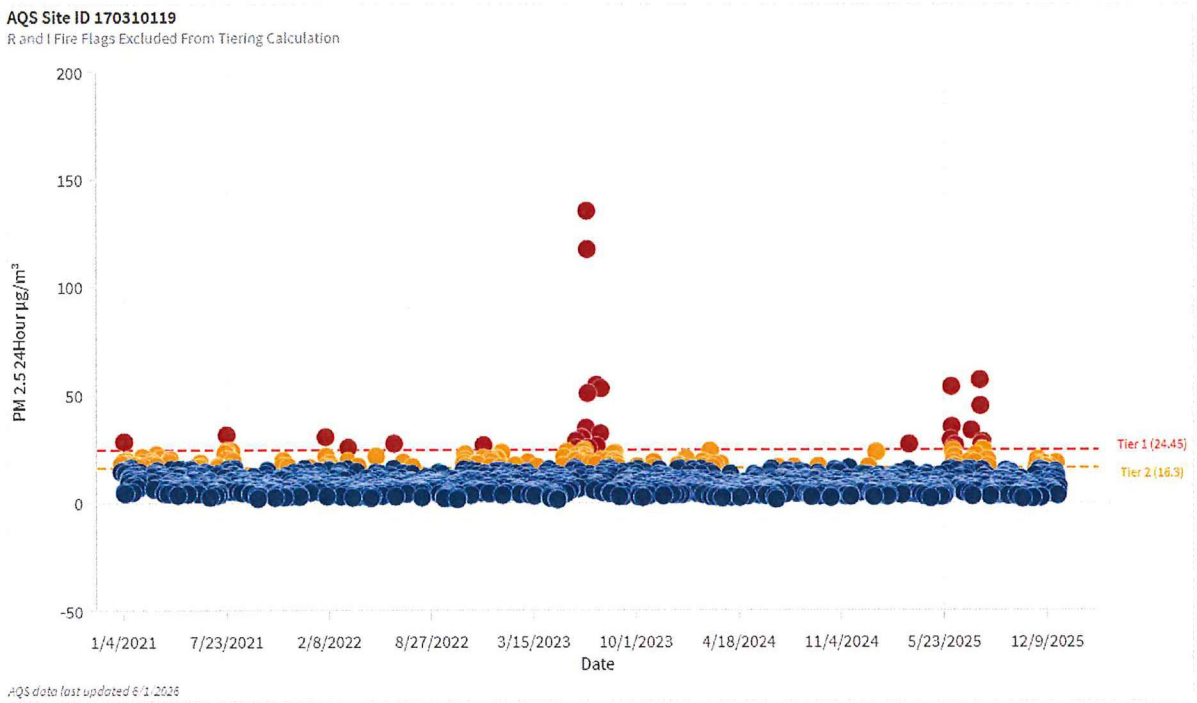

Figure 5. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Kingery Near Road #1 monitor (170310119).

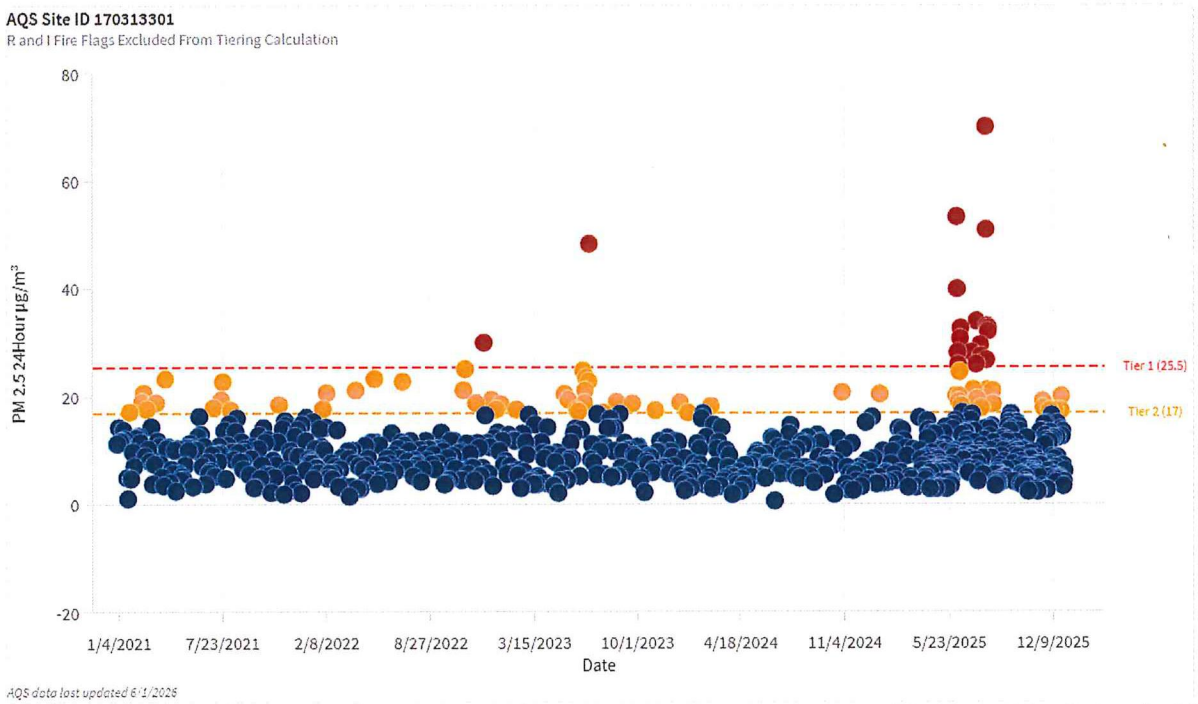

Figure 6. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Graves ES monitor (170313301).

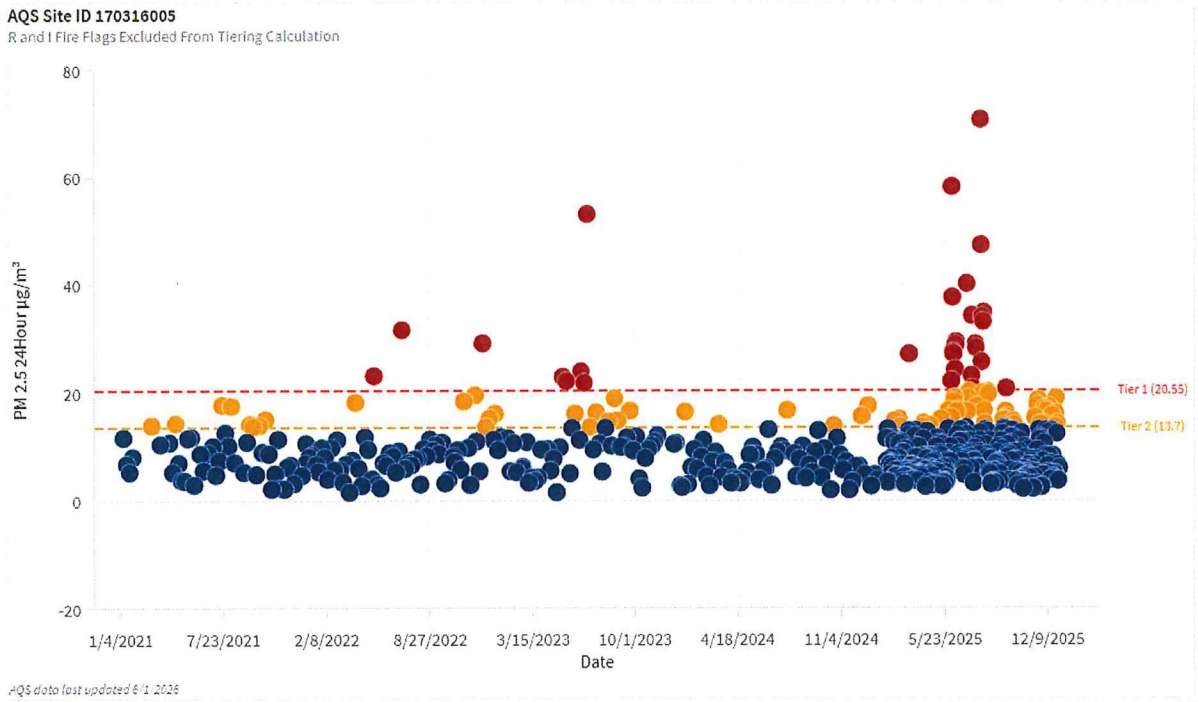

Figure 7. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Liberty School monitor (170316005).

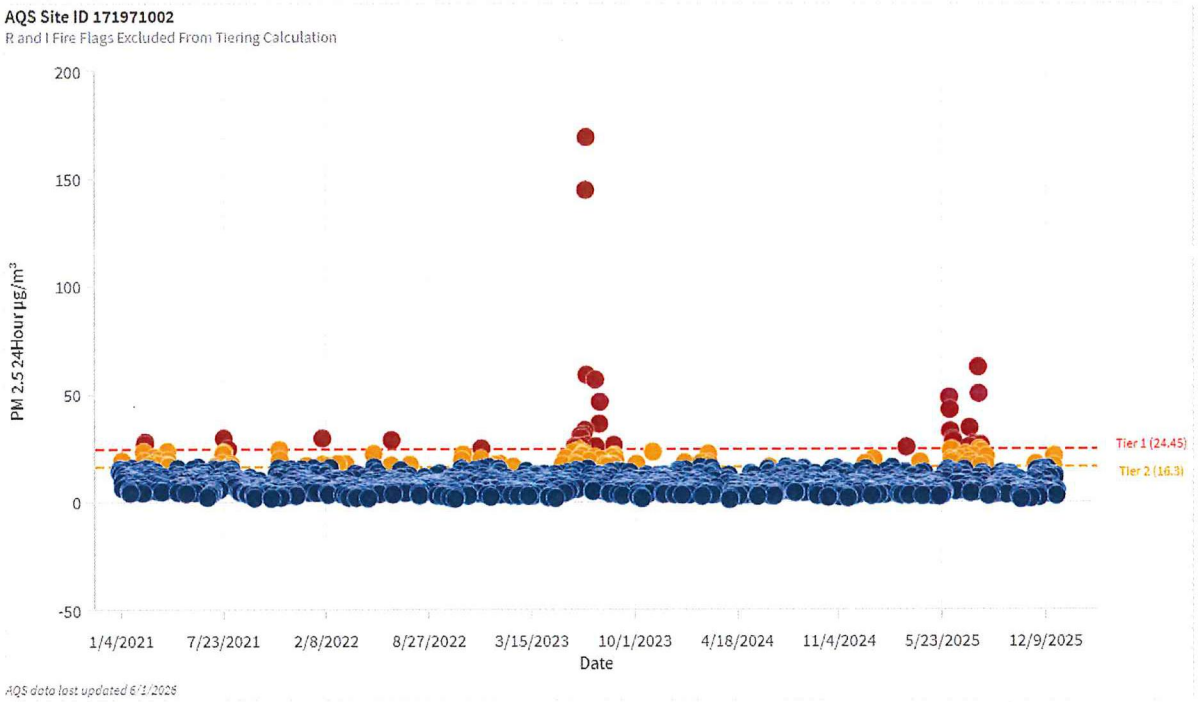

Figure 8. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the City Hall monitor (170434002).

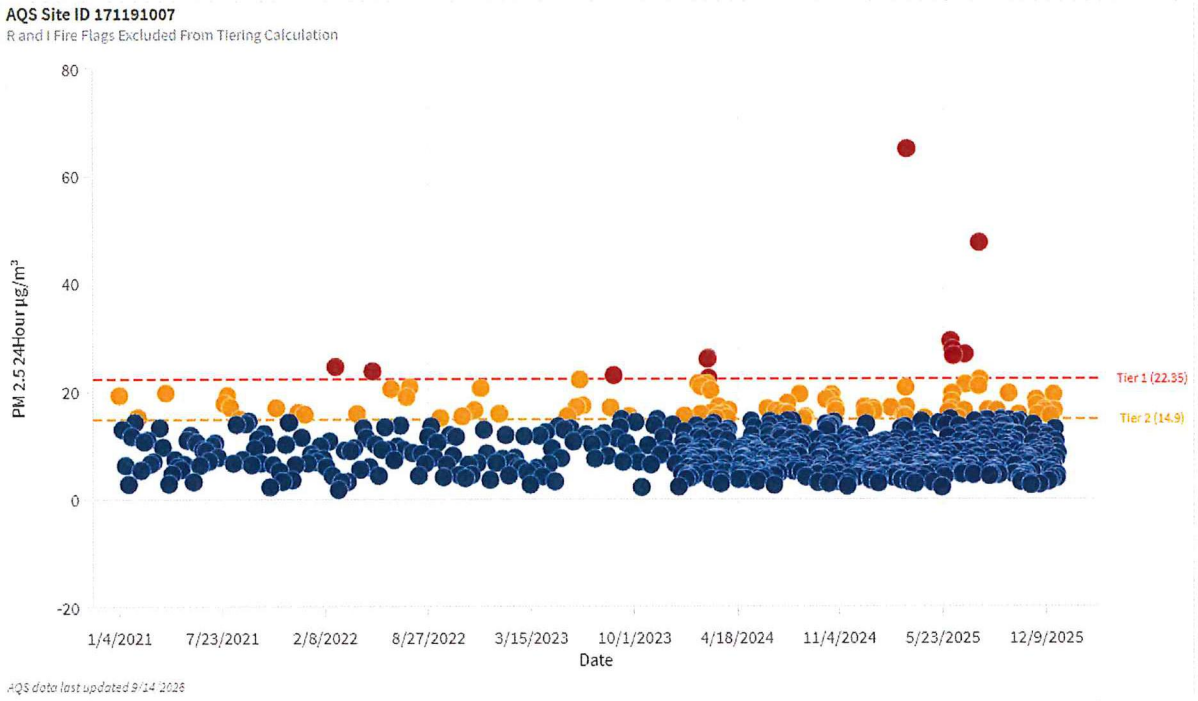

Figure 9. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Firestation #1 monitor (171191007).

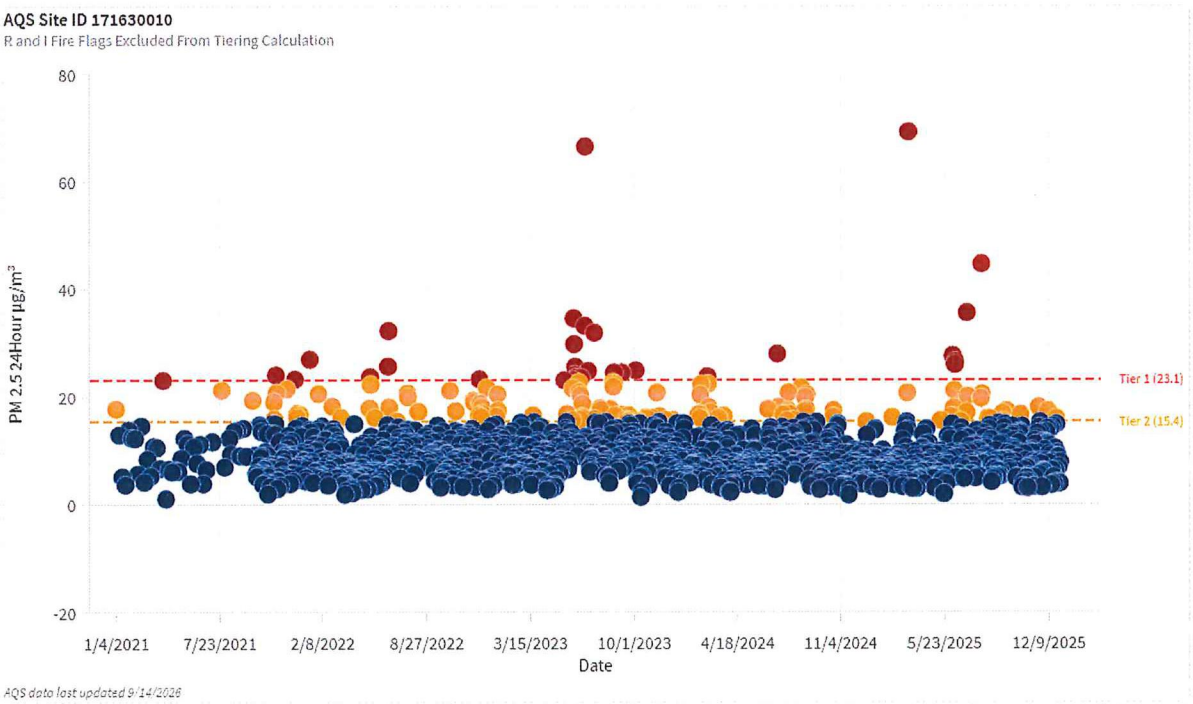

Figure 10. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the IEPA-Raps trailer monitor (171630010).

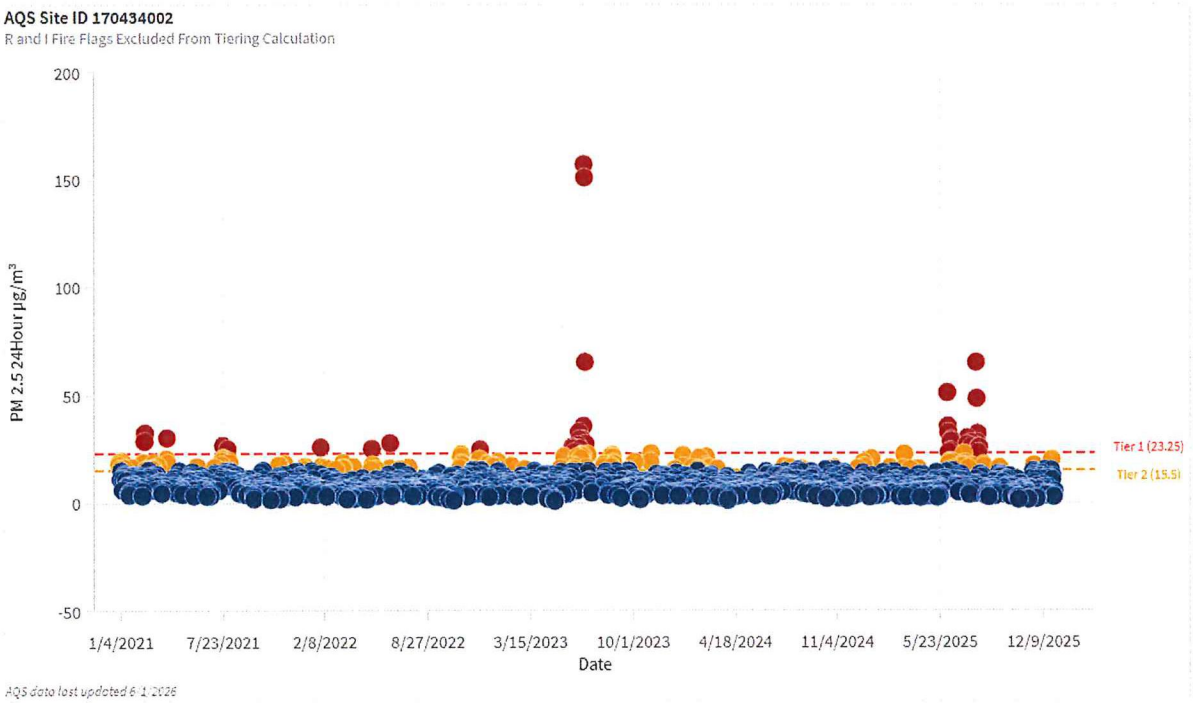

Figure 11. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Pershing School monitor (171971002).

Tier 1 / Tier 2 Dates Selected

Table 2 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[4] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 2. Monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2023-03-20										16.6	
2023-04-04										14.4	
2023-05-12		18.8	19.4	17.2		20.5	23	16.1			
2023-05-13				21							17.3
2023-05-19				23.6	21.1	19.4	22.2	21.6		23.1	20.3
2023-05-24									15.4	16.8	
2023-06-03										15.7	
2023-06-04				19.6	18.1			26		21.6	23.1
2023-06-05	18	15.8	17.4	19.5	15.1	17.5	16.2	17.6		23.1	17.8
2023-06-06				28.6	20.1			25.4		34.6	25.8
2023-06-07				21.4	14.2			15.7		29.8	17.8
2023-06-08	15.4	16.7		25.2	16.5	17.2		23.6		24.1	25.3
2023-06-09				19.9	15.2			15.6		25.6	
2023-06-10								16.9		23.6	17.2
2023-06-11									17.1		
2023-06-14								21.5			19.9
2023-06-15				18.4	16.8			26.9			24.1
2023-06-16										22.7	
2023-06-17	22.6	22	24.9	30.3	25.7	24.8	24	33	22.2	20.9	30.8
2023-06-18				29.8	25			29.6		15.8	29.6
2023-06-19				23.6	19.2			25.2		20.3	25.8
2023-06-20	18	17.9		20.5	16.6	18.8		20.7		23.5	21.7
2023-06-21				21.5	16.9	21.1		21.9			21.4

[4] Data downloaded from EPA Tiering Tool on October 21, 2026.

ALPINE GEOPHYSICS

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2023-06-22				21.8	19.1			22.4		16.3	22.1
2023-06-23	22.8	23.8	22.9	24.4	21.6	23.5	21.9	29.6	17.4	18.7	31.2
2023-06-24				17.9	14.2			22.3		16.1	22.8
2023-06-26	30.5	29		34.8	28.1			35.8			33.4
2023-06-27				135.4	118.2			157.2		33.2	144.8
2023-06-28				117.6	102.4	22.8		151		66.5	169.3
2023-06-29	45.7		54.3	50.9	53	48.3	53.2	65.4			59.1
2023-06-30				25.4	23.7			27.5			26.3
2023-07-01				19.4	17.9			16.5			
2023-07-04				17.8	26.1			22.6		24.8	19
2023-07-05			16.1				13.7				
2023-07-15				17.7	22.2						20.8
2023-07-16				54.7	47.2					31.9	56.8
2023-07-17	19.2			26.3	17.7		16.4			15.9	25.9
2023-07-24				32.2	40.5						36.3
2023-07-25				53.1	54.7						46.5
2023-07-26	19.3	19		19.9	20	17					19.7
2023-07-27										17.9	
2023-07-28										17.6	
2023-08-04				15.7				16.7			16.9
2023-08-05				19.5	18.3			18			17.6
2023-08-08				15.5							16.3
2023-08-09				17.4	18.3						17
2023-08-10	14.7			16.1	17.6		14.7				
2023-08-16	14.1								17	17.7	
2023-08-18				22.7	23.2			21.5			20.8
2023-08-19	14.4			19.4	18.8			17.3			17.4
2023-08-20					17.1			16.6			16.9
2023-08-21				23.2	21.4			22.3		22.7	26.5
2023-08-22	18.5	17.9	18.5	19.7	23.1	19	19	21.2	23	21.9	21.7
2023-08-23				18.4	20.7			18.8		24.5	21.1
2023-08-24				17.1	19.8			18.2		22.4	19.4
2023-08-25										16.5	

ALPINE GEOPHYSICS

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2023-08-28				16.4		16.7	14.9				
2023-09-03	15.2										
2023-09-06				14.2					14.8	16.7	13.9
2023-09-07										24.5	
2023-09-15		13.3									
2023-09-16										15.8	
2023-09-18										15.4	
2023-09-19										15.4	
2023-09-20					15.3			13.6		16.6	
2023-09-21		15.6	15.2	14.6	16.6	18.7	16.7	15.5	15.4		13.8
2023-09-22					14.5			15		15.7	
2023-09-23								13.2			
2023-09-29					13.6						
2023-10-10										15.4	
2023-11-04				16.4				19.3			23.5
2023-11-05	16.6	20		18.9	22.8	17.4		23.1		16.1	23.3
2024-02-20					19.3			17.4	26	23.8	17.1
2024-02-21	18.6	17.1		17.9	22.1	18.2		21.5	26.2	22.4	22.5
2024-02-22				24.1	19.3			16.5	22.5	18.1	18.3
2024-02-26									20.2	17.1	
2024-02-27				16.3	17.8			16.4	16		
2024-03-02				17.7							
2024-03-12									17.2	16.1	
2024-03-13			13.8	18.1			14.2	15.9	15.5		
2024-03-22									15.8	16.5	
2024-06-16									16.8	17.7	
2024-06-17					16.2						
2024-06-20											16.3
2024-07-04				16.4	34.1				16.4	28	
2024-07-06										18.1	
2024-07-15									15.9	16.7	
2024-07-23	16.6	17	16.6		21.5		16.8	17	15.9	15.6	
2024-07-24										17.1	

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2024-07-25										17.5	
2024-07-26									17.8	20.8	
2024-07-27									15.8	16.8	
2024-08-03				16.6				16.3			
2024-08-05										15.7	
2024-08-19									19.5	21.7	
2024-08-24					19.4			15.7			
2024-08-26					17.5			16		17.3	
2024-08-27										19.9	
2024-08-29										17.6	
2024-08-30										20.4	
2024-09-12						12.8					
2024-09-13								14.4			
2024-09-18				13.7							13.3
2024-09-20				16.9							
2024-09-21	14.8										
2024-10-10									18.5		
2024-10-20								15.7	18.7	16.3	
2024-10-21							13.9		19.4	17.5	
2024-10-28									17.1		
2024-10-29		16.9						16.2	16.4		
2024-10-30	13.6	17.6				20.7			16.4		15.7
2025-03-09									15.4		
2025-03-13								15.9	20.7	20.7	
2025-03-26								15.5			
2025-05-30	17.3				15.7		16.7				
2025-06-03	18.2	15.9	15.9		15.8		15.4		16.1	16.3	
2025-06-05	59.3	59.4	58.9	53.9	59.1	53.3	58.2	51.1			48.6
2025-06-06	36.7	35	34.7	35.3	34.9	39.9	37.7	35.6			42.8
2025-06-07	24.1	27.1	26.1	24.7	32.2	28.1	27.5	32.7	29.3	27.6	32.8
2025-06-08	26.1	26.7	27.1	24	27.5	25.8	27.2	23.5	16.6	16.3	24
2025-06-09	21.9	18.9	18.3	18.7	19.8	19	18.3	18.4	18	17.9	19.6
2025-06-10	21.5	20.4	19.2	16.9	21.8	20	19	19.2	19.6	21.2	18.4

ALPINE GEOPHYSICS

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2025-06-11	26.4	24.5	24	21.3	26.1	24.5	24.3	24.2	27.7	26	24.1
2025-06-12	28.9	26.5	27.6	26.6	29.8	30.7	28.9	28.6	26.6	26.5	29.1
2025-06-14			15	16.4	15.8	18.2	16.5	18.9			18.9
2025-06-15								14.8			
2025-06-22									14.9	15.4	
2025-06-23	15.3										19.9
2025-07-03									16.4	17.1	
2025-07-04	19.8	79.8	54.7		25.7	28.1	40.2	17.7	26.9	35.6	
2025-07-05	17.3	17.3	17.8		17.9		16.5	17.1	21.3	20.1	16.5
2025-07-07		17.3	17.8		21.8	21.3	19	22.8			22.2
2025-07-08	24.1	19.9	20.4	18.7	20.6	21.2	20.2	18.6			20.3
2025-07-13	21.5	24.6	24	19.5	28.5	25.9	23.2	27			25.5
2025-07-14	44.4	39.7	39	33.7	38.6	33.9	34.3	30.1			34.4
2025-07-15	22.8	25.1	23.5		22.8	19.5	20.8	16.1			18.7
2025-07-21	22.3	34.5	31.5	18.5	37.7	29.5	29	27.9			21.3
2025-07-22	25.9	26.1	26.6	22	28.3	27.4	28.3	26.1			26.9
2025-07-31	66.1	73.9	72.7	57	79.1	70	70.7	65.2	21	19.7	62.5
2025-08-01	47.1	47.6	46.1	45	50.6	50.9	47.4	48.4	47.6	44.7	50.2
2025-08-02	24.9	28.2	26.2	24.5	31.1	26.7	25.7	28	22.2	20.5	24.4
2025-08-03	29.4	35.2	35.2	27.1	39.6	33	34.1	32.2			26.8
2025-08-04	17.2	26.1	21.1		29.3	21.2	20	23.4			16.4
2025-08-05	33.9	34.1	34.3	28.3	33.8	32	33.2	26			26.4
2025-08-06	31.5	32.2	32.6	24.4	35.8	32.6	34.9	25.7			23.3
2025-08-08	15		15.2				14.3				
2025-08-18									16.5	15.9	
2025-09-04									16.4		
2025-09-11									14.6	16.9	
2025-09-12									14.8	15.4	
2025-09-13		14.4	16.8		15.8	14.3	14.9	13.5			
2025-09-15			14.3			15.8					
2025-09-16						13.5	15.1				
2025-09-17						15.2					
2025-09-18		14.1	16.1		16	16.6	16.5	13.3		17.4	12.5

ALPINE GEOPHYSICS

	Monitor-specific 24-hour PM2.5 concentrations (µg/m3)										
Date	170310022	170310052	170310057	170310119	170313103	170313301	170316005	170434002	171191007	171630010	171971002
2025-09-19	18.8	15.4	18.4	14.9	16.3	16.7	20.8				12.6
2025-09-20		13.7	17.5		14.1	13.9	15.5				
2025-09-27		13.5							19.6		
2025-09-29	15.1	13.8	14.2	14	14.3	15					
2025-09-30						15					13.2
2025-10-03			18.3				14.7				
2025-10-04			17				14.1				
2025-10-16									15.7		

Complete Monitor Level Results

A substantial number of days in 2023 and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Illinois. The smoke's effects extended beyond Illinois, with elevated concentrations also observed in regional areas in and around Lake Michigan and St. Louis.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 4, when these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, every analyzed monitor in the Chicago metropolitan area fell below the annual PM2.5 standard of 9.0 $\mu g/m^3$ and both Illinois monitors from the St. Louis metro area were within 0.1-0.2 $\mu g/m^3$ of the 2024 annual PM2.5 NAAQS.

Removing Tier 1 concentrations lowered design values by an average of 0.7 $\mu g/m^3$ across these monitors. When Tier 2 dates were also removed, design values were an average of 1.2 $\mu g/m^3$ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 3. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Illinois monitors, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Illinois	Cook	170310022	Washington HS	10.28	7.57	10.13	9.3
Illinois	Cook	170310052	Mayfair Pump Station	10.02	7.73	9.97	9.2
Illinois	Cook	170310057	Springfield Pump Station	10.48	7.87	10.12	9.5
Illinois	Cook	170310119	Kingery Near Road #1	11.18	7.76	9.31	9.4
Illinois	Cook	170313103	IEPA Trailer	10.37	8.22	10.71	9.8
Illinois	Cook	170313301	Graves ES	10.37	7.62	10.07	9.4
Illinois	Cook	170316005	Liberty School	11.06	7.48	9.75	9.4
Illinois	DuPage	170434002	City Hall	10.66	8.13	9.09	9.3
Illinois	Madison	171191007	Firestation #1	10.16	8.88	9.06	9.4
Illinois	Saint Clair	171630010	IEPA-Raps Trailer	10.62	8.70	9.02	9.4
Illinois	Will	171971002	Pershing School	10.82	7.83	9.13	9.3

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Illinois monitors with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Illinois	Cook	170310022	Washington HS	9.82	7.57	9.13	8.8
Illinois	Cook	170310052	Mayfair Pump Station	9.64	7.73	8.56	8.6
Illinois	Cook	170310057	Springfield Pump Station	9.25	7.87	8.91	8.7
Illinois	Cook	170310119	Kingery Near Road #1	9.76	7.76	8.55	8.7
Illinois	Cook	170313103	IEPA Trailer	9.11	8.15	9.14	8.8
Illinois	Cook	170313301	Graves ES	9.97	7.62	8.89	8.8
Illinois	Cook	170316005	Liberty School	9.28	7.48	8.47	8.4
Illinois	DuPage	170434002	City Hall	9.13	8.13	7.98	8.4
Illinois	Madison	171191007	Firestation #1	10.16	8.79	8.75	9.2
Illinois	Saint Clair	171630010	IEPA-Raps Trailer	9.86	8.61	8.70	9.1
Illinois	Will	171971002	Pershing School	9.02	7.83	8.30	8.4

Table 5. Annual mean concentrations and 3-year design values (µg/m3) at Illinois monitors with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Illinois	Cook	170310022	Washington HS	8.85	7.31	8.67	8.3
Illinois	Cook	170310052	Mayfair Pump Station	9.00	7.53	8.24	8.3
Illinois	Cook	170310057	Springfield Pump Station	8.52	7.64	8.40	8.2
Illinois	Cook	170310119	Kingery Near Road #1	8.76	7.53	8.22	8.2
Illinois	Cook	170313103	IEPA Trailer	8.15	7.92	8.77	8.3
Illinois	Cook	170313301	Graves ES	8.84	7.38	8.49	8.2
Illinois	Cook	170316005	Liberty School	8.47	7.10	8.07	7.9
Illinois	DuPage	170434002	City Hall	8.30	7.85	7.63	7.9
Illinois	Madison	171191007	Firestation #1	9.14	8.27	8.31	8.6
Illinois	Saint Clair	171630010	IEPA-Raps Trailer	9.15	8.08	8.34	8.5
Illinois	Will	171971002	Pershing School	8.03	7.65	7.75	7.8

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Illinois monitors both within the Chicago and St. Louis metro areas and regionwide, the following action is recommended.

1. Each date at monitors within Illinois identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Illinois, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes. An example application would be excluding dates and concentrations from regional Illinois, Michigan, or Ohio monitors consistent with dates and monitors already concurred with by EPA[5] in Indiana's exceptional events demonstrations.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional even days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine

[5] https://www.in.gov/dA/f244662b4f/pm25_exceptional_events_epa_concurrence_lake_co.pdf

technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.

Exhibit C

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Indiana Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Indiana Resulting from Canadian Wildfire Influence in 2023-2025

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October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Indiana, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

The significance of this issue is illustrated clearly by monitor 180970081 (Indpls- W. 18th St./ Ernie Pyle School 90) in Marion County, Indiana. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 11.5 $\mu g/m^3$, removal of all identified smoke-influenced[1] Tier 1 dates would reduce the annual design value to 10.7 $\mu g/m^3$. Figure 1 below shows these dates using EPA's PM2.5 Tiering Tool[2] while Table 1 provides the recalculated annual mean and design values absent these Tier 1 dates and noted overhead smoke.

In fact, for monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations brings all Chicago metro monitors in Lake County below the level of the 2024 annual PM2.5 NAAQS and decreases concentrations at monitors in the Indianapolis metro area by an average of 0.7 $\mu g/m^3$. These values for all monitors are presented in Table 1.

[1] https://www.ospo.noaa.gov/products/land/hms.html
[2] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

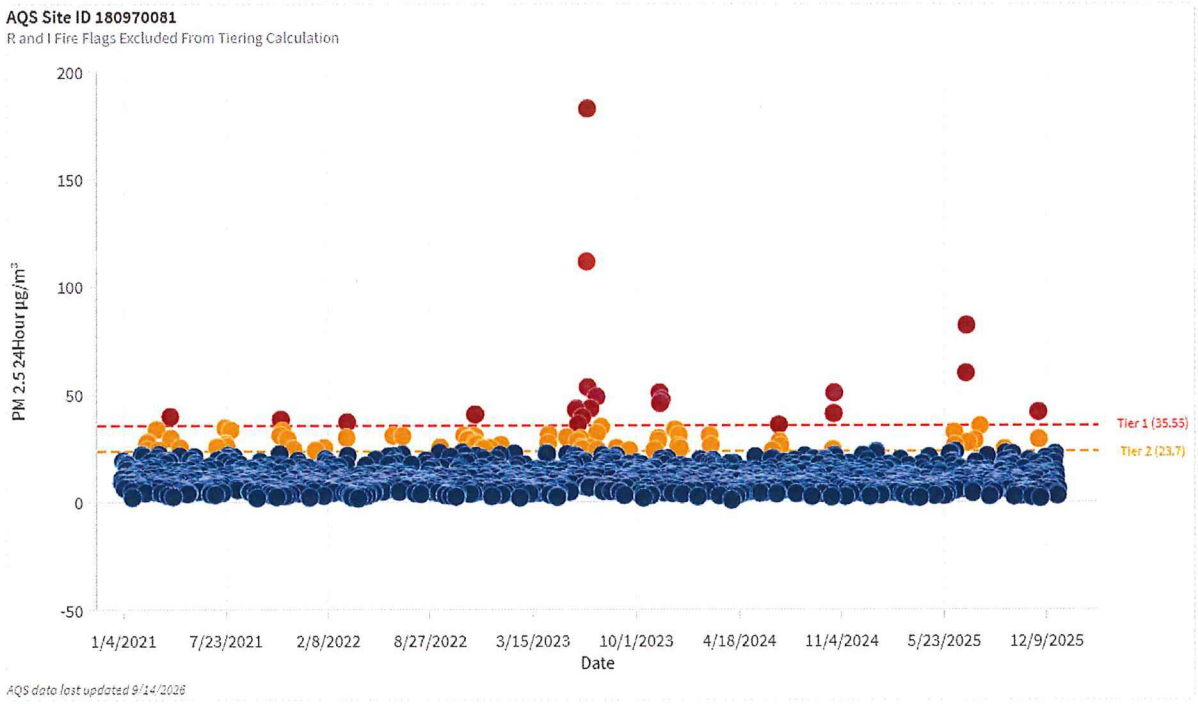

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Indpls- W. 18th St./ Ernie Pyle School 90 monitor (180970081).

Table 1. Unadjusted and excluding smoke-influenced Tier 1 adjusted Indiana PM2.5 monitor annual mean and design values.

				Excluding All Smoke-Influenced Tier 1 Date Concentrations			
County	Site ID	Local Site Name	2023-2025 Annual DV (ug/m3)	2023 Annual Mean (ug/m3)	2024 Annual Mean (ug/m3)	2025 Annual Mean (ug/m3)	2023-2025 Annual DV (ug/m3)
Lake	180890031	Gary- Madison St./ Gary Water	9.1	9.06	8.60	9.00	8.9
Lake	180890034	East Chicago-Marina	9.1	9.49	7.81	8.24	8.5
Lake	180890036	Hammond- 167th St	9.1	8.82	7.62	8.48	8.3
Marion	180970078	Indpls- Washington Park	9.9	9.71	8.75	8.99	9.2
Marion	180970081	Indpls- W. 18th St./ Ernie Pyle School 90	11.5	11.70	10.26	10.06	10.7
Marion	180970087	Indpls.- I 70	11.2	11.91	9.61	9.97	10.5

These examples demonstrate the substantial regulatory implications associated with smoke-influenced concentrations and underscores the magnitude of fully evaluating and excluding affected data where supported by technical evidence. The importance of proper data management increases as standards become increasingly stringent and closer to background levels. Beyond attainment determinations alone, retaining these concentrations within the regulatory record could influence future permitting requirements, transportation conformity analyses, State Implementation Plan obligations, emissions reduction strategies, and broader regulatory planning efforts tied to both PM2.5 and ozone programs.

Consideration should also be given to monitors located outside designated counties and CBSAs but within the same regional airshed that experienced impacts from the same smoke plumes during the 2023-2025 episodes. In many cases, smoke transport is regional in scale and crosses jurisdictional and programmatic boundaries. Therefore, states should be encouraged to reference and leverage existing exceptional events demonstrations prepared by neighboring states where proximal monitors were impacted by the same smoke episodes on the same dates. Such coordination would improve consistency, reduce redundant analytical burdens, and better reflect the regional nature of the wildfire and prescribed fire impacts observed during these events.

Finally, consideration should be given to allowing states, including Indiana, flexibility in satisfying the clear causal relationship criterion for wildfire and prescribed fire dates associated with smoke episodes. The collective body of evidence developed here through satellite imagery, air mass trajectory analyses, smoke modeling, surface observations, and widespread concentration enhancements has already demonstrated that Canadian wildfire smoke and domestic prescribed fires significantly impacted PM2.5 concentrations across the region.

Given the extensive number of demonstrations currently being prepared nationwide for these episodes, it would be reasonable and appropriate for regulatory agencies to permit states to adopt and reference other state technical analyses and supporting evidence and related demonstrations to satisfy Tier 1 obligations. Such an approach would maintain technical rigor while promoting regulatory consistency and administrative efficiency in addressing these unprecedented regional smoke events.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[3].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

Figure 2 shows the 24-hour PM2.5 concentrations for the Gary- Madison St./ Gary Water monitor (180890031) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

PM2.5 concentrations were elevated at all remaining reviewed sites in Indiana during these dates (Figure 2 through Figure 6) demonstrating that the region was impacted by area-wide events.

All the reviewed monitors recorded multiple 24-hour PM2.5 concentrations above their Tier 1 threshold values during the period of 2023 through 2025, indicating rare PM2.5 episodes. At all monitors, the observations from many of these days were in the top five days of the five-year period between 2023 and 2025, in many locations they were the single top value.

[3] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

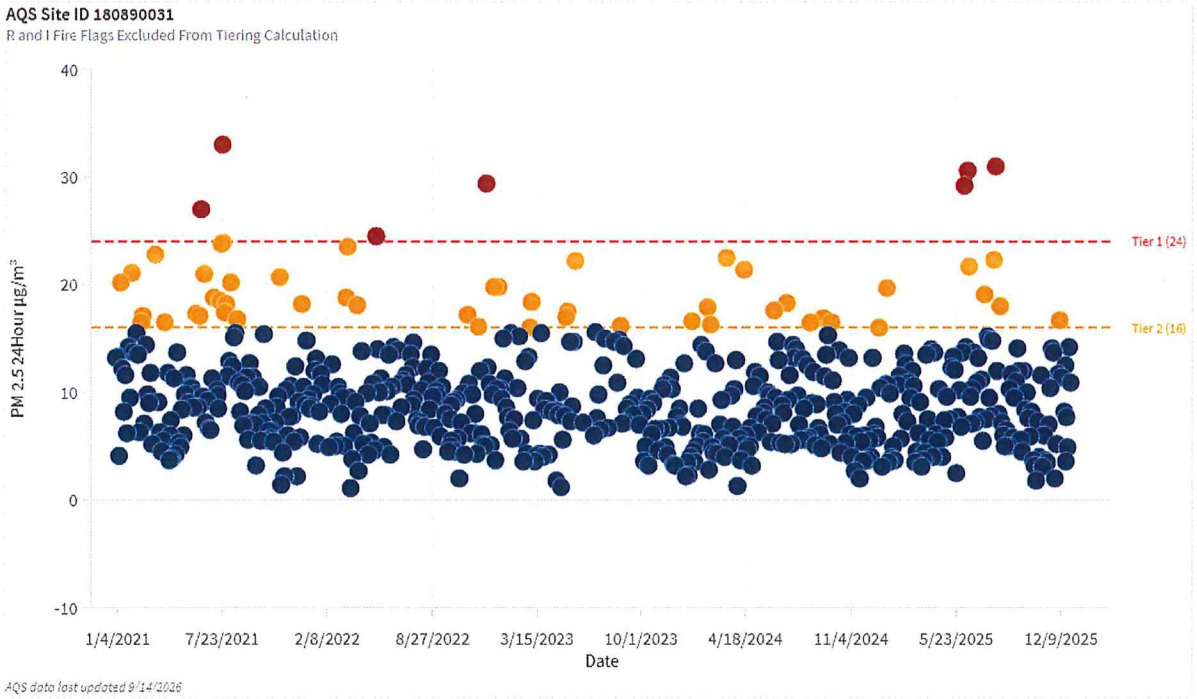

Figure 2. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Gary- Madison St./ Gary Water monitor (180890031).

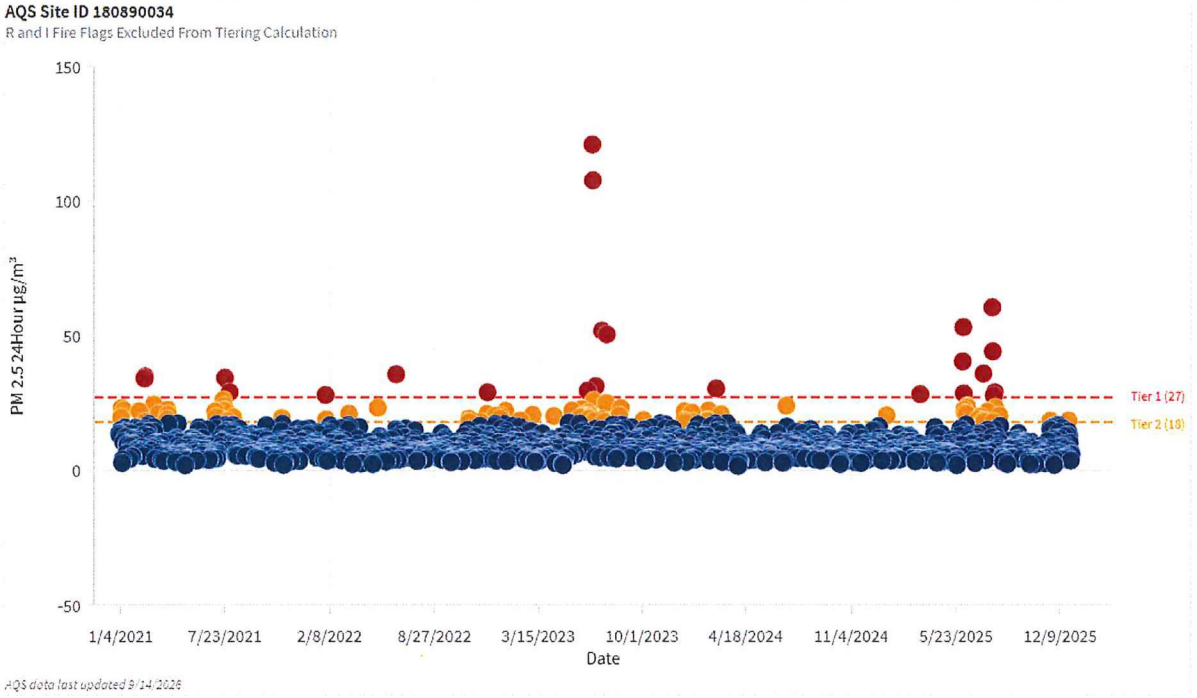

Figure 3. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the East Chicago-Marina monitor (180890034).

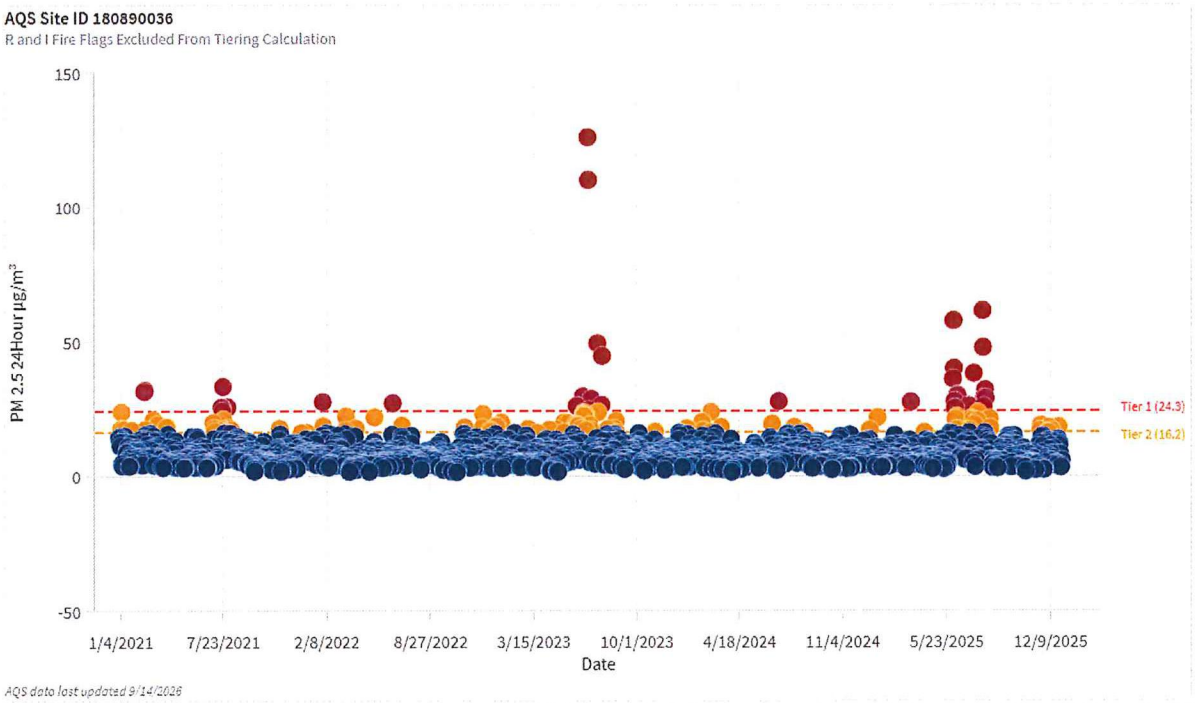

Figure 4. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Hammond- 167th St monitor (180890036).

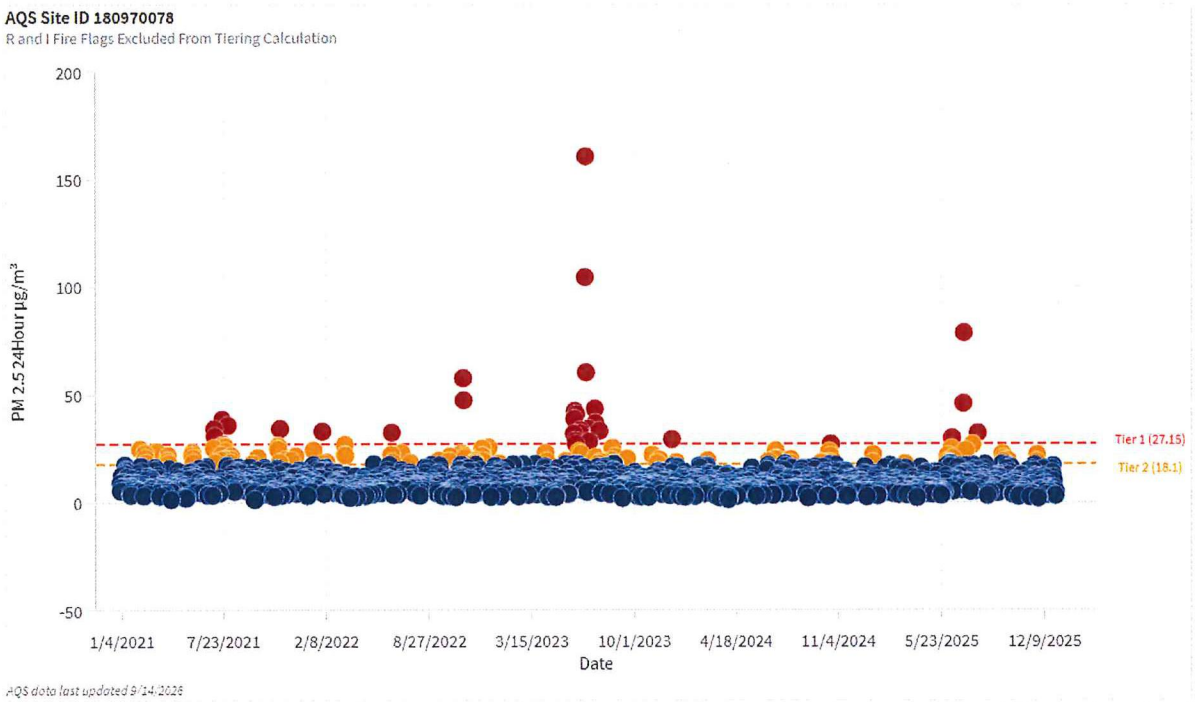

Figure 5. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Indpls- Washington Park monitor (180970078).

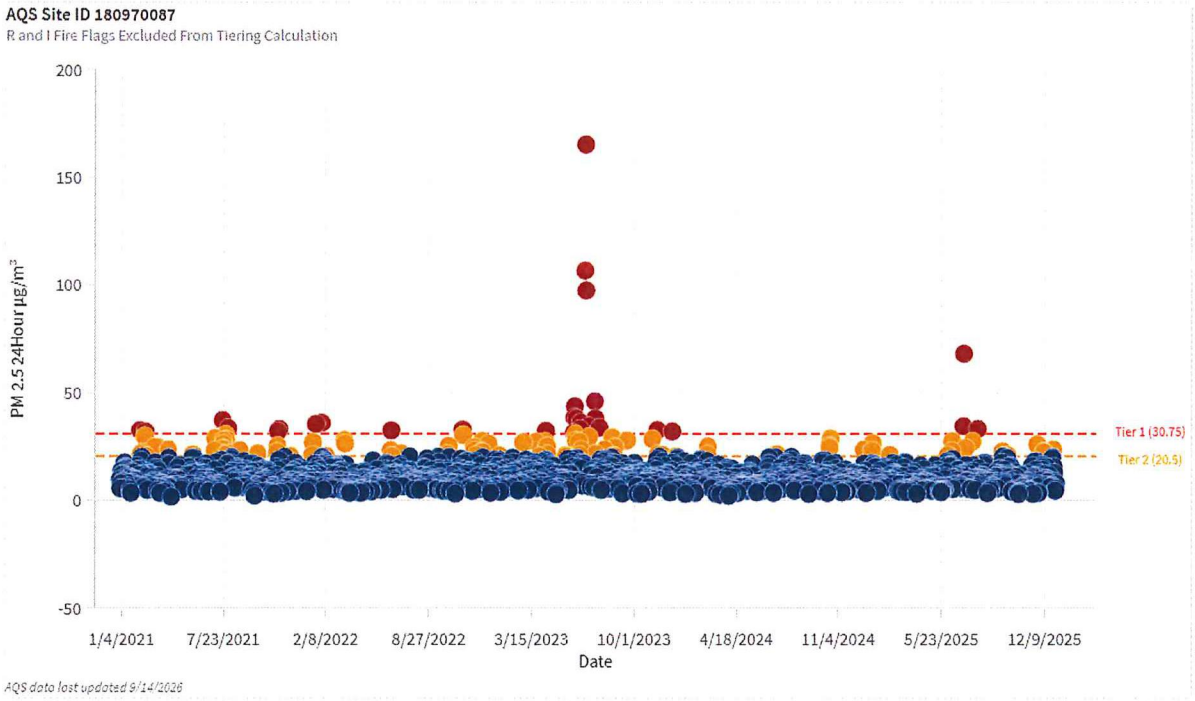

Figure 6. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Indpls.- I 70 monitor (180970087).

Tier 1 / Tier 2 Dates Selected

Table 2 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[4] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 2. Monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

	24-hour PM2.5 Concentrations (µg/m3)					
Date	180890031	180890034	180890036	180970078	180970081	180970087
2023-03-29						20.5
2023-04-09						18.7
2023-04-10						27.3
2023-04-11				23.1		32.3
2023-04-12						18.7
2023-04-13				19.2	27.3	25.2
2023-04-14		20.2	17.3		31.3	21.5
2023-05-07		13.5				
2023-05-09	17					
2023-05-12	17.5	17.6	16.3			
2023-05-13		17.6	20			
2023-05-17	14.7					
2023-05-19		22.2	19.7		30.1	20.9
2023-05-20				19.3	22.2	20.5
2023-05-24	14.7					
2023-05-30			15.5			
2023-06-04		19.7	19.2			
2023-06-05				31.9		31.3
2023-06-06		22.8	26.1	38.8	42.8	38.6
2023-06-07		19.7	18.9	42.5	43.5	43.7
2023-06-08				28.6		30.7
2023-06-09		20.3	18.7	27.2	28.2	27.8
2023-06-10				41	36.1	38.1
2023-06-15		19.8	17.7	23.6	29.4	27.3
2023-06-16						21.2
2023-06-17				32.2	25.3	33.2
2023-06-18		29.6	29.6	33.5	39.3	36.2
2023-06-19		19.9	23.4	22.7	24.6	23.5
2023-06-20		21.5	22.4			
2023-06-21		19.2	22.6			
2023-06-22		20.5	23.3			
2023-06-24			17.1			
2023-06-27		121.1	125.9	104.6	111.7	106.8
2023-06-28		107.7	110.1	160.7	182.7	165.3

[4] Data downloaded from EPA Tiering Tool on October 21, 2026.

	24-hour PM2.5 Concentrations (µg/m3)					
Date	180890031	180890034	180890036	180970078	180970081	180970087
2023-06-29				60.4	53.3	97.5
2023-06-30		25.9	24.6			
2023-07-01		18.4	19			
2023-07-03			17.1			
2023-07-04		31.3	28.7	34.2	43.4	34.5
2023-07-05				28.3	25.2	29.5
2023-07-16		51.9	49.4	43.5	48.9	46
2023-07-17		18.9	23.8	36.9	32	38.1
2023-07-18				21		21.7
2023-07-20		18.1				
2023-07-23				18.1		
2023-07-24		25	26.5			
2023-07-25		50.5	44.7	33.3	34.9	33.8
2023-07-27				18.9		
2023-08-04				18.9		23.6
2023-08-05			17.5			
2023-08-18		20.3	17.6	19.6		
2023-08-19				25.4		29.2
2023-08-21		23.2	20.5			
2023-08-22	16.2		16.2			20.7
2023-08-23				18.1	21.6	20.5
2023-08-24				21.2	25.1	24.6
2023-09-10		16				
2023-09-17				20.4	24	27.9
2023-11-05			16.6	22.2		28.6
2023-11-15				18.4	50.7	32.7
2023-11-16					45.9	21.5
2024-02-20					30.9	
2024-02-21			16.3			21.4
2024-02-22		30.4	23.9	19.6	26.3	25.1
2024-03-02		20.8				
2024-03-13	22.5		18.3			
2024-04-15	21.4					
2024-05-19					21.1	
2024-06-21			19.5	19.1	23.7	
2024-07-04		24	27.8	20.2	35.9	
2024-07-05	18.3			24.2	28	21.6
2024-07-07				20.3	26	21.4
2024-08-03			18.3	18.1		
2024-08-04				20.1		20.2
2024-08-19	16.5					
2024-08-24			16.4		21.5	
2024-09-10					20	
2024-09-12	16.9					
2024-09-20		13.4				
2024-10-02				18.3		

	24-hour PM2.5 Concentrations (µg/m3)					
Date	180890031	180890034	180890036	180970078	180970081	180970087
2024-10-03				18.7		
2024-10-12	13.9					
2024-10-18					24.5	24.6
2024-10-19				21.7	41.1	29
2024-10-20				27.2	50.7	28.7
2024-10-21				18.3		
2024-10-29			13.7			
2024-10-30			14.8			
2025-03-13				18.1		
2025-05-30		15.4	16			
2025-06-03				18.8		
2025-06-04				21.8		21
2025-06-05		53.2	57.8			
2025-06-06	29.2	28.6	40	18.3		
2025-06-07		22.5	27.8			
2025-06-08		21.4	25.3			
2025-06-09			21.2			
2025-06-10			17.2			
2025-06-11		21	22	25	32.5	23
2025-06-12	30.6	23.5	30.1	29.9	26.4	27.5
2025-06-14			17.4			
2025-06-15	21.7					
2025-07-04		19	26.1	45.9	59.9	34.5
2025-07-05				78.7	82.1	68.1
2025-07-07			17			
2025-07-08		20	21.2	24.1	27.7	24.4
2025-07-13		18.6	20.8			
2025-07-14		36	38.2			
2025-07-15	19.1	18.1	19.2			
2025-07-21			20.5			
2025-07-22		21.8	23.5	26.9	28.7	27.4
2025-07-31		60.6	61.5			
2025-08-01		44.2	47.8	32.2	35.4	33.2
2025-08-02	22.3	18	25.8			
2025-08-03		27.8	29			
2025-08-05	31	29	32.1			
2025-08-06		23.3	28.9			
2025-09-18			13.9	22.5	24.7	22.8
2025-09-19		13.8	14.8	20.5		
2025-09-20				19.1	22.8	20.8
2025-09-29			15			

Complete Monitor Level Results

A substantial number of days in 2023 and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Indiana. The smoke's effects extended beyond Indiana, with elevated concentrations also observed in regional areas in and around the Midwest.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 4, when these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, each analyzed monitor in the Indiana side of the Chicago metropolitan area fell below the annual PM2.5 standard of 9.0 $\mu g/m^3$ and Indianapolis-based monitors fell 0.7 $\mu g/m^3$ on average from unadjusted values.

Removing Tier 1 concentrations lowered design values by an average of 0.6 $\mu g/m^3$ across all six of these monitors. When Tier 2 dates were also removed, design values were an average of 1.1 $\mu g/m^3$ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 3. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Indiana monitors, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Indiana	Lake	180890031	Gary- Madison St./ Gary Water	9.06	8.60	9.50	9.1
Indiana	Lake	180890034	East Chicago-Marina	10.53	7.87	8.87	9.1
Indiana	Lake	180890036	Hammond- 167th St	10.06	7.67	9.44	9.1
Indiana	Marion	180970078	Indpls- Washington Park	11.39	8.80	9.43	9.9
Indiana	Marion	180970081	Indpls- W. 18th St./ Ernie Pyle School 90	13.41	10.52	10.52	11.5
Indiana	Marion	180970087	Indpls.- I 70	13.69	9.61	10.25	11.2

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Indiana monitors with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Indiana	Lake	180890031	Gary- Madison St./ Gary Water	9.06	8.60	9.00	8.9
Indiana	Lake	180890034	East Chicago-Marina	9.49	7.81	8.24	8.5
Indiana	Lake	180890036	Hammond- 167th St	8.82	7.62	8.48	8.3
Indiana	Marion	180970078	Indpls- Washington Park	9.71	8.75	8.99	9.2
Indiana	Marion	180970081	Indpls- W. 18th St./ Ernie Pyle School 90	11.70	10.26	10.06	10.7
Indiana	Marion	180970087	Indpls.- I 70	11.91	9.61	9.97	10.5

Table 5. Annual mean concentrations and 3-year design values (µg/m3) at Indiana monitors with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Indiana	Lake	180890031	Gary- Madison St./ Gary Water	8.56	8.17	8.70	8.5
Indiana	Lake	180890034	East Chicago-Marina	8.71	7.70	7.82	8.1
Indiana	Lake	180890036	Hammond- 167th St	8.24	7.41	8.03	7.9
Indiana	Marion	180970078	Indpls- Washington Park	9.06	8.40	8.61	8.7
Indiana	Marion	180970081	Indpls- W. 18th St./ Ernie Pyle School 90	10.88	9.81	9.67	10.1
Indiana	Marion	180970087	Indpls.- I 70	11.09	9.30	9.61	10.0

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Indiana and other regional monitors, the following action is recommended.

1. Each date at monitors within Indiana identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Indiana, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes. An example application would be excluding dates and concentrations from regional Illinois, Michigan, or Ohio monitors consistent with dates and monitors already concurred with by EPA[5] in Indiana's exceptional events demonstrations.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional even days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.

[5] https://www.in.gov/dA/f244662b4f/pm25_exceptional_events_epa_concurrence_lake_co.pdf

Exhibit D

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Michigan Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Michigan Resulting from Canadian Wildfire Influence in 2023-2025

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October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Michigan, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

The significance of this issue is illustrated clearly by monitor 260770008 (Kalamazoo Fairgrounds) in Kalamazoo County, Michigan. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 10.1 $\mu g/m^3$, removal of all identified smoke-influenced[1] Tier 1 dates would reduce the annual design value at the monitor to 9.1 $\mu g/m^3$. Figure 1 below shows these dates using EPA's PM2.5 Tiering Tool[2] while Table 1 provides the recalculated annual mean and design values absent these Tier 1 dates and noted overhead smoke.

In fact, for all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual mean and resulting 3-year design value calculations decreases concentrations across the state by an average of 1.1 $\mu g/m^3$. These values are presented in Table 1.

[1] https://www.ospo.noaa.gov/products/land/hms.html
[2] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

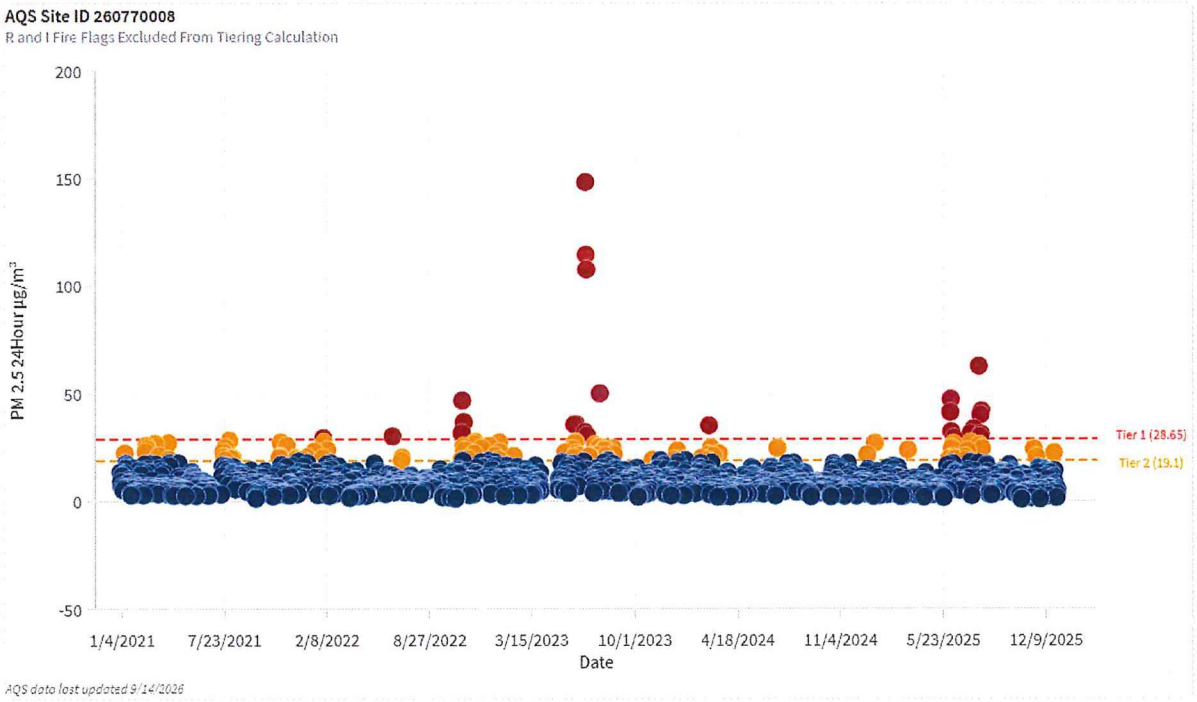

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Kalamazoo Fairgrounds monitor (260770008).

Table 1. Unadjusted and excluding smoke-influenced Tier 1 adjusted Michigan PM2.5 monitor annual mean and design values.

				Excluding All Smoke-Influenced Tier 1 Date Concentrations			
County	Site ID	Local Site Name	2023-2025 Annual DV (ug/m3)	2023 Annual Mean (ug/m3)	2024 Annual Mean (ug/m3)	2025 Annual Mean (ug/m3)	2023-2025 Annual DV (ug/m3)
Kalamazoo	260770008	Kalamazoo Fairgrounds	10.1	10.76	8.18	8.23	9.1
Wayne	261630015	Detroit-Southwest	9.6	9.99	8.72	8.85	9.2
Wayne	261630033	Property Owned By Dearborn Public Schools	10.1	10.71	8.91	8.30	9.3
Wayne	261630093	Eliza Howell-Nr	11.7	11.67	10.77	10.76	11.1
Wayne	261630097	Nmh48217 New Mt Herman Church	9.4	10.72	6.93	7.72	8.5
Wayne	261630098	Detroit Police 4th Precinct	10.6	11.91	8.78	8.90	9.9
Wayne	261630099	Trinity St Marks - Gordy Howe International Bridge (Ghib)	11.0	12.39	8.84	8.69	10.0
Wayne	261630100	Military Park (Ghib)	11.9	9.74	8.23	7.70	8.6

These examples demonstrate the substantial regulatory implications associated with smoke-influenced concentrations and underscores the magnitude of fully evaluating and excluding affected data where supported by technical evidence. The importance of proper data management increases as standards become increasingly stringent and closer to background levels. Beyond attainment determinations alone, retaining these concentrations within the regulatory record could influence future permitting requirements, transportation conformity analyses, State Implementation Plan obligations, emissions reduction strategies, and broader regulatory planning efforts tied to both PM2.5 and ozone programs.

Consideration should also be given to monitors located outside designated counties and CBSAs but within the same regional airshed that experienced impacts from the same smoke plumes during the 2023-2025 episodes. In many cases, smoke transport is regional in scale and crosses jurisdictional and programmatic boundaries. Therefore, states should be encouraged to reference and leverage existing exceptional events demonstrations prepared by neighboring states where proximal monitors were impacted by the same smoke episodes on the same dates. Such coordination would improve consistency, reduce redundant analytical burdens, and better reflect the regional nature of the wildfire and prescribed fire impacts observed during these events.

Finally, consideration should be given to allowing states, including Michigan, flexibility in satisfying the clear causal relationship criterion for wildfire and prescribed fire dates associated with smoke episodes. The collective body of evidence developed here through satellite imagery, air mass trajectory analyses, smoke modeling, surface observations, and widespread concentration enhancements has already demonstrated that Canadian wildfire smoke and domestic prescribed fires significantly impacted PM2.5 concentrations across the region.

Given the extensive number of demonstrations currently being prepared nationwide for these episodes, it would be reasonable and appropriate for regulatory agencies to permit states to adopt and reference other state technical analyses and supporting evidence and related demonstrations to satisfy Tier 1 obligations. Such an approach would maintain technical rigor while promoting regulatory consistency and administrative efficiency in addressing these unprecedented regional smoke events.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[3].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

Figure 2 shows the 24-hour PM2.5 concentrations for the Detroit-Southwest monitor (261630015) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

PM2.5 concentrations were elevated at all remaining reviewed sites in Michigan during these dates (Figure 2 through Figure 8), demonstrating that the region was impacted by area-wide events.

All the reviewed monitors recorded multiple 24-hour PM2.5 concentrations above their Tier 1 threshold values during the period of 2023 through 2025, indicating rare PM2.5 episodes. At all monitors, the observations from many of these days were in the top five days of the five-year period between 2023 and 2025, in many locations they were the single top value.

[3] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

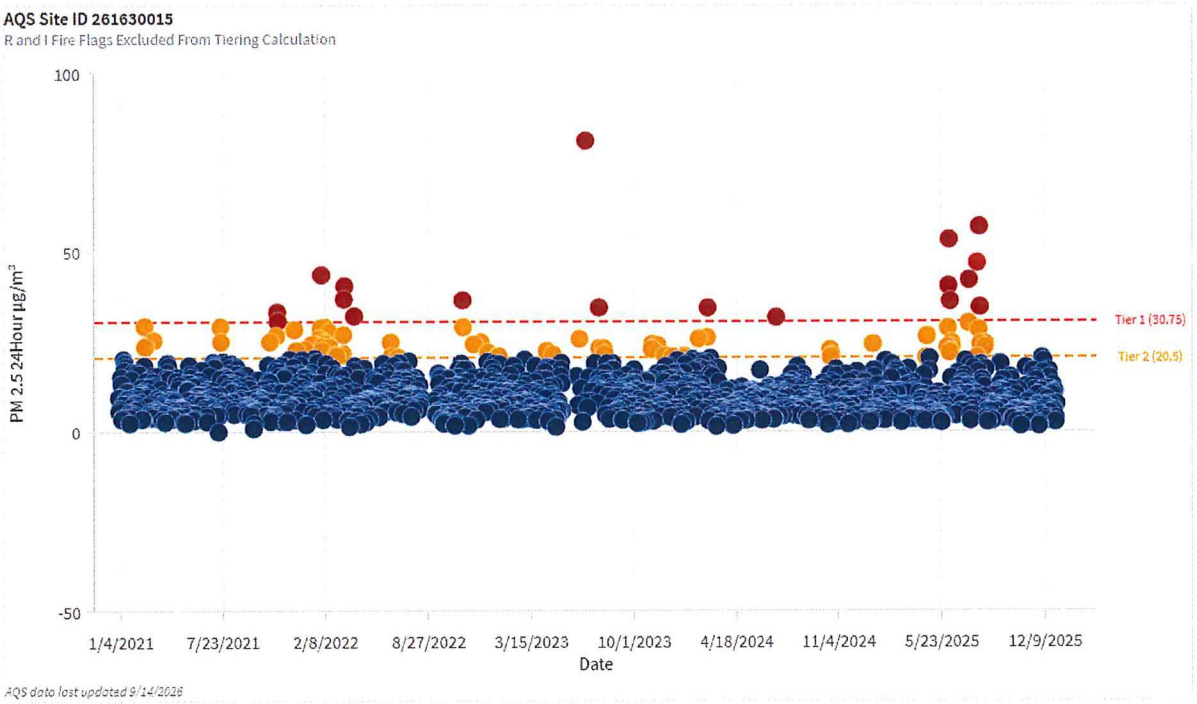

Figure 2. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Detroit-Southwest monitor (261630015).

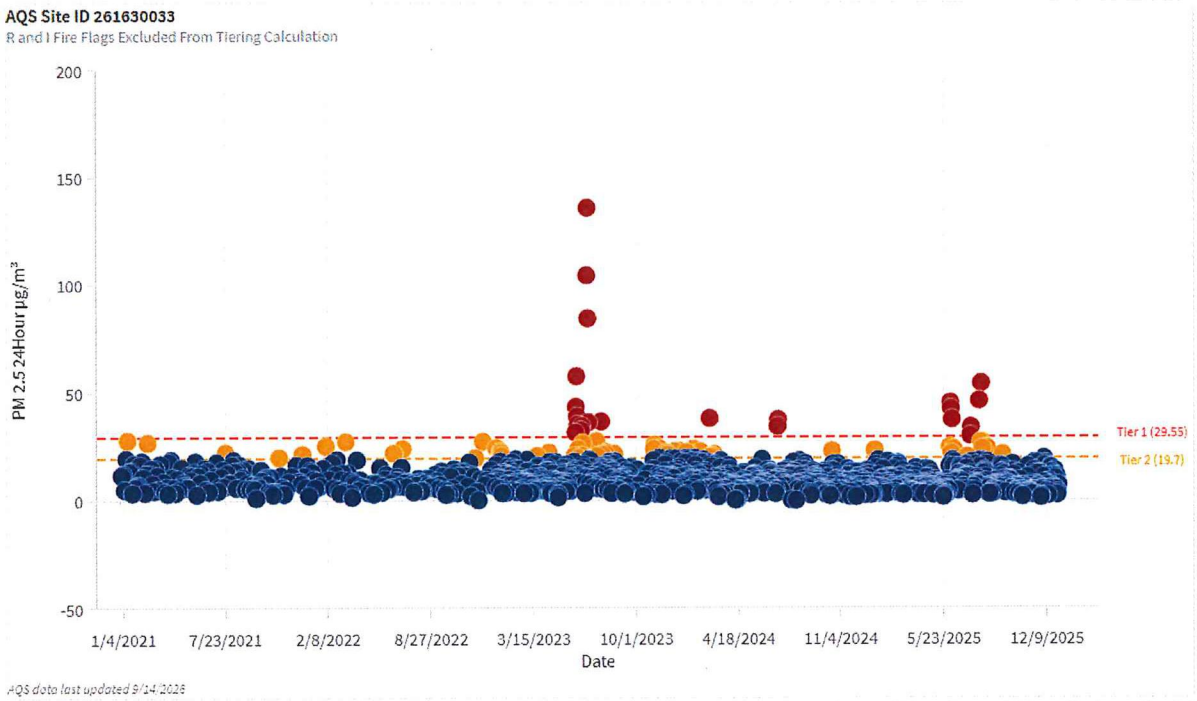

Figure 3. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Property Owned By Dearborn Public Schools monitor (261630033).

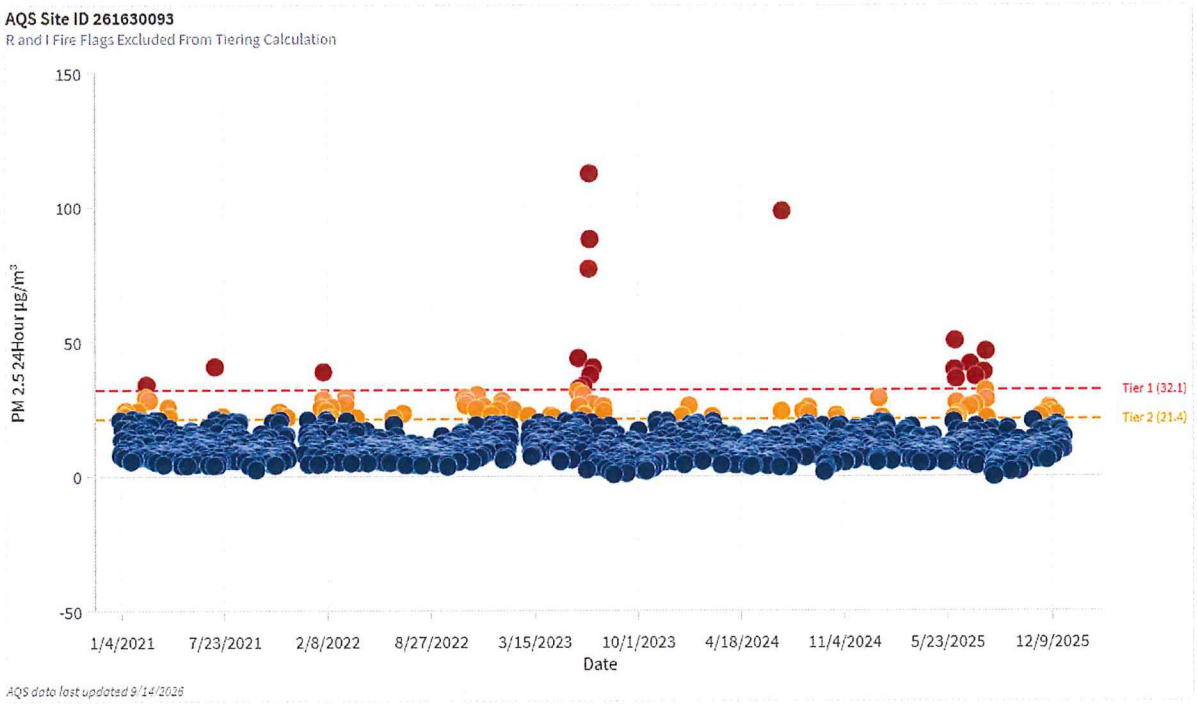

Figure 4. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Eliza Howell-Nr monitor (261630093).

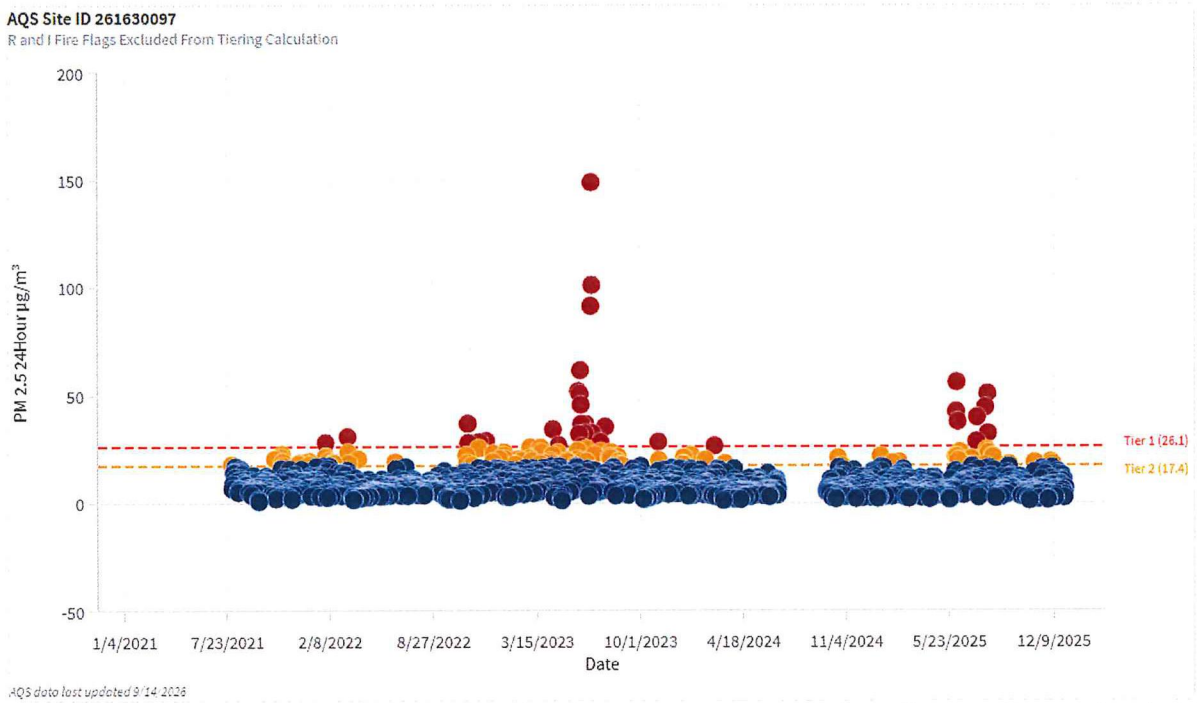

Figure 5. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Nmh48217 New Mt Herman Church monitor (261630097).

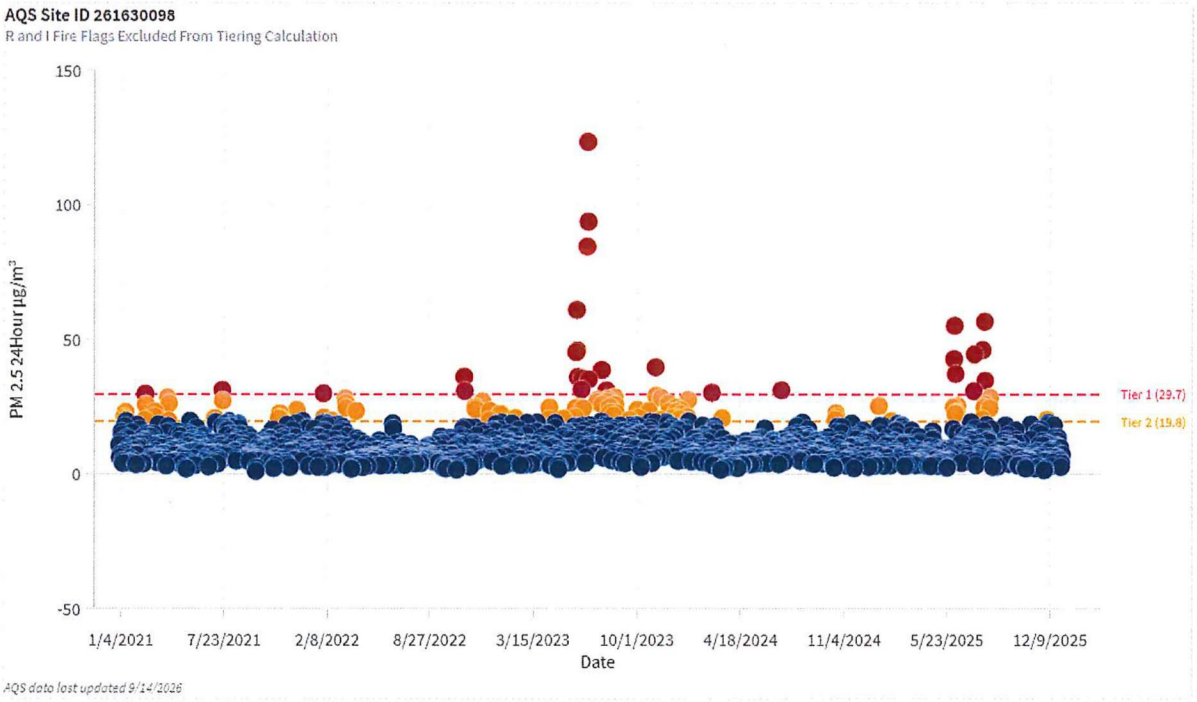

Figure 6. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Detroit Police 4th Precinct monitor (261630098).

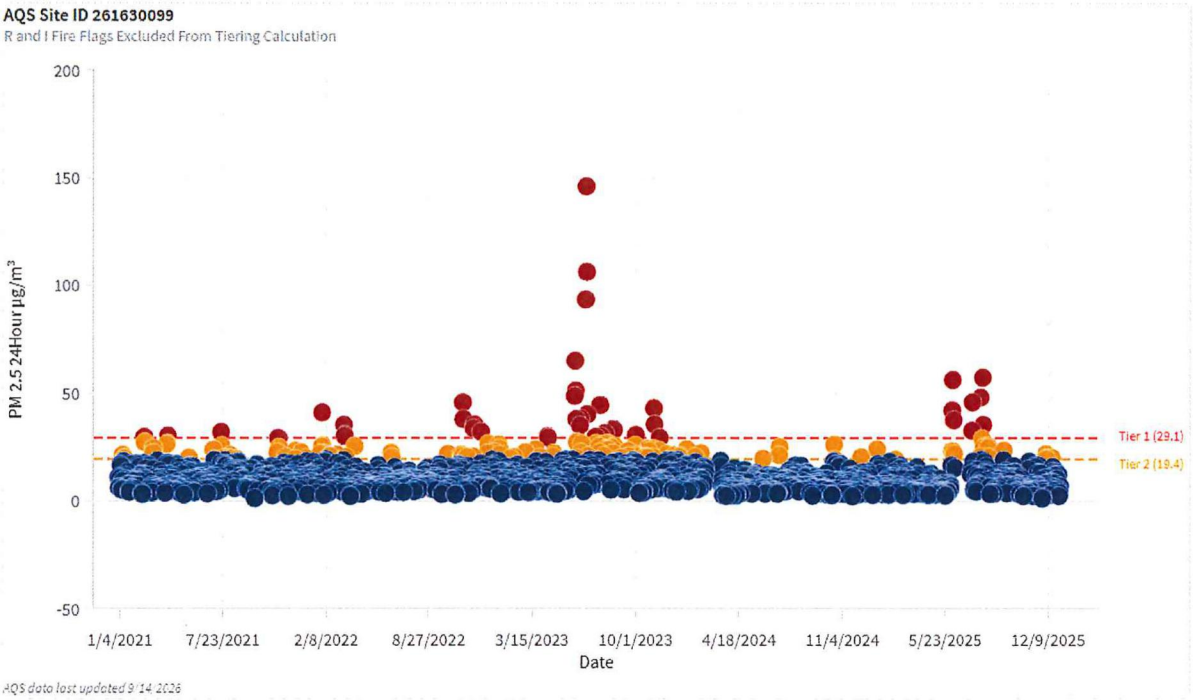

Figure 7. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Trinity St Marks - Gordy Howe International Bridge (Ghib) monitor (261630099).

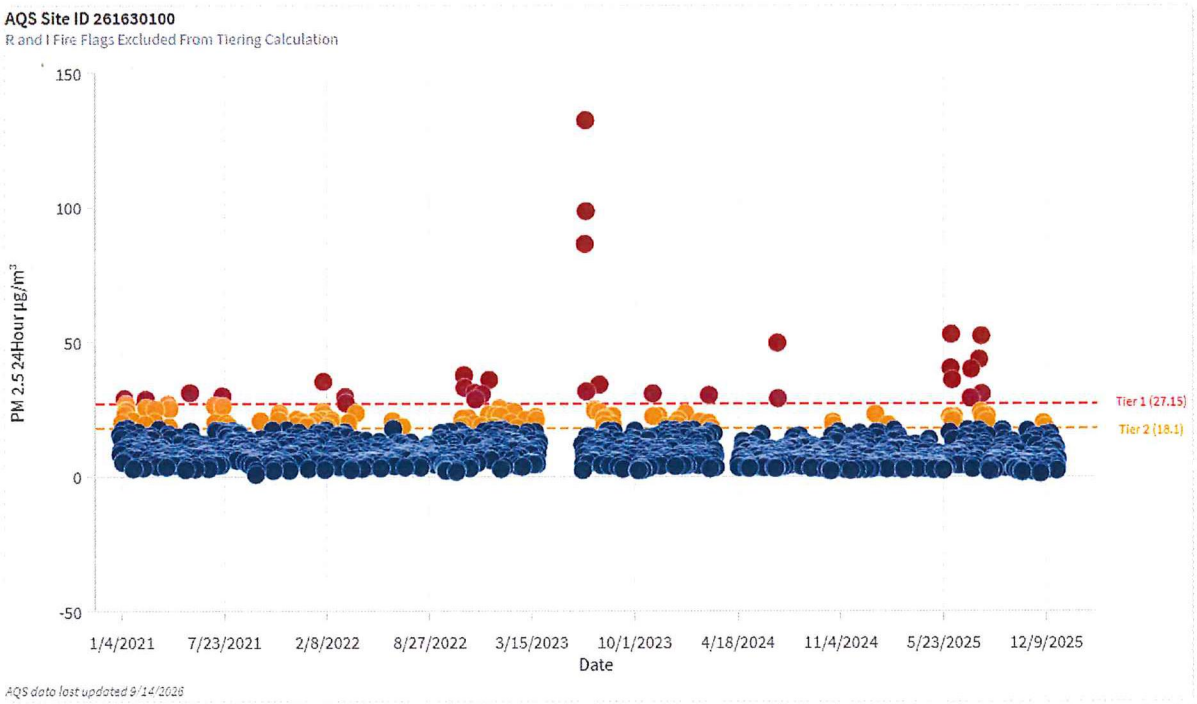

Figure 8. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Military Park (Ghib) monitor (261630100).

Tier 1 / Tier 2 Dates Selected

Table 2 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[4] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 2. Monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

	24-hour PM2.5 concentrations (µg/m3)							
Date	**260770008**	**261630015**	**261630033**	**261630093**	**261630097**	**261630098**	**261630099**	**261630100**
2023-03-21					18.3			
2023-04-10					19.7			
2023-04-13					18.5			
2023-04-14		22.4	22.2	22.6	22.5	20.4	30.1	
2023-04-15			17.8	22.5	34.3	24.7	29.5	
2023-05-10		15.4						
2023-05-11		17.2			13.6		17	
2023-05-12	17.6	19.1	15	20.4	20	20.6	18.8	
2023-05-19	22.8		16.7	19.7		15.6	19.3	
2023-05-20			15.1	16.3		15.2	16.9	
2023-05-22				16.5		14.6		
2023-05-23				16.5				
2023-05-24	16.3							
2023-05-28	16.6			17.6	17.5			
2023-05-29					14.2			
2023-05-30				16.1	17			
2023-05-31					16.5			
2023-06-01					20.4			
2023-06-02					24.4	17.7		
2023-06-03	24.3		20.6		51.9	21.1		

[4] Data downloaded from EPA Tiering Tool on October 21, 2026.

ALPINE GEOPHYSICS

	24-hour PM2.5 concentrations (µg/m3)							
Date	260770008	261630015	261630033	261630093	261630097	261630098	261630099	261630100
2023-06-05	20.4		31.5		32.1	24.5		
2023-06-06	35.7		43.3	31.4	50.8	45.3	48.8	
2023-06-07	27.1		57.6	43.9	61.7	61	65.1	
2023-06-08	27.5		39	32.6	45.7	45.9	51.3	
2023-06-09	35.9		35.2	26	36.8	36.1	38	
2023-06-10	22.2		23.8		26.2	24.9	27.4	
2023-06-11			19.7		19.8	17.5	19.9	
2023-06-16	21.2		32.5	30.2	32.4	31.4	35.1	
2023-06-17		25.8	34.5	33.7	36.8	35.6	38.2	
2023-06-18			20.8	22.5	19.3	17.9	22.6	
2023-06-19			26.6	22.8	25.2	24.4	26.7	
2023-06-26	32.2							
2023-06-27	148.3		104.4	77.1	91.5	84.5	93.5	86.5
2023-06-28	114.6		135.8	112.5	148.9	123.4	146	132.5
2023-06-29	107.7	81	84.5	88.1	101.2	93.8	106.4	98.7
2023-06-30	30.6		36.2	37.6	32.5	35.2	40.2	31.7
2023-07-01							20.9	
2023-07-04	20.9			26.9	22.5			
2023-07-05	21			40.4				
2023-07-16	26.2		27.5		28.3	26.8	29.8	25.1
2023-07-17	21.5		20.6		24	27.6	26.7	24.5
2023-07-23							25.3	
2023-07-24	25.1					19.5	22.6	
2023-07-25	50.1	34.5	36.6	26	35.5	38.7	44.5	34.2
2023-07-26	25.4	23.2	21.3	24		25.9	30.1	23.9
2023-08-01							21	
2023-08-02							23.9	14.5
2023-08-03	23.8	23.1	21.6		21.6	31.1	31.6	21.2
2023-08-04	24.7				20.8	26.9	26.6	19.1
2023-08-05	21	21.5	22.4		23.6	27.9	24.2	21.7
2023-08-06						17.9		

ALPINE GEOPHYSICS

	24-hour PM2.5 concentrations (µg/m3)							
Date	260770008	261630015	261630033	261630093	261630097	261630098	261630099	261630100
2023-08-08						15.2	16.7	
2023-08-09	19.2					24.9	26.7	17.1
2023-08-10						22.8	23.8	17
2023-08-16						21.8	24.9	15.6
2023-08-17						16	22.3	
2023-08-18						16.9	18	
2023-08-19	24.7				21.6	28.5	33.5	22.6
2023-08-20			21.6		19.3	25.8	33	19.2
2023-08-21	21.9				18	22.8	25.6	17
2023-08-26					17.6			
2023-08-29						18.1	18.4	
2023-09-03						15.7	20.1	
2023-09-05						13.8		
2023-09-07						16.1		
2023-09-11						14.9	17.6	
2023-09-16		15.6			15.8	20.1	23.3	
2023-09-17					13.9	18.1	20.8	
2023-09-20						14		
2023-09-21						17.4	18.1	
2023-09-22						15.6		
2023-09-23						13.6		14.4
2023-09-24	14.6							
2023-09-29						14.4	18.4	
2023-09-30					14.1	18.3	25.8	13.9
2023-10-01						23.9	30.7	
2023-10-03						20.9	21.4	
2023-10-18							20.3	
2023-10-23						23.4		
2023-10-24							20.2	
2023-11-03							20.4	
2023-11-04	19.2							

ALPINE GEOPHYSICS

	24-hour PM2.5 concentrations (µg/m3)							
Date	260770008	261630015	261630033	261630093	261630097	261630098	261630099	261630100
2023-11-05	19.2	22.9	23.8		28.4	39.7	43.1	30.9
2023-11-06		24.4	25.9		19.9	29.1	35.6	22.5
2023-11-15						20.2	23.5	
2023-11-16		24	24			28.3	29.4	22.6
2024-02-21	21.7	26.2		22.2				20
2024-02-22	35.2							
2024-02-26	24.9		20.7					
2024-02-27								18.1
2024-03-02	21.1							
2024-03-13	22.2				18.4	20.8		
2024-05-14	15.7							
2024-05-18	15.1							
2024-06-03						17	19.8	
2024-07-04	24.7		34.3	24.2			21.4	49.7
2024-07-05	24.8	31.8	37.4	98.5		31.2	25.2	29
2024-08-04						17.8	16.6	14.6
2024-08-15				24.1		19.2	16.5	15.3
2024-08-25				25.6				
2024-08-26				23.3		16.8		
2024-09-22				18.8				
2024-10-18						20.3		
2024-10-19		22.7	22.9	22.6	21.1	22.7	26.4	20.3
2024-10-20		20.7		21.4		21.3	19.4	19.1
2024-10-22		21.2						
2024-10-29			16.8					
2025-05-30	16.7							
2025-06-03	19.6	23.3						
2025-06-04		28.7	24.7	21.7	21.6	24.9	23.4	22.3
2025-06-05	41.3	40.5	45.2	39.6	42.4	42.8	42.2	40.4
2025-06-06	47.4	53.4	42.4	50.4	56.1	55.2	56.3	52.9
2025-06-07	32.3	21.9	21.7	21.8	21.5	22.6	23.2	21.4

ALPINE GEOPHYSICS

	24-hour PM2.5 concentrations (µg/m3)							
Date	260770008	261630015	261630033	261630093	261630097	261630098	261630099	261630100
2025-06-08	24.6	36.2	37.5	36.2	37.8	37.3	37.7	36
2025-06-09	20.4	22.2		27.4	19.7	22.8	22.1	20.8
2025-06-11	26.6	24.6	23.7	22.1	19.8	23.2		20.8
2025-06-12	29.3	23.3		23.1	23.7	25.4		22.3
2025-07-04	20.6			25.9	20.5			
2025-07-05	19.1			41.7				
2025-07-08	23.4		20.2		17.6	19.4		17.4
2025-07-14	31.3	30.1	29.9	26.6	28.6	30.9	32.8	29.2
2025-07-15	27.2	42.1	33.9	37	39.8	44.6	46	39.9
2025-07-21	33.7							
2025-07-30		20.5			17.5	20.5	20.6	
2025-07-31	62.7	46.9	46.2	38.8	44.4	46.2	48.2	43.6
2025-08-01	26.1					16.2	19.2	14.6
2025-08-02	30							
2025-08-03	40.1	28.3	26.9	31.9	24.6	24.9	29	24.1
2025-08-04	31.2	57	54.3	46.5	50.8	56.7	57.4	52.3
2025-08-05	41.9	34.6	27.2	28.5	32.3	34.8	35.5	30.8
2025-08-06	24.5	24.2	23.9	21.7	23.3	25.9	25	22.6
2025-08-07						18.4	18.3	16
2025-08-16						16.8	20.5	15.2
2025-09-11			16		13.8			
2025-09-13		18.9	15.5	16.6	16.9	18.1	19.1	16.1
2025-09-18		14.2				14.7		13.7
2025-09-28	16.9							
2025-09-29	14.7							

Complete Monitor Level Results

A substantial number of days in 2023, 2024, and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Michigan. The smoke's effects extended beyond Michigan, with elevated concentrations also observed in regional areas of the upper Midwest.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 4, when these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, concentrations were decreased across all monitors by an average of 1.1 $\mu g/m^3$.

When Tier 2 dates were also removed, design values were an average of 1.6 $\mu g/m^3$ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 3. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Michigan monitors, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Michigan	Kalamazoo	260770008	Kalamazoo Fairgrounds	12.86	8.25	9.10	10.1
Michigan	Wayne	261630015	Detroit-Southwest	10.42	8.78	9.51	9.6
Michigan	Wayne	261630033	Property Owned By Dearborn Public Schools	12.21	9.05	8.91	10.1
Michigan	Wayne	261630093	Eliza Howell-Nr	12.67	11.05	11.37	11.7
Michigan	Wayne	261630097	Nmh48217 New Mt Herman Church	12.71	6.93	8.47	9.4
Michigan	Wayne	261630098	Detroit Police 4th Precinct	13.44	8.84	9.64	10.6
Michigan	Wayne	261630099	Trinity St Marks - Gordy Howe International Bridge (Ghib)	14.65	8.84	9.60	11.0
Michigan	Wayne	261630100	Military Park (Ghib)	18.78	8.41	8.40	11.9

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Michigan monitors with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Michigan	Kalamazoo	260770008	Kalamazoo Fairgrounds	10.76	8.18	8.23	9.1
Michigan	Wayne	261630015	Detroit-Southwest	9.99	8.72	8.85	9.2
Michigan	Wayne	261630033	Property Owned By Dearborn Public Schools	10.71	8.91	8.30	9.3
Michigan	Wayne	261630093	Eliza Howell-Nr	11.67	10.77	10.76	11.1
Michigan	Wayne	261630097	Nmh48217 New Mt Herman Church	10.72	6.93	7.72	8.5
Michigan	Wayne	261630098	Detroit Police 4th Precinct	11.91	8.78	8.90	9.9
Michigan	Wayne	261630099	Trinity St Marks - Gordy Howe International Bridge (Ghib)	12.39	8.84	8.69	10.0
Michigan	Wayne	261630100	Military Park (Ghib)	9.74	8.23	7.70	8.6

Table 5. Annual mean concentrations and 3-year design values (µg/m3) at Michigan monitors with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Michigan	Kalamazoo	260770008	Kalamazoo Fairgrounds	9.67	7.89	7.72	8.4
Michigan	Wayne	261630015	Detroit-Southwest	9.44	8.57	8.36	8.8
Michigan	Wayne	261630033	Property Owned By Dearborn Public Schools	10.00	8.81	7.95	8.9
Michigan	Wayne	261630093	Eliza Howell-Nr	11.13	10.47	10.28	10.6
Michigan	Wayne	261630097	Nmh48217 New Mt Herman Church	9.84	6.86	7.27	8.0
Michigan	Wayne	261630098	Detroit Police 4th Precinct	10.77	8.64	8.51	9.3
Michigan	Wayne	261630099	Trinity St Marks - Gordy Howe International Bridge (Ghib)	11.34	8.65	8.30	9.4
Michigan	Wayne	261630100	Military Park (Ghib)	9.34	8.10	7.33	8.3

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Michigan monitors and regionwide, the following action is recommended.

1. Each date at monitors within Michigan identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Michigan, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes. An example application would be excluding dates and concentrations from regional Illinois, Michigan, or Ohio monitors consistent with dates and monitors already concurred with by EPA[5] in Indiana's exceptional events demonstrations.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional even days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.

[5] https://www.in.gov/dA/f244662b4f/pm25_exceptional_events_epa_concurrence_lake_co.pdf

Exhibit E

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Minnesota Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Minnesota Resulting from Canadian Wildfire Influence in 2023-2025

Prepared by:
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387 Pollard Mine Road
Burnsville, NC 28714

October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Minnesota, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[1].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

[1] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

Figure 1 shows the 24-hour PM2.5 concentrations for the Apple Valley monitor (270370470) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

This monitor recorded multiple 24-hour PM2.5 concentrations above its Tier 1 threshold value during the period of 2023 through 2025, indicating rare PM2.5 episodes. The observations from many of these days were in the top five days of the five-year period between 2023 and 2025, including the single top value.

The significance of this issue is illustrated clearly by the Apple Valley monitor (270370470), currently the only one in Minnesota with a design value above the level of the annual PM2.5 NAAQS. This monitor in Dakota County experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 9.1 µg/m3, removal of all identified smoke-influenced Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 7.8 µg/m^3) with the current annual PM2.5 NAAQS.

In fact, Minnesota Pollution Control Agency has submitted an exceptional events demonstration[2] addressing one event occurring on July 12, 2025, at this monitor which upon EPA concurrence, would bring the monitor into attainment with the NAAQS.

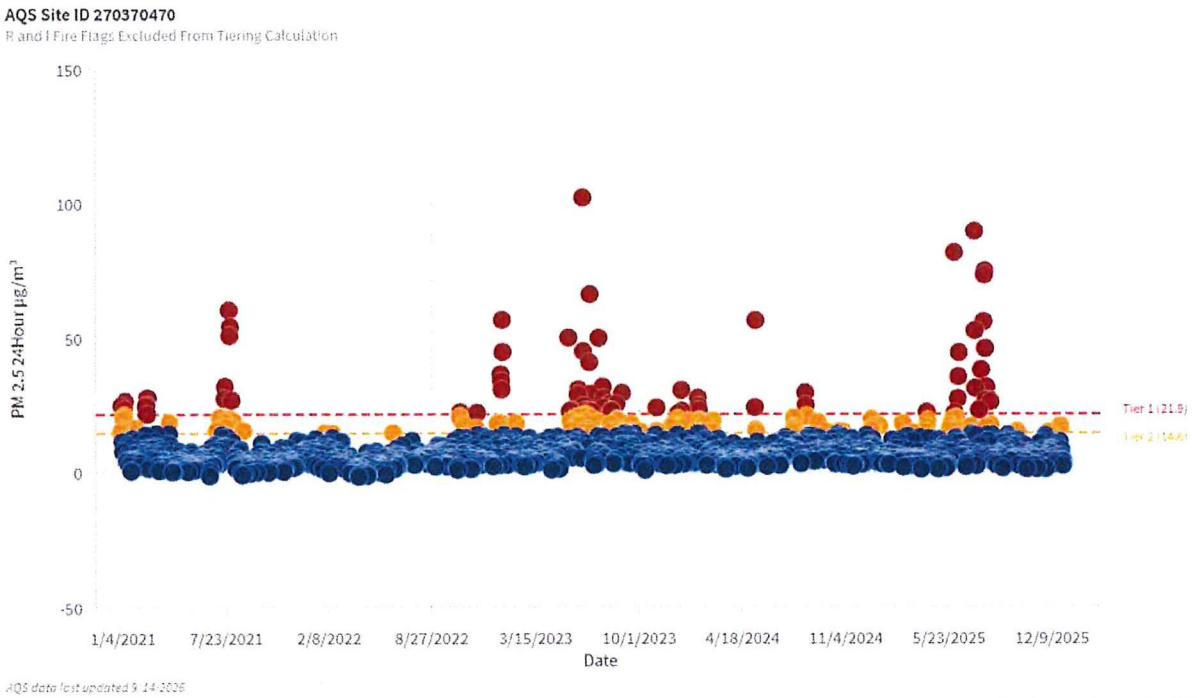

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Apple Valley monitor (270370470).

[2] https://comment.pca.state.mn.us/33980/widgets/120906/documents/85162

Tier 1 / Tier 2 Dates Selected

Table 1 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[3] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 1. Apple Valley monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

Date	24-hour PM2.5 Concentration (µg/m3)
2023-05-18	50.1
2023-05-20	12.7
2023-05-21	22.9
2023-05-22	19.3
2023-05-23	23.2
2023-05-24	15.7
2023-05-31	11.2
2023-06-04	20.7
2023-06-05	29
2023-06-06	30.9
2023-06-07	18.1
2023-06-09	17.7
2023-06-14	102.2
2023-06-15	45
2023-06-16	20.8
2023-06-17	24.8
2023-06-18	14.9
2023-06-20	23.2
2023-06-21	21.6
2023-06-22	18.9
2023-06-23	16
2023-06-26	22.9
2023-06-27	41
2023-06-28	66.2
2023-06-29	29.3
2023-06-30	17.9
2023-07-01	22.6
2023-07-02	20.2

Date	24-hour PM2.5 Concentration (µg/m3)
2023-07-03	14.7
2023-07-15	50
2023-07-16	18.6
2023-07-23	31.9
2023-07-24	27.6
2023-07-25	24.2
2023-08-04	14.6
2023-08-05	25.6
2023-08-06	18
2023-08-07	17.9
2023-08-08	23.2
2023-08-09	22.9
2023-08-17	15.2
2023-08-18	25.5
2023-08-20	19.8
2023-08-21	19.4
2023-08-22	19.3
2023-08-23	16.2
2023-08-29	29.6
2023-09-03	14.5
2023-09-04	15.3
2023-09-05	15.1
2023-09-16	18.1
2023-09-30	15.5
2023-10-03	15.3
2023-11-04	24.2
2024-02-22	15.1
2024-05-12	24.3

Date	24-hour PM2.5 Concentration (µg/m3)
2024-05-13	56.5
2024-05-14	16.1
2024-05-15	15.1
2024-05-16	11.4
2024-07-22	14.7
2024-07-25	15.5
2024-07-26	16.9
2024-07-27	20.4
2024-07-28	16.6
2024-08-18	29.7
2024-08-19	25.1
2024-08-20	21
2024-08-25	13.6
2024-09-12	18.7
2024-09-28	15.2
2024-10-22	15.4
2024-10-29	15.4
2025-03-03	13.4
2025-04-11	16.8
2025-04-12	19.4
2025-05-04	12.2
2025-05-09	11.3
2025-05-25	15.9
2025-05-26	17.4
2025-05-31	15.3
2025-06-01	19.9
2025-06-03	81.6
2025-06-04	22.2

Date	24-hour PM2.5 Concentration (µg/m3)
2025-06-07	20.4
2025-06-08	15.6
2025-06-10	27.5
2025-06-11	35.6
2025-06-12	44.5
2025-07-04	15
2025-07-06	17
2025-07-12	89.6
2025-07-13	52.7
2025-07-14	31.3
2025-07-21	23.2
2025-07-25	38.2
2025-07-30	56
2025-07-31	73.3
2025-08-01	74.8
2025-08-02	46.1
2025-08-03	26.8
2025-08-04	31.8
2025-08-05	16.8
2025-08-06	13.8
2025-08-11	26.9
2025-08-12	26.3
2025-08-13	17.6
2025-10-03	15.5
2025-10-04	14.6

[3] Data downloaded from EPA Tiering Tool on October 21, 2026.

Complete Monitor Level Results

A substantial number of days in 2023, 2024, and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Minnesota. The smoke's effects extended beyond the state, with elevated concentrations also observed in regional areas in the upper Midwest.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 3, when these dates and associated smoke-influenced Tier 1 observations were removed from the record, recalculated annual design values at the Apple Valley monitor fell to levels well below the 9.0 µg/m³ annual PM2.5 NAAQS.

Removing Tier 1 concentrations lowered the 2023-2025 design value by 1.3 µg/m³. When Tier 2 dates were also removed, this design value was 1.8 µg/m³ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 2. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Apple Valley monitor, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Minnesota	Dakota	270370470	Apple Valley	10.62	7.84	8.86	9.1

Table 3. Annual mean concentrations and 3-year design values (µg/m3) at Apple Valley monitor with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Minnesota	Dakota	270370470	Apple Valley	8.96	7.51	7.00	7.8

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Apple Valley monitor with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Minnesota	Dakota	270370470	Apple Valley	8.12	7.18	6.53	7.3

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Minnesota monitors and regionwide, the following action is recommended.

1. Each date at monitors within Minnesota identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Minnesota, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional even days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.

Exhibit F

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Ohio Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Ohio Resulting from Canadian Wildfire Influence in 2023-2025

Prepared by:
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October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Ohio, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

The significance of this issue is illustrated clearly by monitor 390170015 (Ohio Bell) in Butler County, Ohio, from the Cincinnati metro area. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 9.4 $\mu g/m^3$, removal of all identified smoke-influenced[1] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.9 $\mu g/m^3$) with the current annual PM2.5 NAAQS. Figure 1 below shows these dates using EPA's PM2.5 Tiering Tool[2] while Table 1 provides the recalculated annual mean and design values absent these Tier 1 dates and noted overhead smoke.

In fact, across all monitors analyzed in this report, removal of smoke-influenced Tier 1 dates alone from the annual means decreased the resulting 3-year design value by 0.4 $\mu g/m^3$ on average. This also brought key monitors in Butler and Hamilton Counties to the level of the annual standard. The recalculated values for all monitors are presented in Table 1.

[1] https://www.ospo.noaa.gov/products/land/hms.html
[2] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

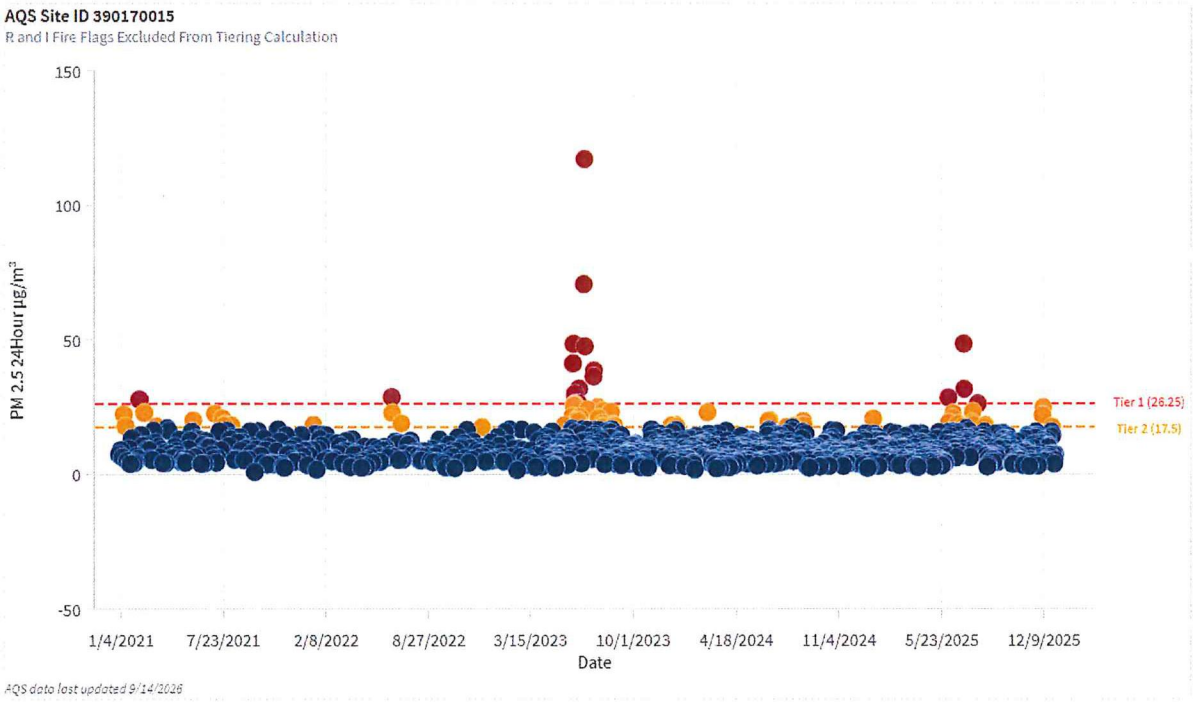

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Ohio Bell monitor (390170015).

Table 1. Unadjusted and excluding smoke-influenced Tier 1 adjusted Ohio PM2.5 monitor annual mean and design values.

				Excluding All Smoke-Influenced Tier 1 Date Concentrations			
County	Site ID	Local Site Name	2023-2025 Annual DV (ug/m3)	2023 Annual Mean (ug/m3)	2024 Annual Mean (ug/m3)	2025 Annual Mean (ug/m3)	2023-2025 Annual DV (ug/m3)
Butler	390170015	Ohio Bell	9.4	9.38	8.25	9.20	8.9
Butler	390170022	Bpg	10.7	10.60	9.39	10.59	10.2
Cuyahoga	390350038	St Theodosius	9.8	9.95	8.83	9.14	9.3
Cuyahoga	390350060	Gt Craig Ncore Pams	10.2	10.61	9.34	9.19	9.7
Cuyahoga	390350065	Harvard Yards	11.1	11.52	9.67	10.44	10.5
Hamilton	390610014	Carthage	9.6	9.79	8.43	9.23	9.1
Hamilton	390610048	Cincinnati Near Road	9.5	8.67	8.36	10.06	9.0
Lucas	390951003	Eastside Pump St	9.4	9.28	9.02	9.36	9.2
Stark	391510017	Canton Fire St8	9.3	9.50	8.82	9.37	9.2

These examples demonstrate the substantial regulatory implications associated with smoke-influenced concentrations and underscores the magnitude of fully evaluating and excluding affected data where supported by technical evidence. The importance of proper data management increases as standards become increasingly stringent and closer to background levels. Beyond attainment determinations alone, retaining these concentrations within the regulatory record could influence future permitting requirements, transportation conformity analyses, State Implementation Plan obligations, emissions reduction strategies, and broader regulatory planning efforts tied to both PM2.5 and ozone programs.

Consideration should also be given to monitors located outside designated counties and CBSAs but within the same regional airshed that experienced impacts from the same smoke plumes during the 2023-2025 episodes. In many cases, smoke transport is regional in scale and crosses jurisdictional and programmatic boundaries. Therefore, states should be encouraged to reference and leverage existing exceptional events demonstrations prepared by neighboring states where proximal monitors were impacted by the same smoke episodes on the same dates. Such coordination would improve consistency, reduce redundant analytical burdens, and better reflect the regional nature of the wildfire and prescribed fire impacts observed during these events.

Finally, consideration should be given to allowing states, including Ohio, flexibility in satisfying the clear causal relationship criterion for wildfire and prescribed fire dates associated with smoke episodes. The collective body of evidence developed here through satellite imagery, air mass trajectory analyses, smoke modeling, surface observations, and widespread concentration enhancements has already demonstrated that Canadian wildfire smoke and domestic prescribed fires significantly impacted PM2.5 concentrations across the region.

Given the extensive number of demonstrations currently being prepared nationwide for these episodes, it would be reasonable and appropriate for regulatory agencies to permit states to adopt and reference other state technical analyses and supporting evidence and related demonstrations to satisfy Tier 1 obligations. Such an approach would maintain technical rigor while promoting regulatory consistency and administrative efficiency in addressing these unprecedented regional smoke events.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[3].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

Figure 2 shows the 24-hour PM2.5 concentrations for the Bpg monitor (390170022) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

PM2.5 concentrations were elevated at all remaining reviewed sites in Ohio during these dates (Figure 2 through Figure 9), demonstrating that the region was impacted by area-wide events.

All the reviewed monitors recorded multiple 24-hour PM2.5 concentrations above their Tier 1 threshold values during the period of 2023 through 2025, indicating rare PM2.5 episodes. At all monitors, the observations from many of these days were in the top five days of the five-year period between 2023 and 2025, in many locations they were the single top value.

[3] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

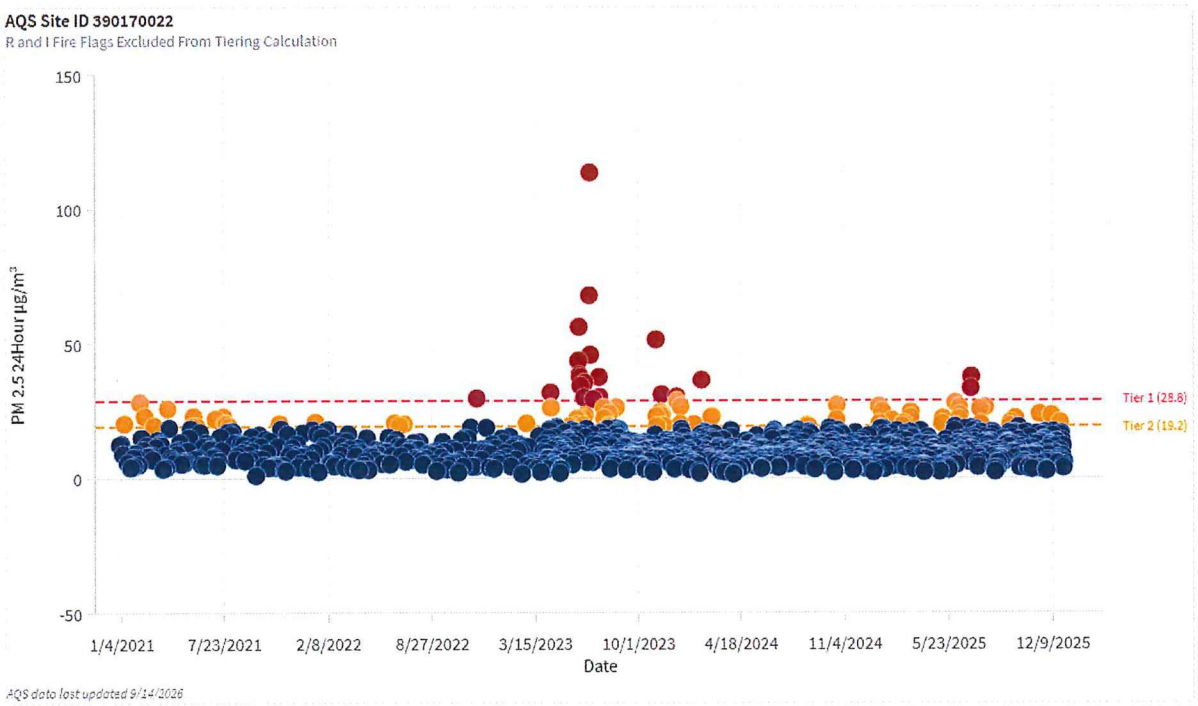

Figure 2. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Bpg monitor (390170022).

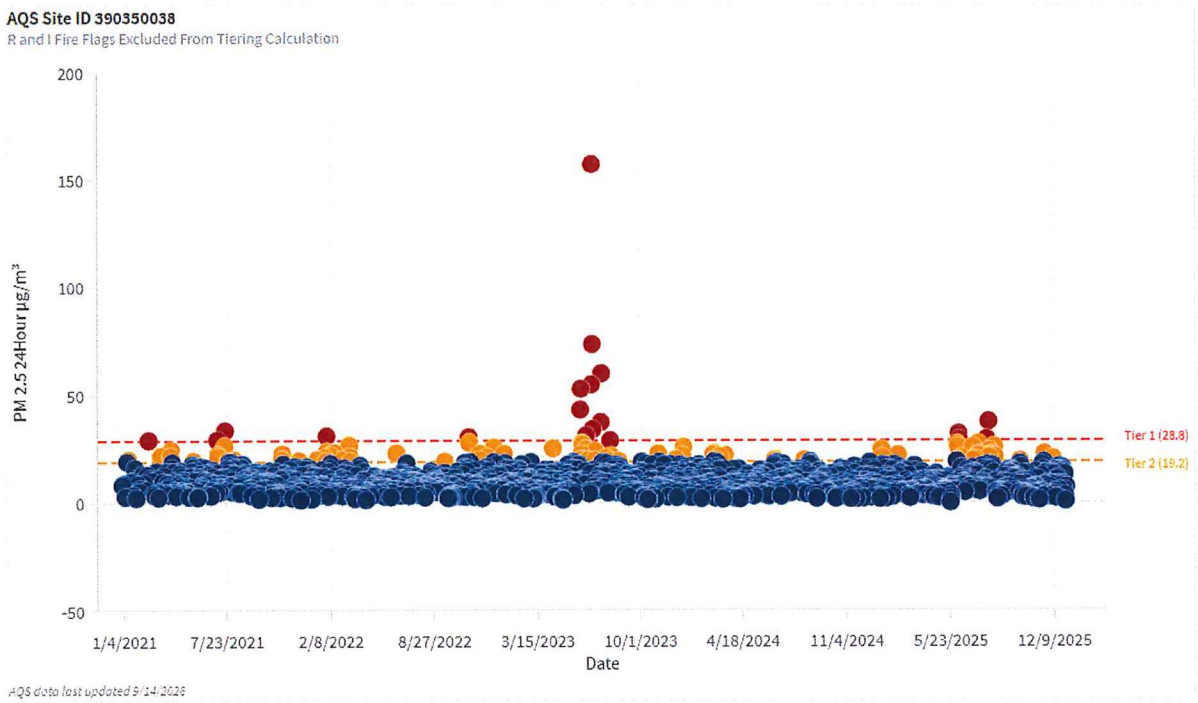

Figure 3. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the St Theodosius monitor (390350038).

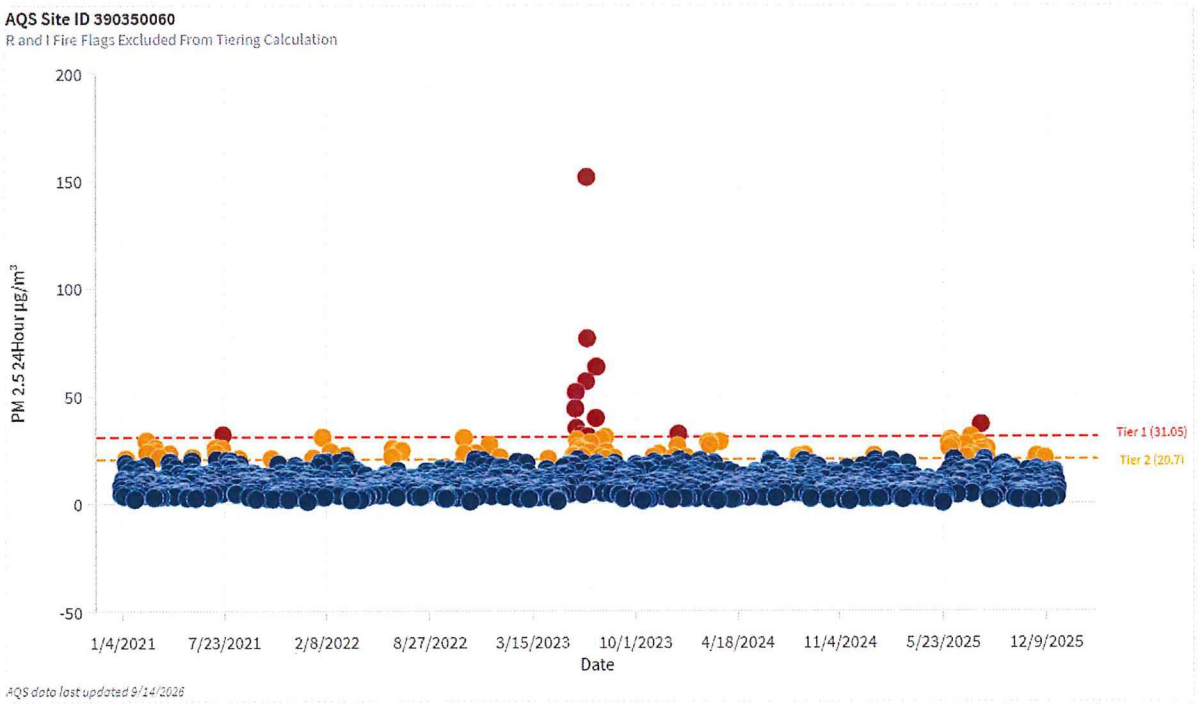

Figure 4. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Gt Craig Ncore Pams monitor (390350060).

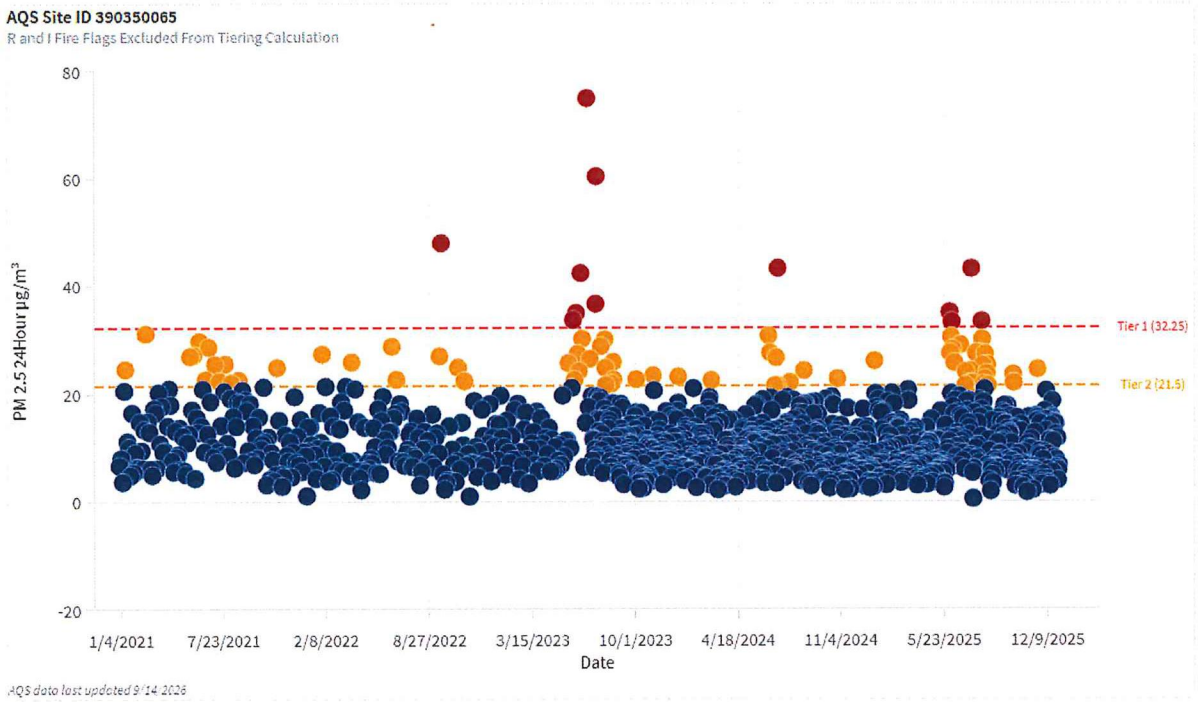

Figure 5. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Harvard Yards monitor (390350065).

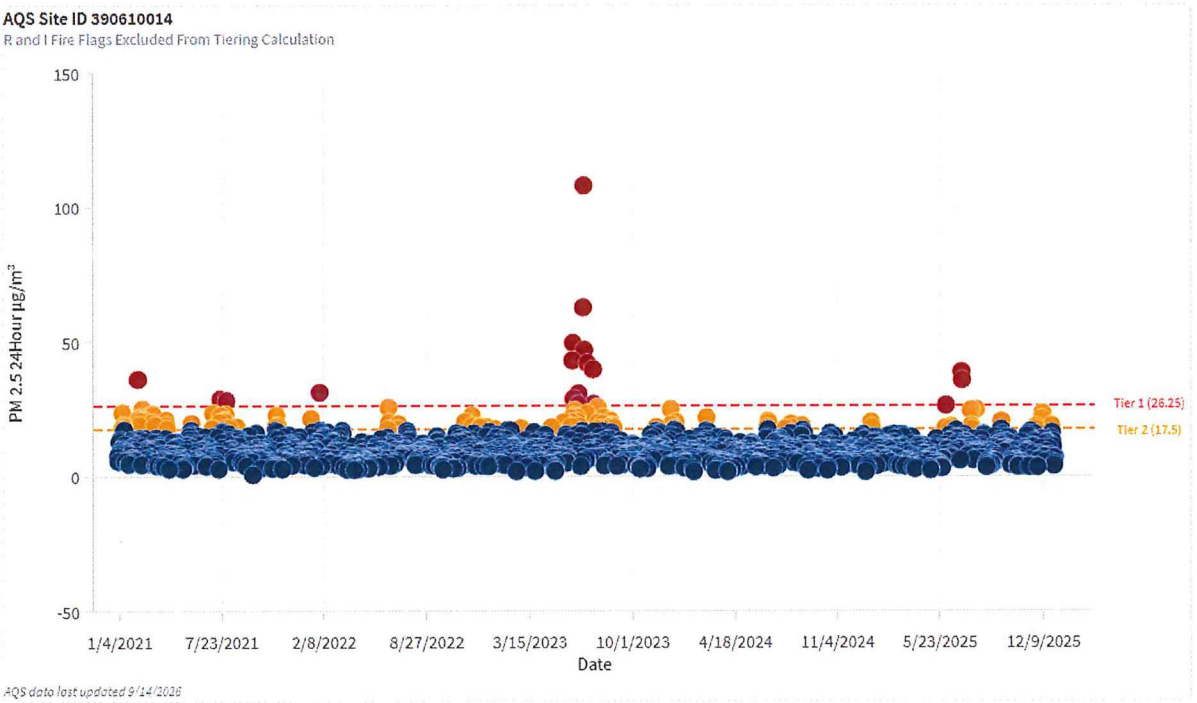

Figure 6. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Carthage monitor (390610014).

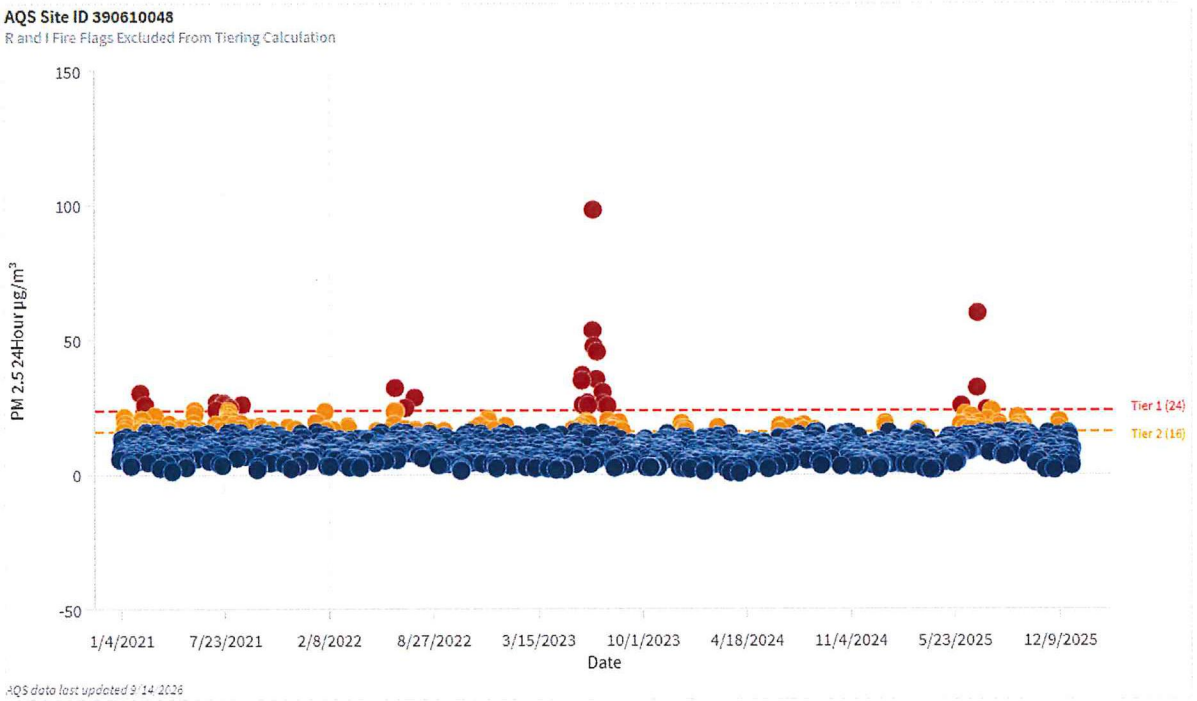

Figure 7. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Cincinnati Near Road monitor (390610048).

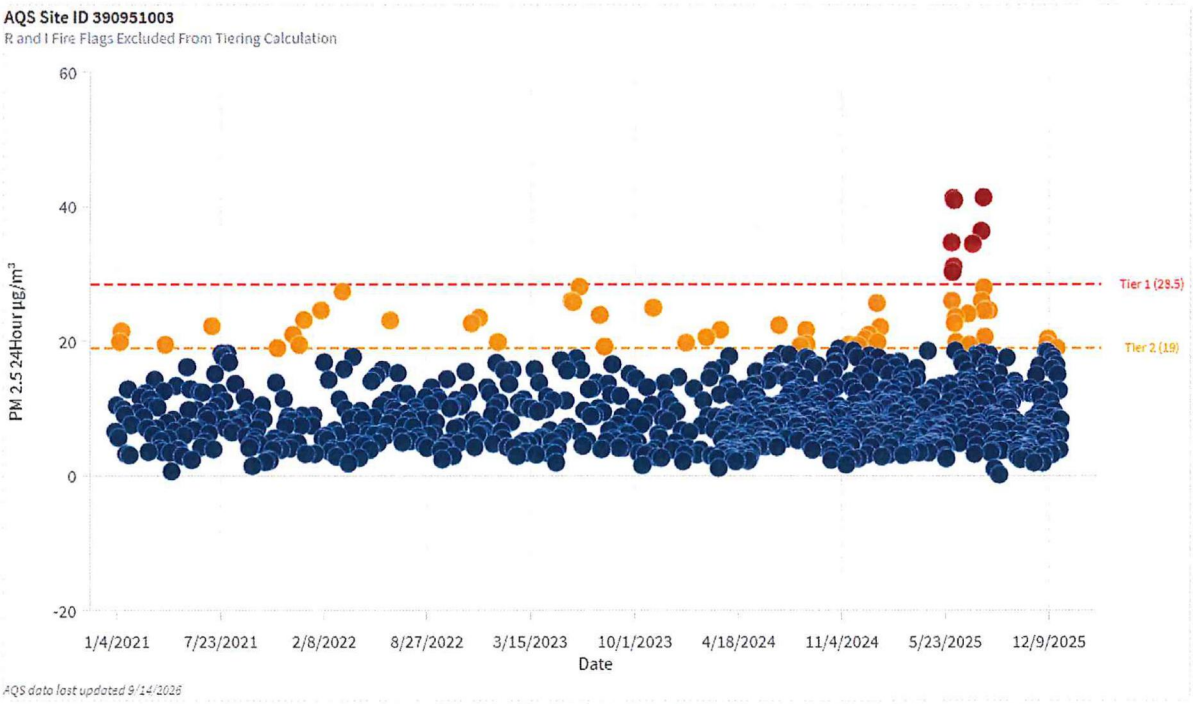

Figure 8. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Eastside Pump St monitor (390951003).

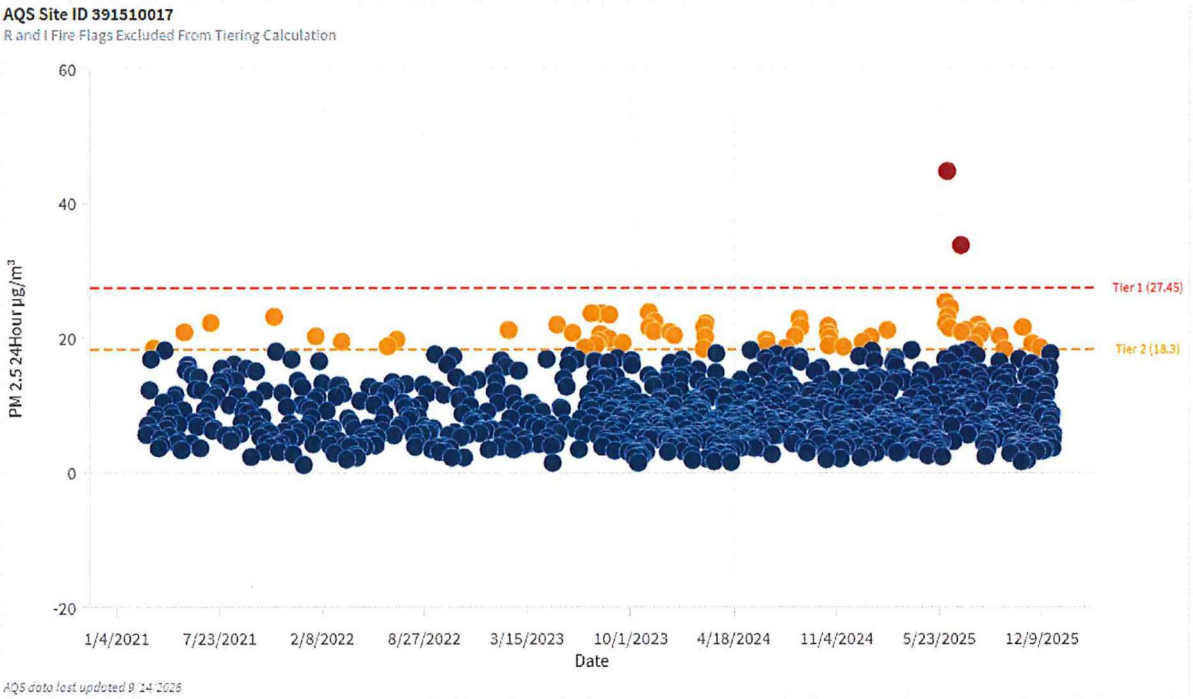

Figure 9. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Canton Fire St8 monitor (391510017).

Tier 1 / Tier 2 Dates Selected

Table 2 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[4] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 2. Monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

	24-hour PM2.5 Concentrations (µg/m3)								
Date	**390170015**	**390170022**	**390350038**	**390350060**	**390350065**	**390610014**	**390610048**	**390951003**	**391510017**
2023-04-13		31.8							
2023-04-14		26.2	25.2	20.8					
2023-05-12								17.2	22
2023-05-20	18.3	19.3	18			20.1	16.7		
2023-05-23			18.9						
2023-05-24				18.2	25.7				
2023-05-30				18.2					
2023-06-02				22.3	33.7			26	
2023-06-03		21.8				18.6			
2023-06-04		19.9				21.7	16.6		
2023-06-05	21.6	22.3	19.7	21.9	22.6	20.1	18	25.8	
2023-06-06	41.3	43.7	43.1	44.1		43.1	34.9		
2023-06-07	48.5	56.2	52.8	51.8		49.6	36.9		
2023-06-08	25.7	38.4	22.5	35	35	28.8	25.8		
2023-06-09	26.2	37.6	27.5	29.4		22.5			
2023-06-10	30	34.4	20			24.5	17.6		
2023-06-11			27	26	27.4		16		20.8
2023-06-14					24.2				
2023-06-15	20.4	19.7				21.9	19.6		
2023-06-16	19.7	22.3	24.7	24.9		20.3	18.9		

[4] Data downloaded from EPA Tiering Tool on October 21, 2026.

ALPINE GEOPHYSICS

	24-hour PM2.5 Concentrations (µg/m3)								
Date	390170015	390170022	390350038	390350060	390350065	390610014	390610048	390951003	391510017
2023-06-17	26.4	30	31.1	31.7	42.4	26.7	26.7	28.1	
2023-06-18	31.9	35.6	24.7	25.1		30.8	25.6		
2023-06-19	21.4	23.3	24.7	24.1		18.7	18.8		
2023-06-20			19.6	21.5	30.2				
2023-06-21			19.6						
2023-06-27	70.7	67.9	54.8	56.7		62.8	53.5		
2023-06-28	117.2	113.6	157.1	151.6		108.1	98.3		
2023-06-29	47.6	45.8	73.5	76.7	74.9	47	47.6		
2023-06-30			34	31.2					
2023-07-04			19.5	23.8		23.4	35.4		
2023-07-05	24.2	29.4	24	28.1	26.5	42.1	45.6		18.6
2023-07-16	36.4	37.6	37.3	39.7	36.7	39.8	30.6		
2023-07-17	38.6	30.2	59.9	63.5	60.4	27	26.3		
2023-07-18									23.7
2023-07-25	25	26.1		21.5		25.7	25.5		
2023-07-26	20.9	22.3	20.7	29.7	28.8	20	19.9	23.9	19
2023-07-27						17.7	17.1		
2023-08-01									19.5
2023-08-02	17.5								
2023-08-03	19	19.2	28.9	30.9	30.1	17.8	16.6		
2023-08-04	18	19.6	19.3	20.7	24.8	19.6	17.9	19.2	20.6
2023-08-05	23.7	24	21.6	23.9	21.6	22	16.9		23.7
2023-08-16					21.9	18.3	19.4		
2023-08-19	23.3	26.3			25.9	20.7			
2023-08-20			19.2	21.2	22.6				19.9
2023-08-21	17.6					19			23.5
2023-08-22							16.2		
2023-08-23	18.6					18.9			
2023-08-24						18.7			
2023-08-25	18.2					18			
2023-09-16									19.3

ALPINE GEOPHYSICS

	24-hour PM2.5 Concentrations (µg/m3)								
Date	390170015	390170022	390350038	390350060	390350065	390610014	390610048	390951003	391510017
2023-10-01				18.2					
2023-10-03			18.8	17.3	22.7				
2023-11-04		51.5							
2023-11-05	16.7	23	22.6	21.7	23.4			25	23.8
2023-11-06		19.3							21.6
2023-11-12		24.5							
2023-11-16		23.4		23		18.3			22.4
2024-02-27					22.5				
2024-03-04			21.4						
2024-03-13								21.7	
2024-03-14			21.9	28.7					
2024-03-30								17.8	
2024-06-17					30.8				
2024-06-19	19.9		19.3			18.2	16.1		19.8
2024-06-20			20.2		27.6		18.2		
2024-06-21	20.2		19.5			20.6			19.7
2024-06-22	20.3					19.9			18.9
2024-07-04					21.6				
2024-07-05					43.3			22.4	
2024-07-07							17.2		
2024-07-25	17.6					17.7	17.7		
2024-07-28									18.5
2024-07-29					22.1				
2024-08-04							16.6		
2024-08-05						19.5	18.5		
2024-08-06	17.9					18.1	16.4		
2024-08-14				21.9					
2024-08-15			19.7	20.7				19.3	20.3
2024-08-24	18.3	19.6							22.9
2024-08-25					24.3				
2024-08-26	19.8	19.2		22.2		18.9	16.7	21.7	21.6

ALPINE GEOPHYSICS

	24-hour PM2.5 Concentrations (µg/m3)								
Date	390170015	390170022	390350038	390350060	390350065	390610014	390610048	390951003	391510017
2024-08-27	18.2			22.8			16.8	19.6	
2024-09-11				18.4				16.6	
2024-10-18									20.7
2024-10-19		21.7							21.8
2024-10-20	16.4	27.1				16.1			18.9
2024-10-21								17.9	20
2024-10-22									20.7
2024-10-29	16.2					14.9	15.6	18.9	
2024-10-30					22.8				
2025-03-10		22.5							
2025-03-11		24.4							
2025-05-11		22.1							
2025-06-03				28.4	35.1	17.9	18.4	34.7	
2025-06-04	28.5	27.9	27	25.6	27.5	26.4	25.5	26	25.4
2025-06-05	19.2	19.4	19.3			17.9	18.6	30.3	22.2
2025-06-06			25.7	29.5	30.5			41.3	
2025-06-07			31.8	29.5	33.3			31.1	44.8
2025-06-08			29	26.8	28.2			41	23.2
2025-06-09								22.7	
2025-06-11		21.9					17	23.6	
2025-06-12	20.9	26.2	20.5		25.7	17.6	22.3	19.9	21.5
2025-06-22							16.6		
2025-06-23	18.8						21.5		
2025-06-24					29		17.8		
2025-06-25							16.9		
2025-07-03	17.7				21.5		16.6		
2025-07-04	48.5	33.4	25.6	27.2	24	38.8	32.3		33.8
2025-07-05	31.7	37.7	19.4	21.3		35.8	60	24.1	20.9
2025-07-06							18.9		
2025-07-08								19.5	
2025-07-09			20	21.3			17.3		17.8

ALPINE GEOPHYSICS

	24-hour PM2.5 Concentrations (µg/m3)								
Date	390170015	390170022	390350038	390350060	390350065	390610014	390610048	390951003	391510017
2025-07-12					24.2				
2025-07-14			21.5		22			34.5	
2025-07-15			27.2	30.9	43.2			34.5	21.2
2025-07-16			22.1	22.4	21.9				
2025-07-21	19.2								18.2
2025-07-22	23.3	25.7				24.6	24.2		
2025-07-24				21.6	27.5	17.5	16.3		
2025-07-31			29.3	27.9	27.5			36.4	19.1
2025-08-01	26.3	26.2				24.8	23.6	26	
2025-08-04			37.5	36.8	33.4			41.4	
2025-08-05			20.9	24.8	30.1			28	
2025-08-06			23.8	23.3	25.2			24.6	22
2025-08-07								20.7	
2025-08-08					21.7				
2025-08-09			21.4						22
2025-08-10			22.1		22.7				20.5
2025-08-11					27.3				
2025-08-16	18.3		21.2	20.8	21.5				21
2025-09-10			14.7						
2025-09-15							17.1		
2025-09-16			15.2						
2025-09-17			14.7				16		
2025-09-18		19.4		18.5		17.4	18.4	17.6	20.3
2025-09-19	15.5	20.6				20.4	21.3		
2025-09-20							17.3		
2025-09-27									18.3
2025-09-29							18.5		
2025-10-04		18.9	19.2		23.5				
2025-10-05					22				

Complete Monitor Level Results

A substantial number of days in 2023 and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Ohio. The smoke's effects extended beyond Ohio, with elevated concentrations also observed in regional areas in the Midwest.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 4, when these dates and associated smoke-influenced Tier 1 observations were removed from the record, recalculated annual design values at key monitors in Butler and Hamilton Counties fell to levels in attainment of the 9.0 $\mu g/m^3$ annual PM2.5 NAAQS.

Removing Tier 1 concentrations lowered design values by an average of 0.4 $\mu g/m^3$ across all analyzed monitors. When Tier 2 dates were also removed, design values were an average of 0.9 $\mu g/m^3$ lower than the unadjusted values. These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 3. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Ohio monitors, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Ohio	Butler	390170015	Ohio Bell	10.54	8.25	9.46	9.4
Ohio	Butler	390170022	Bpg	12.06	9.39	10.72	10.7
Ohio	Cuyahoga	390350038	St Theodosius	11.22	8.83	9.38	9.8
Ohio	Cuyahoga	390350060	Gt Craig Ncore Pams	11.92	9.34	9.26	10.2
Ohio	Cuyahoga	390350065	Harvard Yards	12.83	9.75	10.71	11.1
Ohio	Hamilton	390610014	Carthage	10.87	8.43	9.43	9.6
Ohio	Hamilton	390610048	Cincinnati Near Road	9.78	8.36	10.32	9.5
Ohio	Lucas	390951003	Eastside Pump St	9.28	9.02	10.01	9.4
Ohio	Stark	391510017	Canton Fire St8	9.50	8.82	9.53	9.4

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Ohio monitors with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Ohio	Butler	390170015	Ohio Bell	9.38	8.25	9.20	8.9
Ohio	Butler	390170022	Bpg	10.60	9.39	10.59	10.2
Ohio	Cuyahoga	390350038	St Theodosius	9.95	8.83	9.14	9.3
Ohio	Cuyahoga	390350060	Gt Craig Ncore Pams	10.61	9.34	9.19	9.7
Ohio	Cuyahoga	390350065	Harvard Yards	11.52	9.67	10.44	10.5
Ohio	Hamilton	390610014	Carthage	9.79	8.43	9.23	9.1
Ohio	Hamilton	390610048	Cincinnati Near Road	8.67	8.36	10.06	9.0
Ohio	Lucas	390951003	Eastside Pump St	9.28	9.02	9.36	9.2
Ohio	Stark	391510017	Canton Fire St8	9.50	8.82	9.37	9.2

Table 5. Annual mean concentrations and 3-year design values (µg/m3) at Ohio monitors with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Ohio	Butler	390170015	Ohio Bell	8.69	7.96	8.99	8.5
Ohio	Butler	390170022	Bpg	9.94	9.25	10.16	9.8
Ohio	Cuyahoga	390350038	St Theodosius	9.17	8.64	8.50	8.8
Ohio	Cuyahoga	390350060	Gt Craig Ncore Pams	9.72	9.14	8.50	9.1
Ohio	Cuyahoga	390350065	Harvard Yards	10.35	9.38	9.62	9.8
Ohio	Hamilton	390610014	Carthage	9.03	8.18	8.99	8.7
Ohio	Hamilton	390610048	Cincinnati Near Road	8.24	8.14	9.64	8.7
Ohio	Lucas	390951003	Eastside Pump St	8.30	8.68	8.93	8.6
Ohio	Stark	391510017	Canton Fire St8	8.81	8.42	8.90	8.7

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Ohio monitors and regionwide, the following action is recommended.

1. Each date at monitors within Ohio identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Ohio, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes. An example application would be excluding dates and concentrations from regional Illinois, Michigan, or Ohio monitors consistent with dates and monitors already concurred with by EPA[5] in Indiana's exceptional events demonstrations.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional even days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.

[5] https://www.in.gov/dA/f244662b4f/pm25_exceptional_events_epa_concurrence_lake_co.pdf

Exhibit G

Supporting Materials Demonstrating Increased PM2.5 Concentrations in Pennsylvania Resulting from Canadian Wildfire Influence in 2023-2025

Supporting Materials Demonstrating Increased PM2.5 concentrations in Pennsylvania Resulting from Canadian Wildfire Influence in 2023-2025

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October 2026

Summary

Based on the results of ongoing Alpine analyses of exceptional events influence and the widespread impact of wildfire and prescribed fire smoke on monitors throughout Pennsylvania, including areas within the broader regional airshed, it is recommended that regulatory agencies give full and consistent consideration to the treatment of affected PM2.5 data under the Exceptional Events Rule. The evidence developed and presented here for the 2023, 2024, and 2025 wildfire and prescribed fire smoke episodes demonstrates that transported smoke significantly elevated monitored concentrations across large portions of the region beyond what would reasonably be expected in the absence of wildfire conditions. These impacts were neither isolated nor localized but instead represented widespread regional air quality disturbances affecting both attainment and nonattainment areas alike.

Accordingly, each date and monitor identified as having experienced wildfire or prescribed fire smoke impacts during these periods, where PM2.5 concentrations were demonstrably enhanced by smoke intrusion, should be flagged as influenced by exceptional events and the associated concentration values removed from the regulatory record used in design value calculations and boundary designations. Importantly, the concept of "regulatory significance" should not be narrowly interpreted solely through the lens of whether the exclusion changes an attainment or nonattainment designation. Rather, any concentration demonstrably influenced by wildfire or prescribed fire smoke should be considered appropriate for exclusion regardless of the ultimate attainment outcome. Failure to recognize and remove these influenced concentrations risks embedding atypical and non-representative conditions into long-term regulatory datasets that support multiple Clean Air Act programs, including PSD compliance demonstrations, Good Neighbor State or Federal Implementation Plans (SIPs and FIPs), and State attainment demonstrations, to name a few.

The significance of this issue is illustrated clearly by monitor 421010057 (Fire Administration Building monitor) in Philadelphia County, Pennsylvania. Analysis indicates that this monitor experienced measurable enhancement on multiple dates from both wildfire and prescribed fire smoke intrusion during the 2023-2025 period. While the monitor's current annual design value remains above the annual PM2.5 National Ambient Air Quality Standard (NAAQS) at 9.4 $\mu g/m^3$, removal of all identified smoke-influenced[1] Tier 1 dates would reduce the annual design value sufficiently to bring the monitor into attainment (at 8.8 $\mu g/m^3$) with the current annual PM2.5 NAAQS. Figure 1 below shows these dates using EPA's PM2.5 Tiering Tool[2] while Table 1 provides the recalculated annual mean and design values absent these Tier 1 dates and noted overhead smoke.

When these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, design values were lowered by an average of 0.5 $\mu g/m^3$ across all analyzed monitors. These values for all monitors are presented in Table 1.

[1] https://www.ospo.noaa.gov/products/land/hms.html
[2] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

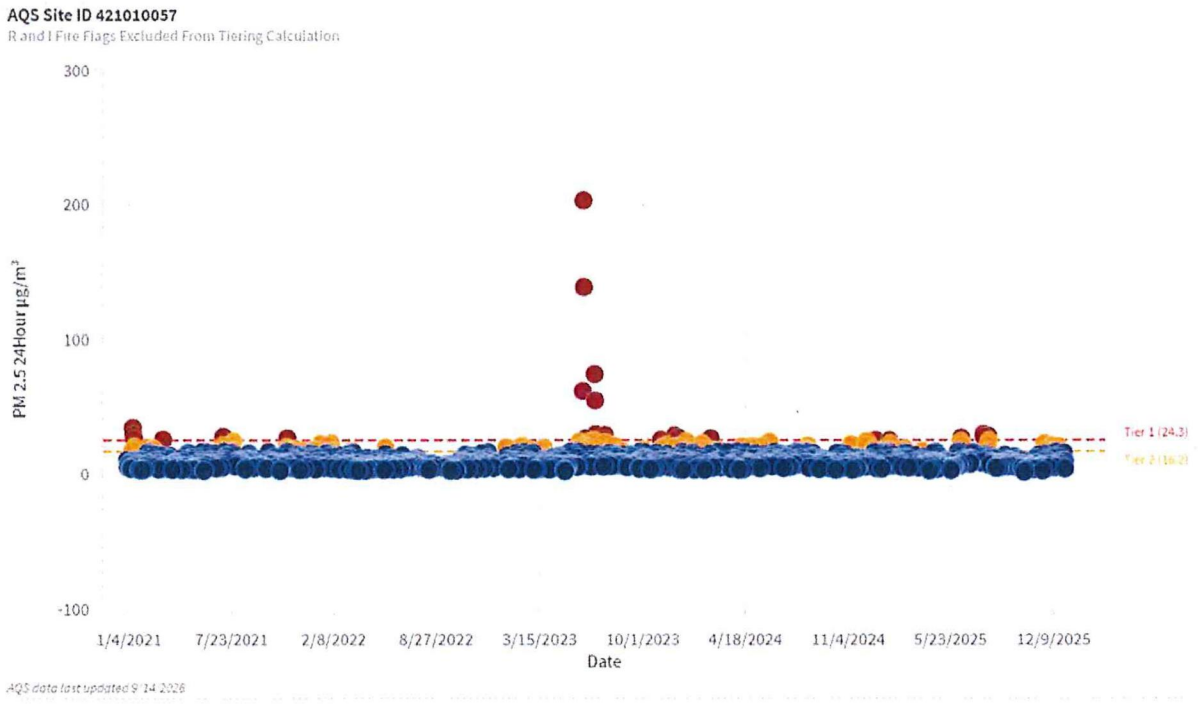

Figure 1. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Fire Administration Building monitor (421010057).

Table 1. Unadjusted and excluding smoke-influenced Tier 1 adjusted Pennsylvania PM2.5 monitor annual mean and design values.

				Excluding All Smoke-Influenced Tier 1 Date Concentrations			
County	**Site ID**	**Local Site Name**	**2023-2025 Annual DV (ug/m3)**	**2023 Annual Mean (ug/m3)**	**2024 Annual Mean (ug/m3)**	**2025 Annual Mean (ug/m3)**	**2023-2025 Annual DV (ug/m3)**
Allegheny	420030064	Liberty	10.1	11.44	8.96	9.43	9.9
Allegheny	420031301	North Braddock	9.5	9.75	8.43	9.20	9.1
Philadelphia	421010004	Air Management Services Laboratory	10.6	10.85	9.94	9.43	10.1
Philadelphia	421010048	North East Waste	9.2	10.24	7.17	8.32	8.6
Philadelphia	421010055	Ritner	9.4	9.81	8.31	7.87	8.7
Philadelphia	421010057	Fire Administration Building	9.4	9.16	8.87	8.46	8.8
Philadelphia	421010075	Torresdale Station	10.2	11.55	9.36	8.02	9.6

These examples demonstrate the substantial regulatory implications associated with smoke-influenced concentrations and underscores the magnitude of fully evaluating and excluding affected data where supported by technical evidence. The importance of proper data management increases as standards become increasingly stringent and closer to background levels. Beyond attainment determinations alone, retaining these concentrations within the regulatory record could influence future permitting requirements, transportation conformity analyses, State Implementation Plan obligations, emissions reduction strategies, and broader regulatory planning efforts tied to both PM2.5 and ozone programs.

Consideration should also be given to monitors located outside designated counties and CBSAs but within the same regional airshed that experienced impacts from the same smoke plumes during the 2023-2025 episodes. In many cases, smoke transport is regional in scale and crosses jurisdictional and programmatic boundaries. Therefore, states should be encouraged to reference and leverage existing exceptional events demonstrations prepared by neighboring states where proximal monitors were impacted by the same smoke episodes on the same dates. Such coordination would improve consistency, reduce redundant analytical burdens, and better reflect the regional nature of the wildfire and prescribed fire impacts observed during these events.

Finally, consideration should be given to allowing states, including Pennsylvania, flexibility in satisfying the clear causal relationship criterion for wildfire and prescribed fire dates associated with smoke episodes. The collective body of evidence developed here through satellite imagery, air mass trajectory analyses, smoke modeling, surface observations, and widespread concentration enhancements has already demonstrated that Canadian wildfire smoke and domestic prescribed fires significantly impacted PM2.5 concentrations across the region.

Given the extensive number of demonstrations currently being prepared nationwide for these episodes, it would be reasonable and appropriate for regulatory agencies to permit states to adopt and reference other state technical analyses and supporting evidence and related demonstrations to satisfy Tier 1 obligations. Such an approach would maintain technical rigor while promoting regulatory consistency and administrative efficiency in addressing these unprecedented regional smoke events.

Comparison of Fire-Influenced PM2.5 Exceedances with Historical Concentrations

U.S. EPA's Exceptional Events Guidance and supplemental materials indicate that a clear causal demonstration should include a comparison of the event-related exceedance with historical concentrations measured at each monitor requested for data exclusion. Examples of supporting documentation include time-series plots overlaying five years of data and five-year percentiles or alternate graphical representation of these data using EPA's Tiering Tool[3].

EPA's tiering approach helps tailor the amount of evidence needed in a wildland-fire PM2.5 exceptional-events demonstration. For each monitoring site, EPA sets a threshold using the lower of two statistics from the most recent complete five-year period: the month-specific 98th percentile of daily PM2.5 concentrations or the lowest annual 98th percentile. The event-day concentration is then compared with the site's threshold: Tier 1 is at least 1.5 times the threshold, Tier 2 is at least the threshold but less than 1.5 times it, and Tier 3 is below it.

Figure 2 shows the 24-hour PM2.5 concentrations for the Liberty monitor (170310022) using EPA's Tiering Tool with clear indication of Tier 1 and Tier 2 dates represented by the red and gold dots, respectively. Increased PM2.5 above the Tier 1 and Tier 2 thresholds is evident on multiple dates.

PM2.5 concentrations were elevated at all remaining reviewed sites in Pennsylvania during these dates (Figure 2 through Figure 7), demonstrating that the region was impacted by area-wide events.

All the reviewed monitors recorded multiple 24-hour PM2.5 concentrations above their Tier 1 threshold values during the period of 2023 through 2025, indicating rare PM2.5 episodes. At all monitors, the observations from many of these days were in the top five days of the five-year period between 2023 and 2025, in many locations they were the single top value.

[3] https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

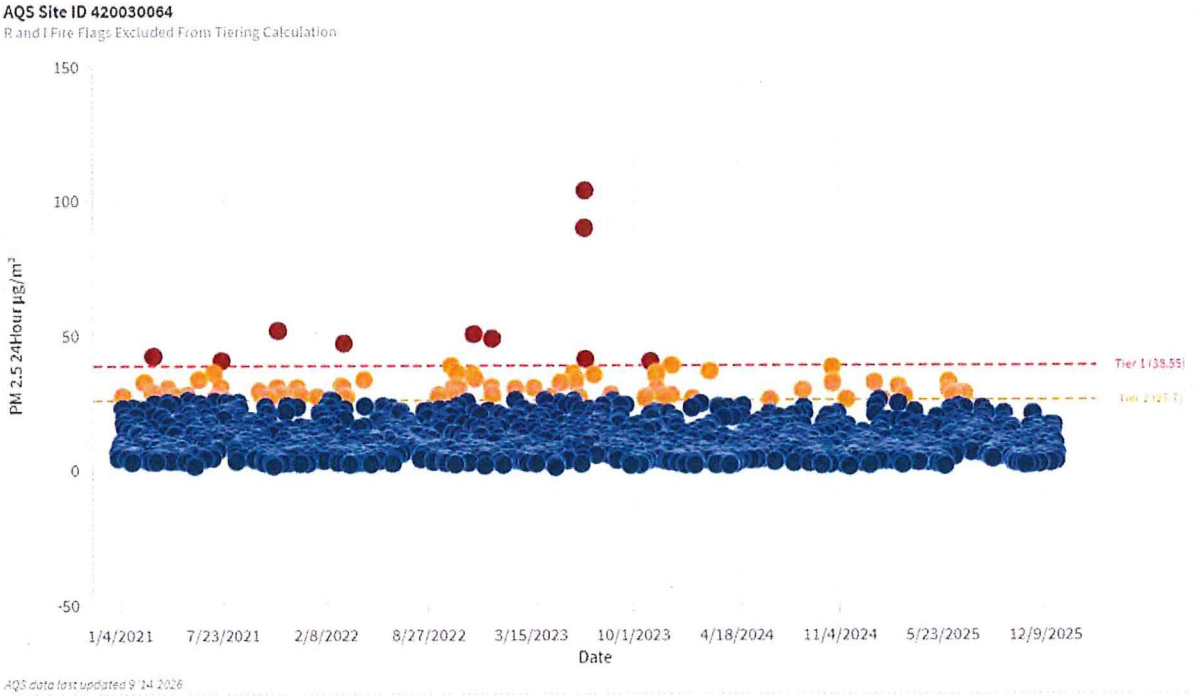

Figure 2. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Liberty monitor (420030064).

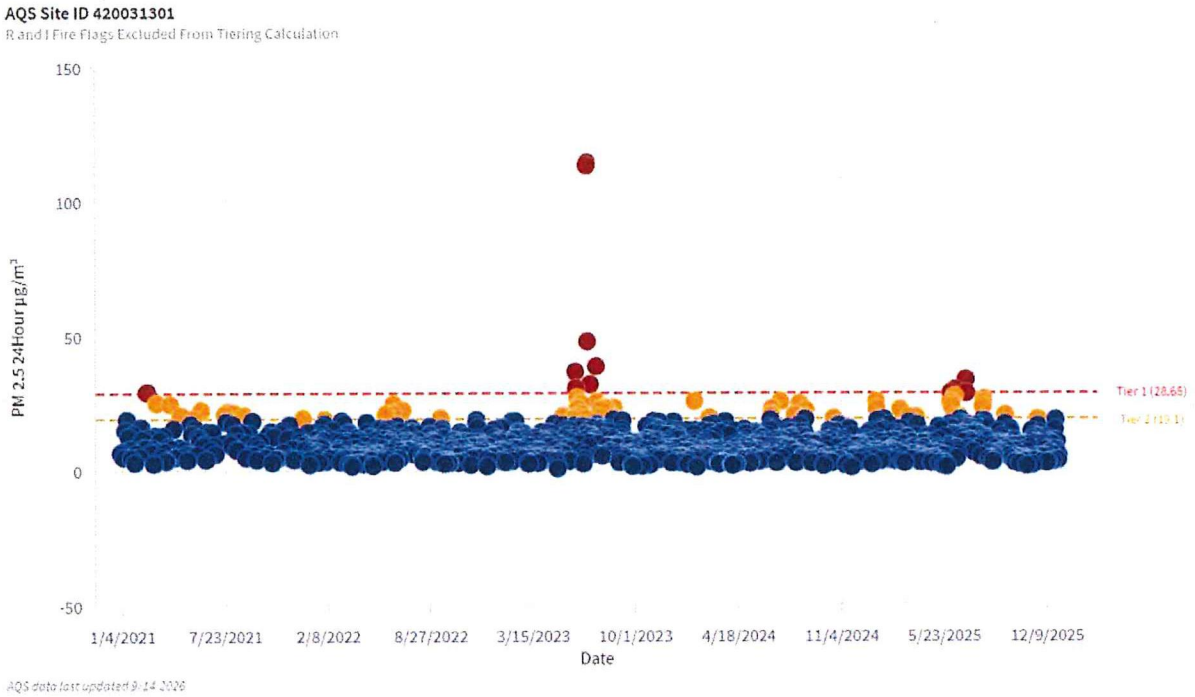

Figure 3. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the North Braddock monitor (420031301).

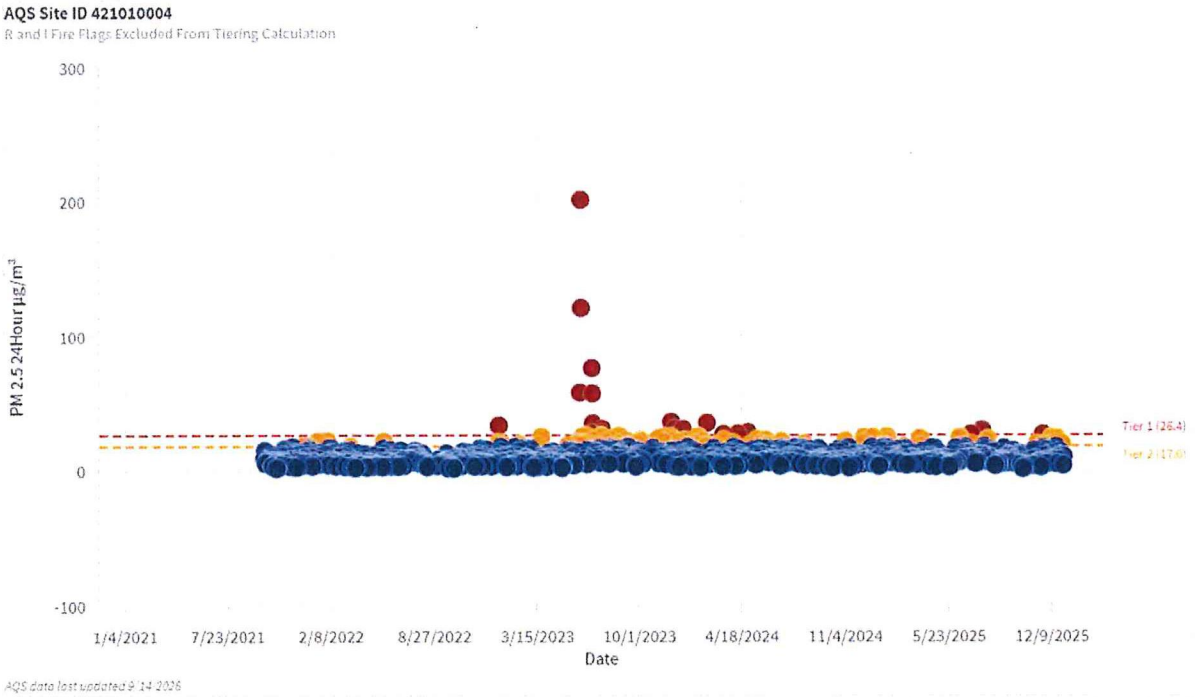

Figure 4. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Air Management Services Laboratory monitor (421010004).

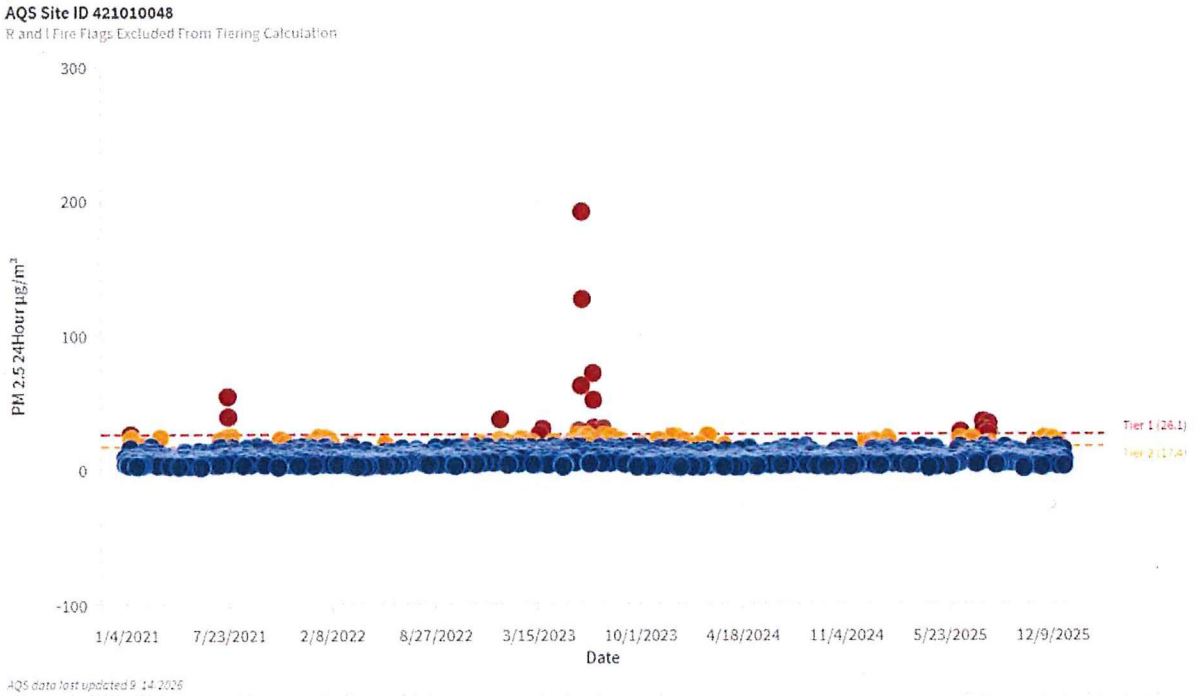

Figure 5. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the North East Waste monitor (421010048).

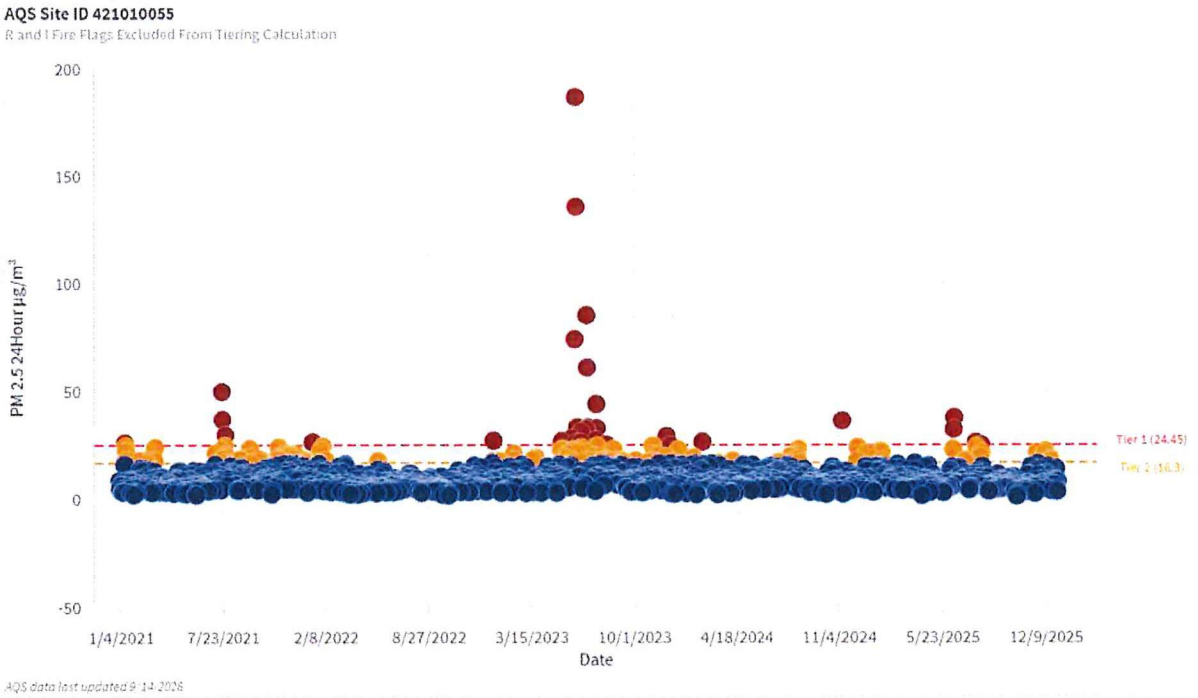

Figure 6. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Ritner monitor (421010055).

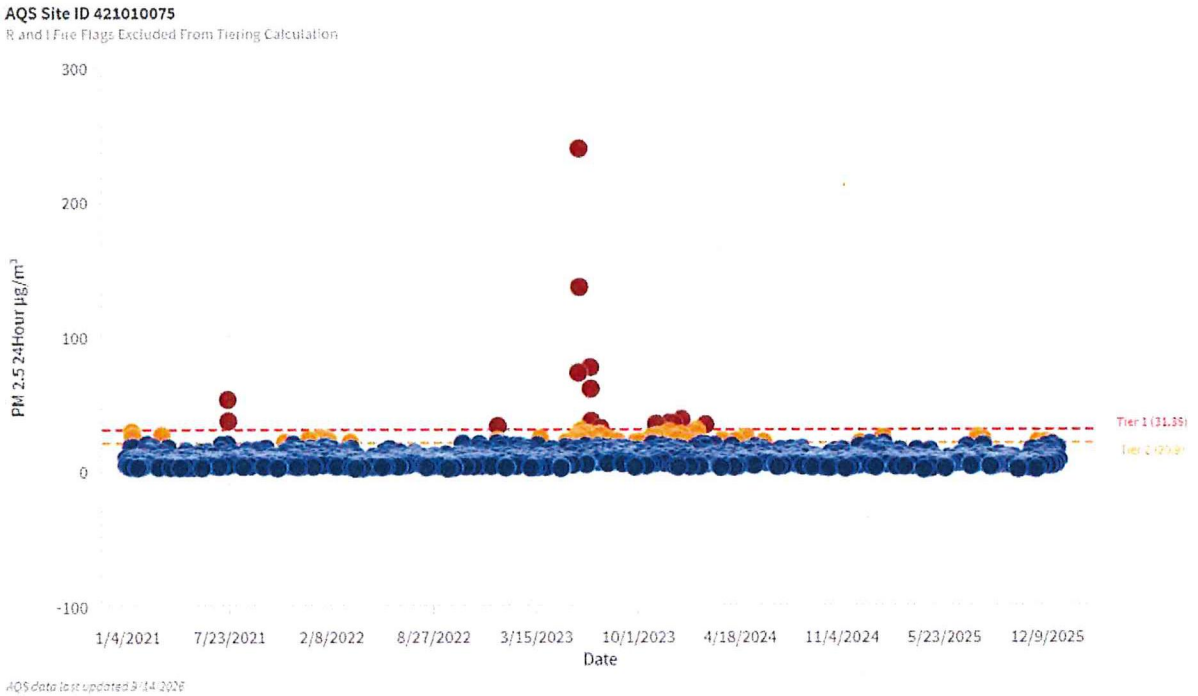

Figure 7. Five-year (2021-2025) time series of 24-hour PM2.5 concentrations, Tier 1 and Tier 2 threshold values at the Torresdale Station monitor (421010075).

Tier 1 / Tier 2 Dates Selected

Table 2 below provides a listing of 2023-2025 monitor-specific EPA Tiering Tool-identified Tier 1 (orange) and Tier 2 (yellow) 24-hour PM2.5 concentrations (µg/m^3) and dates[4] found to also have HMS smoke present during the episode. The values in this table are those removed from design value calculations in the next step of this analysis.

Table 2. Monitor-specific 24-hour PM2.5 concentrations (µg/m^3) and Tier 1 (orange) and Tier 2 (yellow) dates selected for removal from design value calculations.

	24-hour PM2.5 Concentrations (µg/m3)						
Date	420030064	420031301	421010004	421010048	421010055	421010057	421010075
2021-03-11							26.9
2021-07-20							53.5
2021-07-21							37.5
2023-04-13				17.3			
2023-04-14				20.3			
2023-04-21	26.7						
2023-05-11					22.4		
2023-05-12	31.9	19.9			26.5		18.1
2023-05-16					19.2		
2023-05-21				18.2	18.4		
2023-05-22				19.6	20.3	16.1	
2023-05-30				19.8	17.3		
2023-05-31			20.9	25.6	27.8	23.3	23.4
2023-06-01			19.4	27.1	21.7	18.5	24.3
2023-06-02		19.1	20.6	28.8	22.4	20	25.7
2023-06-03		19.7			16.6		
2023-06-06	35.4	36.7	57.9	62.3	73.9	61	73.3
2023-06-07		30.6	201.2	191.6	186.4	202.6	239.8
2023-06-08		20.2	121	126.7	135.4	138.3	136.8
2023-06-09		23.1	18.5	21.1	22.4	20.1	23
2023-06-10	32.1	27.1	20.3	22.2	25.9	20.4	26.8
2023-06-11	33.4	23	25.4	27.5	32.9	25.8	30.2
2023-06-17	26.5	25.2	20.8	24.6	25.8	18.8	
2023-06-18	26.8	24.8	26	25.4	30.8	23.2	27.2
2023-06-19		21.1	20.3	17.6	23.4	16.8	
2023-06-20					16.7		
2023-06-27		19.3					
2023-06-28	89.5	113.4	27.6	27.8	32	24.2	27.6
2023-06-29	103.4	114.4	76.2	71.6	85.1	73.6	77.2
2023-06-30	40.8	47.9	57.3	51.6	60.7	54	61.3
2023-07-01			34.8	31	32.8	28.8	37.3
2023-07-02			22.2	21.2	20.9	18	23.9
2023-07-05		32.1	18.8	19	17.4		20.9

[4] Data downloaded from EPA Tiering Tool on October 21, 2026.

	24-hour PM2.5 Concentrations (µg/m3)						
Date	420030064	420031301	421010004	421010048	421010055	421010057	421010075
2023-07-12					19.4		
2023-07-13			18		17.2		
2023-07-17	34.9	38.7	26.2	27.8	26.9	22.5	26.8
2023-07-18		25.5	28.2	29.6	43.8	24.9	27.2
2023-07-19			30.9	30.6	32.5	28.3	32.2
2023-07-20			25	25.4	24.3	22.5	26.7
2023-07-26		22.5					
2023-07-27		19.8	21	18.2	19.2		
2023-07-28					17.1		
2023-08-02		23.6					
2023-08-03		23.1					
2023-08-05		23.3			18		
2023-08-06			22.7	24.3	24.9	20.2	23.7
2023-08-09			18.6		17.2		
2023-08-11					17.1		
2023-08-19		19.9					
2023-08-20	27.7		20		17.5		
2023-08-21	25.4	23.3	25.9	21.4	22.7	16.2	22.3
2023-08-24							17.5
2023-09-04			17.7				
2023-09-05			22.2	18.2	17.5	13.7	17.4
2023-09-06			19.3	17.6	17.3		17.2
2023-09-07			17.8		17.5	13.8	
2023-09-08					16.6		
2023-09-16	23.7						
2023-09-26			19.8			16	21.4
2023-10-03			22.4	18.6	17.4	17.3	21.9
2023-10-04			21.1			15.4	20.9
2023-11-05				21.8	24.4	24.6	35.1
2023-11-06		18.4					
2023-11-07					20.2		
2023-11-16	35.8		24.8	17.4	19.9	20.8	26.4
2024-02-26	36.2						
2024-02-27			18.3			16.9	
2024-03-13			27	17.6	16.4		22.2
2024-03-14			22.8				23.2
2024-04-29					15.6	18.4	23.3
2024-05-25			19.7				
2024-05-26			19.4				
2024-06-03			18.4				
2024-06-04			22.6			23.3	21.8
2024-06-13			18.5				
2024-06-20		20.4					
2024-06-21		20.9					
2024-06-22	25.7	22.9					
2024-07-04			21.3				

	24-hour PM2.5 Concentrations (µg/m3)						
Date	420030064	420031301	421010004	421010048	421010055	421010057	421010075
2024-07-09		25.6					
2024-07-16					16.7		
2024-07-28					16.7		
2024-08-01					19.2		
2024-08-05		20.6					
2024-08-06		20.3					
2024-08-14					19.6	17.4	
2024-08-15		24.9			18		
2024-08-16					20.8	16.9	
2024-08-17			19.9		22.7	20.3	
2024-08-18					16.4		
2024-08-25	29.2						
2024-08-26		19.8					
2024-08-27		22.4					
2024-10-20	37.8	19.4					
2024-10-21	31.6						
2024-10-22	32.4						
2024-10-29		16.7					
2024-10-30		16.8					
2025-06-04	32.3	25.2					
2025-06-05	29	28.7					
2025-06-07		23.8					
2025-06-08		25.3					
2025-06-11		19.6					
2025-06-12	27.6	27.5	23.5	22.8	22.6	23.4	
2025-06-13		29.9	24.7	28	31.9	26.1	
2025-06-24	27.8	19.7					
2025-07-04		33.7	26.7	20.8	16.8		
2025-07-05	28.1	28.7	19.6	22.6	17.5		
2025-07-26			29.9	35.7	25.9	28.8	23.4
2025-07-27			28.6	29.3	23.8	27.1	25.7
2025-07-30				18.2			
2025-08-04			21.3	26.3	19	20.6	19
2025-08-05				34.2	24.6	27.5	23.9
2025-08-06		23.6	23.1	28.4	21.1	23.8	19.6
2025-08-07		25.3		19.2		16.3	
2025-08-08		26.6					
2025-09-19		20.6					
2025-12-18			24	19.5	17.8	19.8	

Complete Monitor Level Results

A substantial number of days in 2023 and 2025 were influenced by Canadian wildfire smoke, elevating PM2.5 observations across Pennsylvania. The smoke's effects extended beyond Pennsylvania, with elevated concentrations also observed in regional areas.

Using EPA tools, dates were identified when Canadian wildfire smoke affected PM2.5 observations. As can be seen in Table 4, when these dates and associated smoke-influenced Tier 1 observations were removed from the record and annual design values were recalculated, design values were lowered by an average of 0.5 µg/m³ across these monitors. When Tier 2 dates were also removed, design values were an average of 0.9 µg/m³ lower than the unadjusted values (Table 5). These comparisons show that wildfire-affected days contributed meaningfully to the measured design values.

Table 3. Annual unadjusted mean concentrations and 3-year design values (µg/m3) at Pennsylvania monitors, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Pennsylvania	Allegheny	420030064	Liberty	11.98	8.96	9.43	10.1
Pennsylvania	Allegheny	420031301	North Braddock	10.70	8.43	9.42	9.5
Pennsylvania	Philadelphia	421010004	Air Management Services Laboratory	12.35	9.99	9.59	10.6
Pennsylvania	Philadelphia	421010048	North East Waste	11.87	7.17	8.66	9.2
Pennsylvania	Philadelphia	421010055	Ritner	11.90	8.31	8.03	9.4
Pennsylvania	Philadelphia	421010057	Fire Administration Building	10.72	8.87	8.70	9.4
Pennsylvania	Philadelphia	421010075	Torresdale Station	13.27	9.36	8.02	10.2

Table 4. Annual mean concentrations and 3-year design values (µg/m3) at Pennsylvania monitors with Tier 1 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Pennsylvania	Allegheny	420030064	Liberty	11.44	8.96	9.43	9.9
Pennsylvania	Allegheny	420031301	North Braddock	9.75	8.43	9.20	9.1
Pennsylvania	Philadelphia	421010004	Air Management Services Laboratory	10.85	9.94	9.43	10.1
Pennsylvania	Philadelphia	421010048	North East Waste	10.24	7.17	8.32	8.6
Pennsylvania	Philadelphia	421010055	Ritner	9.81	8.31	7.87	8.7
Pennsylvania	Philadelphia	421010057	Fire Administration Building	9.16	8.87	8.46	8.8
Pennsylvania	Philadelphia	421010075	Torresdale Station	11.55	9.36	8.02	9.6

Table 5. Annual mean concentrations and 3-year design values (µg/m3) at Pennsylvania monitors with Tier 1 and Tier 2 dates removed, 2023-2025.

				Annual Mean (µg/m3)			2023-2025 Annual Design Value (µg/m3)
State	County	Site ID	Local Site Name	2023	2024	2025	
Pennsylvania	Allegheny	420030064	Liberty	10.81	8.57	9.16	9.5
Pennsylvania	Allegheny	420031301	North Braddock	9.02	8.01	8.78	8.6
Pennsylvania	Philadelphia	421010004	Air Management Services Laboratory	9.95	9.68	9.19	9.6
Pennsylvania	Philadelphia	421010048	North East Waste	9.50	7.14	8.12	8.3
Pennsylvania	Philadelphia	421010055	Ritner	8.82	8.04	7.62	8.2
Pennsylvania	Philadelphia	421010057	Fire Administration Building	8.52	8.69	8.26	8.5
Pennsylvania	Philadelphia	421010075	Torresdale Station	10.71	9.22	7.85	9.3

Recommendations

Based on the results of this analysis and the widespread impact of Canadian wildfire smoke on Pennsylvania monitors and regionwide, the following action is recommended.

1. Each date at monitors within Pennsylvania identified as Tier 1 with wildfire smoke present should be recognized as having been influenced by that smoke during the 2023-2025 timeframe and found to have increased PM2.5 concentrations. As a result, each monitor-date should be flagged as influenced by exceptional events, and the associated pollutant concentration values should be removed from the regulatory record used to determine design values and attainment designations.
2. Given the duration and extent of the wildfires, there are numerous Tier 2 days that should also be flagged as influenced. The "regulatory significant" nomenclature typically applied to concurring with exceptional events demonstrations should not be limited to the attainment / nonattainment determination and instead should include any date or concentration that was enhanced by wildfire smoke, regardless of the attainment outcome of the exceptions.
3. Consideration should be given to excluding dates and concentrations at other monitors outside of Pennsylvania, but in the same regional airshed, that would have also been impacted by Canadian wildfire smoke during the same 2023-2025 episodes. This may include simply referencing other state exceptional events demonstrations when proximal monitors were impacted on the same dates and by the same wildfire plumes.
4. Consideration should be given to all regional states to allow limited information necessary to support the clear causal relationship criterion for any wildfire date that fell within the 2023-2025 Canadian wildfire episode. Ample evidence has been provided here and elsewhere to support the fact that smoke from Canadian wildfires in select episodes in 2023, 2024, and 2025 had significant impact on PM2.5 observations and enhanced concentrations beyond reasonable and typical conditions. As it is understood that many states are preparing exceptional events demonstrations for monitors and dates affected during the Canadian wildfire episodes of 2023 and 2025, it would be appropriate to allow for information in this document to be adopted to satisfy Tier 1 obligations in those demonstrations.
5. To the extent that EPA believes additional information is needed to remove exceptional event days related to Canadian wildfires to adequately assess air quality conditions and determine whether an area meets applicable NAAQS, areas should be designated as unclassifiable. Assigning an attainment or nonattainment designation without a complete and reliable evidentiary basis could result in an inaccurate characterization of the area's air quality status. An unclassifiable designation provides the opportunity to conduct additional monitoring, refine technical analyses, and resolve outstanding uncertainties, thereby supporting a scientifically defensible and appropriate designation.