# Introduction

## Overview

[Agency to add content]

## June 25-June 30, 2023 PM2.5 Episode

Air quality in the Great Lakes Basin was impacted in late June 2023 by fire smoke entering the region. Wildfires in Ontario and Quebec Canada produced smoke plumes that impacted the states in the Great Lakes area through much of June through August 2023. The smoke from these fires produced a PM2.5 pollution episode across the Great Lakes region that had significant health and regulatory implications. Figure 1‑1 is a daily maximum PM2.5 concentration heat map for late June 2023 for CBSAs across the Great Lakes region. This plot illustrates that elevated surface PM2.5 concentrations from June 25 to June 30, 2023 were observed at core-based statistical areas (CBSAs) across the region, indicating the presence of a region-wide smoke plume that impacted surface monitors during this period. The vast spatial extent and magnitude of the PM2.5 pollution, which ultimately spanned from Minnesota to the east coast of the U.S., was an indication that this episode was not due to local emissions sources but was driven by the Canadian wildfire smoke plumes that transported across the region during this period.

Figure 1‑2 shows daily average PM2.5 concentrations for the years 2019 – 2023 averaged across all major CBSAs in the U.S. EPA Region 5 states[[1]](#footnote-2). This plot shows the average PM2.5 concentration by year on each day across all monitors in these CBSAs. Figure 1‑2 illustrates the severity of the late June PM2.5 episode relative to other periods of the year and compared to the same period in the past five years.

The smoke plume that impacted the region is shown in the AirNow PM2.5 Air Quality Index (AQI) maps for June 25 to June 30, 2023 in Figure 1‑3. These maps illustrate the build-up of surface PM2.5 concentrations during this period, and that fires in Canada were the origin of the smoke plumes that contributed the high particulate pollution. The evidence presented in this section identifies that wildfire smoke from Canada was the dominant source of surface PM2.5 concentrations in the Great Lakes Basin in late June 2023. Additional information about the nature of this episode and the impacts to air quality in the region are presented in the following sections.

|  |  |
| --- | --- |
| A graph of smoke events  Description automatically generated with medium confidence | A graph of smoke events  Description automatically generated |

Figure 1‑1. June 2023 daily maximum PM2.5 by Great Lakes region CBSA

A graph of a graph

Description automatically generated

June 25 – June 30

Figure 1‑2. 2019-2023 daily average PM2.5 concentrations for all major CBSAs[[2]](#footnote-3) in the Great Lakes region

|  |  |
| --- | --- |
| A map of different colored areas  Description automatically generated | A map of different colored circles  Description automatically generated |
| A map of different colors  Description automatically generated | A map of different colored areas  Description automatically generated |
| A map of the world  Description automatically generated |  |
| A screenshot of a phone  Description automatically generated | |

Figure 1‑3. AirNow PM2.5 AQI maps for June 25-June 30, 2023

## Clean Air Act Requirements

[Agency to add content]

## Exceptional Events Rule Requirements

EPA’s Treatment of Data Influenced by Exceptional Events (Exceptional Event Rule) (81 FR68216) provides the requirements that air agencies must meet when requesting EPA to exclude exceptional event-related concentrations from regulatory determinations.

The following are requirements under 40 CFR 50.14(c)(3)(iv)(A–E):

* A [narrative conceptual model](#_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); **(See Section 2 of this document)**
* A demonstration that the event affected air quality in such a way that there exists a [clear causal relationship](#_Clear_Causal_Relationship) between the specific event and the monitored exceedance or violation; **(See Section 3 of this document)**
* Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement in 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; **(See Section 3 of this document)**
* A demonstration that the event was both [not reasonably controllable and not reasonably preventable](#_Not_Reasonably_Controllable); and **(See Section 4 of this document)**
* A demonstration that the event was a [human activity that is unlikely to recur at a location or was a natural event](#_Human_Activity_Unlikely). **(See Section 5 of this document)**

The Exceptional Events Rule further provides that for wildfire exceptional events, the wildfire must occur predominantly on wildland.

40 CFR 50.14(b)(4): *Wildfires.* The Administrator shall exclude data from use in determinations of exceedances and violations where a State demonstrates to the Administrator's satisfaction that emissions from wildfires caused a specific air pollution concentration in excess of one or more national ambient air quality standard at a particular air quality monitoring location and otherwise satisfies the requirements of this section. Provided the Administrator determines that there is no compelling evidence to the contrary in the record, the Administrator will determine every wildfire occurring predominantly on wildland to have met the requirements identified in paragraph (c)(3)(iv)(D) of this section regarding the not reasonably controllable or preventable criterion.

The definition for “wildland” is provided in 40 CFR Part 50, §50.1(o). The term “wildland” is used in this document consistent with this definition.

40 CFR 50.1(o): *Wildland* means an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.

The application of an exceptional events demonstration to NAAQS designations is allowed under in 40 CFR 50.14(a)(1)(i)(A):

*An action to designate an area, pursuant to Clean Air Act section 107(d)(1), or redesignate an area, pursuant to Clean Air Act section 107(d)(3), for a particular national ambient air quality standard.*

This demonstration addresses the above requirements by showing that the smoke from wildfires in Canada caused elevated surface PM2.5 concentrations across the Great Lakes Basin in late June 2023. Accounting for the smoke influence on the surface PM2.5 concentrations will lower the annual PM2.5 design values at most of the monitors in the region below the level of the 2024 PM2.5 NAAQS and thus avoid nonattainment designation.

# Narrative Conceptual Model

## 2023 Climatology

Canada was the primary source region for the wildfire smoke that impacted the Great Lakes Basin during late June 2023. Canada experienced an unprecedented fire season that was well documented in reports from the Canadian government and media across the globe. The hot and dry weather conditions in Canada contributed to the historic fire season. Natural Resources Canada noted that the record breaking wildfires in 2023 were a “[fiery wake-up call](https://natural-resources.canada.ca/simply-science/canadas-record-breaking-wildfires-2023-fiery-wake-call/25303)[[3]](#footnote-4)”. The international climate science organization World Weather Attribution observed that Canada experienced the warmest “[May through June period in 2023 since 1940](https://www.worldweatherattribution.org/climate-change-more-than-doubled-the-likelihood-of-extreme-fire-weather-conditions-in-eastern-canada/)”, and that the period was also abnormally dry[[4]](#footnote-5). The National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information Global Climate Reports for 2023 showed that temperatures were well above average in Canada in May through June 2023 by 0.5 – 3.0°C (Figure 2‑1).

|  |  |
| --- | --- |
| May 2023  A map of the world  Description automatically generated | June 2023A map of the world  Description automatically generated |
| July 2023A map of the world  Description automatically generated |  |
| A map of the world  Description automatically generated | |

Figure 2‑1. Land and ocean temperature departure from average with respect to a 1991-2020 base period: source: NOAAGlobalTemp v5.10

June 2023 was abnormally hot and dry in the Great Lakes Basin as well. Figure 2‑2 shows the daily maximum temperature and daily precipitation anomalies for June 1 through July 1, 2023. The drought during this period shown in these maps created conditions for the build-up of pollution throughout the atmospheric column. Without the wet deposition of pollution that comes with the late-afternoon summertime convective thunderstorms that typically occur in the region, an important sink of air pollution was notably absent during this period.

The hot and dry conditions both in the fire source region of Canada and in the receptor region of the Great Lakes Basin combined to create prime conditions for the fire smoke particulate pollution that blanked the entirety of north central North America in late June 2023.

|  |  |
| --- | --- |
| A map of the united states  Description automatically generated | A map of the united states  Description automatically generated |

Figure 2‑2. June 2023 average maximum temperature (left) and average daily precipitation (right) departures from 30-year mean

## Fire Source Regions

The Canadian fires in June 2023 that impacted the Great Lakes Basin occurred primarily in the southern portions of the Ontario and Quebec provinces. The map of Canadian wildlands shown in Figure 2‑3 illustrates the extensive coverage of the boreal forests across southern Canada near the Great Lakes region. Most of the wildland in this area is provincially owned with leases held by private logging interests (shown as Long-Term Tenure and Short-Term Tenure in the Figure). The northern boundary of the managed forest land in Quebec shown in this figure delineates the Northern zone from the Intensive zone. This line, shown as the transition between the “Other” category and everything else in Figure 2‑3 does not indicate a transition from forested to another type of landcover, it is only an indication of the change in forest management practices. The Intensive zone is where the provincial and federal governments in Canada devote more resources to land management, fire suppression, and firefighting.

A screen shot of a chart

Description automatically generatedA map of the united states

Description automatically generated

Figure 2‑3. 2020 Canadian forest management map

Starting in early June 2023 and extending through July, Canadian Wildfire Information System (CWIFS)[[5]](#footnote-6) reported that vast areas of southern Ontario and Quebec Canada wildland were in high to extreme fire danger conditions. Figure 2‑4 shows that on June 20, 2023 multiple active fires burned out of control in three clusters around southern Ontario and Quebec. The fires in these three areas progressed through the end of the month and into the late summer. The three circled areas in Figure 2‑4 are the source regions of the wildfire smoke that produced the PM2.5 pollution episode in the Great Lakes Basin from June 25 – June 30, 2023.

A screenshot of a map

Description automatically generated

**3**

**2**

**1**

Figure 2‑4. CWFIS integrated fire map for June 20, 2023 with circles over the Great Lakes Basin fire smoke source areas

## Meteorology Summary

From June 25 through June 30, 2023 distinct airmass transport patterns connected the upper Midwest with Canada and brought smoke into the Great Lakes Basin. Figure 2‑5 shows Hazard Mapping System (HMS) smoke maps, daily average PM2.5 concentrations, satellite imagery, and surface weather maps for each day of this period. During June 25-27 a cyclonic (e.g., counterclockwise) circulation around a large low-pressure system centered on the Great Lakes carried smoke into the upper Midwest from source regions in Ontario and Quebec, Canada. Thick smoke from the Canadian wildfires was transported along the trailing edge of the low-pressure system as it moved east through the Great Lakes basin. Stable moist to stable dry air featured during this period with a consistent northerly to northwesterly wind of 7-15 m/s.

A blocking ‘omega’ pattern formed in the upper air during this period, which featured two strong low-pressure systems sitting over the Pacific Northwest and the northern Great Lakes blocked by a ridge of high pressure over the Great Plains. This feature allowed smoke from Canada to transport into the Great Lake region and build up at the surface across the region.

Starting on Jun 28, 2023, the low-pressure system aloft weakened and moved towards eastern Canada. As a result, a long, weak ridge of high-pressure centered in the Midwest covered most of the eastern U.S. This weak high-pressure system that persisted until the evening of June 29 produced a dry, stagnant air mass in the Great Lakes region that trapped the smoke from the Canadian fires over the region and caused high surface PM2.5 conditions at the surface. On June 28, a large low-pressure system formed east of Lake Winnipeg in Manitoba, Canada. At the same time, two well-established meso-scale convective systems that formed in Nebraska and Kansas moved into Illinois on the morning of June 29. Between these two features, a smoke transport corridor formed across the central Great Lakes Basin that brought smoke from Quebec, Canada along with a smoke-enriched airmass from the central Canadian provinces into the region. This corridor persisted until June 30 when the smoke started to clear out of the region to the east.

| **HMS smoke + surface 24-hour Average PM2.5** | **Satellite Imagery** | **Surface Weather Map, 0700 EST** |
| --- | --- | --- |
| **June 25, 2023** |  |  |
| A map of the united states  Description automatically generated | A satellite image of the united states  Description automatically generated | A map of the surface weather  Description automatically generated |
| **June 26, 2023** |  |  |
| A map of the united states  Description automatically generated | A map of the united states  Description automatically generated | A map of weather forecast  Description automatically generated |
| **June 27, 2023** |  |  |
| A map of the united states  Description automatically generated | A satellite image of the north america  Description automatically generated | A map of the united states  Description automatically generated |
| **June 28, 2023** |  |  |
| A map of the united states  Description automatically generated | A satellite image of the earth  Description automatically generated | A map of the united states  Description automatically generated |
| **June 29, 2023** |  |  |
| A map of the united states  Description automatically generated | A satellite image of the united states  Description automatically generated | A map of the united states  Description automatically generated |
| **June 30, 2023** |  |  |
| A map of the united states  Description automatically generated | A satellite image of the earth  Description automatically generated | A map of the united states  Description automatically generated |

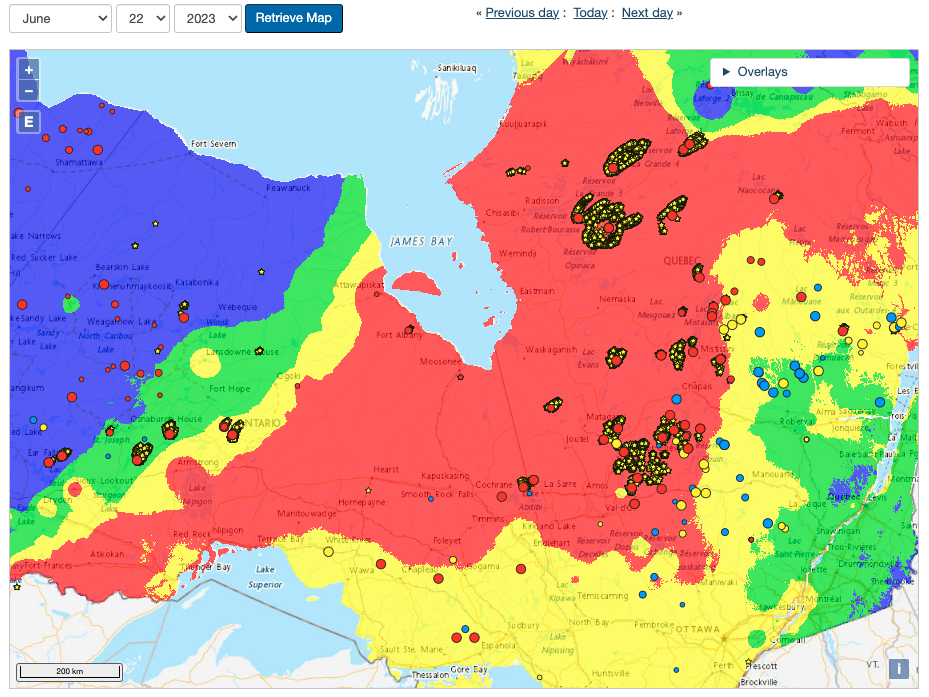
Figure 2‑5. Daily Average PM2.5 ****concentrations overlapped with**** NOAA’s Hazard Mapping System (HMS) smoke layers (left), daily snapshot of the GOES-16 satellite image of cloud cover, and the surface weather map (right) during June 25-30, 2023.

## Canada Wildfires

Starting on May 27, 2023 the CWIFS began to report extreme fire danger conditions from the southwest border of Ontario northeast across Quebec to the Gulf of St. Lawrence. The area of Quebec centered around James Bay remained almost continuously under high to extreme fire danger through most of the month. On June 2 the Quebec provincial fire-management authority, Société de Protection des Forets Contre le Feu (SOPFEU[[6]](#footnote-7)), reported to the Canadian Interagency Forest Fire Center (CIFFC) a fire preparedness level 5 for the province, which is the highest alert level in Canada for mobilizing resources to fight wildfires and protect life and structures[[7]](#footnote-8). The province remained at a level 5 alert continuously until it was lowered to level 4 on July 17. During this same period, the province of Quebec reported a fire preparedness level 4 indicating very high fire loads, very high anticipated fire loads, and inadequate resources to respond to the fires.

By June 22 there were 82 active wildfires burning over 2.3 million acres across Quebec and 24 active wildfires burning nearly 200,000 acres across Ontario. June 22, 2023 is significant because the fires burning on that date contributed smoke to the high-concentration PM2.5 episodes experienced throughout the Great Lakes Basin starting three-days later on June 25. Figure 2‑6 shows active fire hotspots on June 22 in the three smoke source areas identified in Figure 2‑4. Three days later, on June 25 there were 76 active wildfires burning over 3 million acres of wildland in Quebec and 46 active wildfires burning over 300,000 acres of wildland in Ontario[[8]](#footnote-9) as shown in Figure 2‑7. Over the course of the period from June 22 to July 1, 2023 a daily average of 38 active fires burned 388,819 acres/day in Ontario province and a daily average 79 fires burned over 3.1 million acres/day in Quebec. The daily wildfire activity during this period along with the priority fire events by province are summarized in Table 2‑1. These data identify the active and unprecedented fire activity in the three fire smoke source regions of Canada that produced the smoke and particulate pollution that impacted the Great Lakes region during June 25-June 30.

A screenshot of a phone

Description automatically generated

**3**

**2**

**1**

Figure 2‑6. June 22, 2023 active fires in southern Ontario and Quebec (CWIFS)

A screenshot of a phone

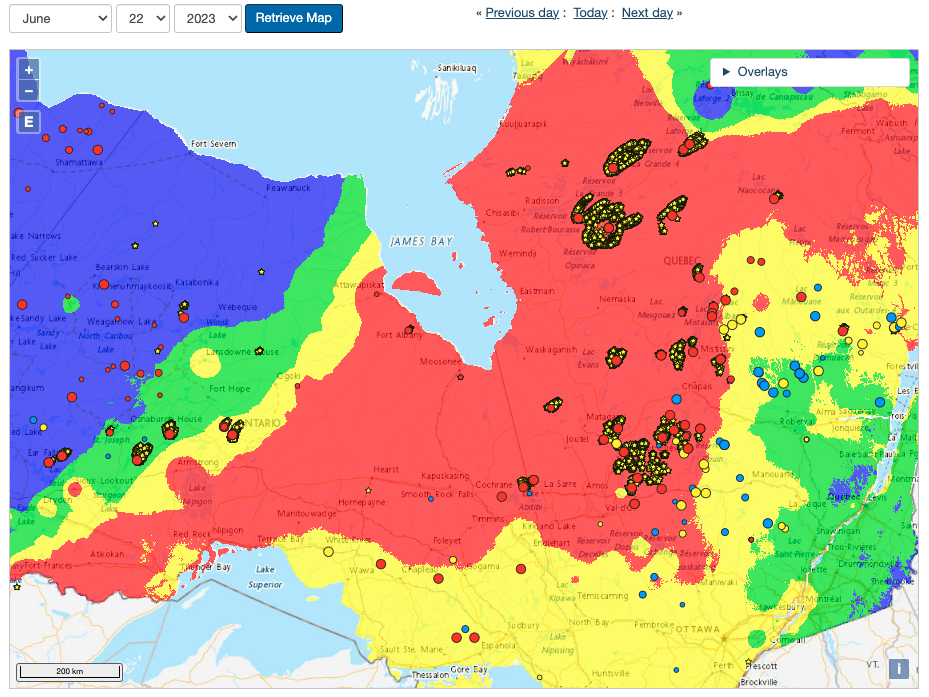
Description automatically generated

Figure 2‑7. June 25, 2023 active fires in eastern Canada (CWIFS)

Table 2‑1. Daily summaries of fires in Quebec and Ontario Canada: June 22 – July 1, 2023

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Province** | **Active Fires** | **Active Acres** | **Priority Fire Events** |
| 6/22/23 | Quebec | 82 | 2,366,422 |  |
| Ontario | 34 | 198,632 | COC\_FIRE\_007, COC\_FIRE\_11, COC\_FIRE\_012, SLK\_FIRE\_007, NIP\_FIRE\_013, NIP\_FIRE\_019, RED\_FIRE\_028, RED\_FIRE\_033 |
| 6/23/23 | Quebec | 82 | 2,704,177 | 245, 281, 283, 297, 334, 344, 373, 379 |
| Ontario | 34 | 235,638 |  |
| 6/24/23 | Quebec | 82 | 2,685,352 |  |
| Ontario | 45 | 264,506 |  |
| 6/25/23 | Quebec | 79 | 3,003,029 |  |
| Ontario | 46 | 312,120 | COC\_FIRE\_001, COC\_FIRE\_012, SLK\_FIRE\_007, SLK\_FIRE\_033,  NIP\_FIRE\_013, NIP\_FIRE\_019,  RED\_FIRE\_028 |
| 6/26/23 | Quebec | 81 | 3,013,844 | 245, 281, 283, 297, 334, 344, 373, 379 |
| Ontario | 43 | 374,919 |  |
| 6/27/23 | Quebec | 80 | 3,200,672 |  |
| Ontario | 37 | 461,026 |  |
| 6/28/23 | Quebec | 76 | 3,425,157 | 245, 281, 283, 297, 334, 344, 373 |
| Ontario | 38 | 488,925 |  |
| 6/29/23 | Quebec | 74 | 3,604,180 | 281, 297, 344, 379 |
|  | Ontario | 38 | 515,698 |  |
| 6/30/23 | Quebec | 74 | 3,602,490 |  |
|  | Ontario | 31 | 518,256 |  |
| 7/1/23 | Quebec | 69 | 3,452,893 | 281, 334, 344 |
|  | Ontario | 30 | 518,478 |  |

## Smoke Impacts

The June 25-30, 2023 smoke episode is seen clearly in satellite imagery, remote sensing products, and in the surface PM2.5 monitors. Figure 2‑8 through Figure 2‑15 show the wildfire smoke impacts in the Great Lakes region from June 23 through June 30, 2023. The left plot in each figure is a composite of data from NASA Worldview[[9]](#footnote-10) that includes the following information:

* Moderate Resolution Imaging Spectroradiometer (MODIS) Terra corrected reflectance (true color)
* Aerosol optical depth (AOD) from the MODIS combined Terra and Aqua Multi-Angle Implementation of Atmospheric Correction (MAIAC) Land Aerosol Optical Depth level 2 product
* The Visible Infrared Imaging Radiometer Suite (VIIRS) Fire and Thermal Anomalies (day and night, 375m) layer showing active fire detections and thermal anomalies

The right plot in each figure is a composite of data from AirNowTech.gov that includes the following information:

* Hazard Mapping System (HMS) smoke layers
* Air Quality System (AQS) 24-hour average PM2.5 surface concentrations
* HYSPLIT dispersion model 72-hour forward trajectories released at 50, 250, and 1000 m. Two release points correspond to the fire source locations 1 and 2 identified above

The maps in the figures all show the origin and transport of the smoke plumes that caused the surface PM2.5 concentrations to peak in the LADCO region during June 26-29, 2023. As this period is the focus of the smoke episode, Figure 2‑8 starts with the fire and smoke conditions on June 23 to show the origin of the smoke that impacted the peak episode PM2.5 surface concentrations that began three days later. The 72-hour forward trajectories initiated in source region 1 in southeastern Ontario all track into Minnesota, Wisconsin, Illinois, and Michigan. The locations of the elevated PM2.5 concentrations on June 26 (Figure 2‑11) correspond to the endpoints of these trajectories. June 23 was also a period of elevated PM2.5, particularly along the western shore of Lake Michigan as seen in the AOD and surface PM2.5 concentrations in Figure 2‑8. The smoke from the southern Ontario fires shown in the AOD maps in Figure 2‑8 and Figure 2‑9 remained in the Great Lakes Basin as the next weather system moved in to the region and brought in new smoke plumes that originated in Quebec.

Figure 2‑9 shows that on June 24 the 72-hour forward trajectories from wildfire complexes in Quebec terminate in the Great Lakes region. This transport pattern indicated a change in the synoptic flow as described in Section 2.3. The low-pressure system that set up over the Great Lakes during this period produced southerly flow that brought smoke into the region from Quebec and impacted the surface air quality starting on June 27. The progression of the dense smoke on the western edge of the low-pressure system is clearly seen in the AOD retrievals in Figure 2‑10 through Figure 2‑12.

Although the cloud cover associated with the low-pressure system and the densest areas of fire smoke obscured the AOD retrievals, taken in combination with the surface PM2.5 observations one can infer from the AOD maps that smoke from the Canadian fires was the cause of the high surface PM2.5 concentrations throughout the Great Lakes region during this period. For example, in Figure 2‑10 many of the high concentration PM2.5 surface monitors of southern Quebec Canada appear to be outside of the area of high AOD. Given the proximity of these monitors to the fire complexes and the visible imagery of smoke, the surface PM2.5 concentrations are clearly being influenced by smoke from the Quebec fires. The AOD and imagery maps in each of the figures below illustrate that dense smoke from the Canadian fires was present in the Great Lakes region throughout late June and that this smoke was the cause of the high concentrations of PM2.5 at the surface monitors.

|  |  |
| --- | --- |
| A satellite image of the north and south america  Description automatically generated | A map of the world  Description automatically generated |

Figure 2‑8. June 23, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers, 24-hour average PM2.5, and 72-hour forward HYSPLIT trajectories

|  |  |
| --- | --- |
| A satellite image of the united states  Description automatically generated | A map of different colored spots  Description automatically generated |

Figure 2‑9. June 24, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers, 24-hour average PM2.5, and 72-hour forward HYSPLIT trajectories

|  |  |
| --- | --- |
| A satellite image of a storm  Description automatically generated | A map of the united states  Description automatically generated |

Figure 2‑10. June 25, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers, 24-hour average PM2.5, and 72-hour forward HYSPLIT trajectories

|  |  |
| --- | --- |
| A satellite image of the north and south america  Description automatically generated | A map of a map with colored dots  Description automatically generated with medium confidence |

Figure 2‑11. June 26, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers, 24-hour average PM2.5, and 72-hour forward HYSPLIT trajectories

|  |  |
| --- | --- |
| A map of the united states  Description automatically generated | A map of the world  Description automatically generated |

Figure 2‑12. June 27, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers and 24-hour average PM2.5.

|  |  |
| --- | --- |
| A map of the united states  Description automatically generated | A map of the world  Description automatically generated |

Figure 2‑13. June 28, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers and 24-hour average PM2.5.

|  |  |
| --- | --- |
| A satellite image of a storm  Description automatically generated | A map of a world  Description automatically generated |

Figure 2‑14. June 29, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers and 24-hour average PM2.5.

|  |  |
| --- | --- |
| A satellite image of a map of the united states  Description automatically generated | A map of the world  Description automatically generated |

Figure 2‑15. June 30, 2023 satellite imagery with MAIAC AOD (left) and AirNowTech map with HMS smoke layers and 24-hour average PM2.5.

## Media Coverage and Public Health Messaging

News media across the country reported on the wildfire smoke in the Great Lakes region during late June 2023. The coverage of the smoke impacts, particularly by media outlets that typically only report on extreme weather and air quality events, indicated the historic nature of the Canadian wildfire smoke impacts on surface air quality in the Great Lakes region. While the list of news stories in Table 2‑2 is not exhaustive, it illustrates the widespread and severe nature of the late June particulate pollution episode.

Table 2‑3 provides a sampling of the air quality and public health alerts issued by public agencies in the Great Lakes region for this episode. As with the media coverage, this list is not exhaustive, but it does show that agencies across the region were simultaneously alerting the public of the smoke impacts during this period.

The reports and alerts cited in Table 2‑2 and Table 2‑3 are further evidence that the late June 2023 episode was not local in nature but driven by transported wildfire smoke from Canada that blanketed the region.

Table 2‑2. News media reporting of late June 2023 Canadian wildfire smoke episode in the Great Lakes region

|  |  |  |
| --- | --- | --- |
| **Date** | **Source** | **Headline (link)** |
| June 27, 2023 | Associated Press National | Expect a hot, smoky summer in much of America. Here’s why you’d better get used to it. ([link](https://apnews.com/article/smoky-air-pollution-canada-fires-hot-climate-9d7f3fd7645e2222357022ea8277f1fa)) |
| June 27, 2023 | WCCO (CBS) News Minneapolis-St. Paul | Smoke from wildfires prompts record 23rd air quality alert in Minnesota this year ([link](https://www.cbsnews.com/minnesota/news/smoke-from-canadian-wildfires-prompts-a-record-23rd-air-quality-alert-in-minnesota/)) |
| June 27, 2023 | WUWM (NPR) Milwaukee | Wildfire smoke blankets Milwaukee, air quality among worst in the world ([link](https://www.wuwm.com/2023-06-27/wildfire-smoke-blankets-milwaukee-tuesday-air-quality-among-worst-in-the-world)) |
| June 27, 2023 | CBS News National | Chicago has the worst air quality in the world due to Canadian wildfire smoke ([link](https://www.cbsnews.com/news/chicago-worst-air-quality-canadian-wildfire-smoke-june-27-2023/)) |
| June 27, 2023 | WTTS (PBS) Chicago | Chicago’s Air Quality Reaches ‘Very Unhealthy’ Levels as Smoke From Canada Wildfires Moves In (l[ink](https://news.wttw.com/2023/06/27/chicago-reeks-smoke-air-quality-alert-issued-through-wednesday-blame-canada-s-wildfires)) |
| June 27, 2023 | WCIA (CBS) Central Illinois | Thick wildfire smoke invades Central Illinois, reduces air quality to “Unhealthy” levels ([link](https://www.wcia.com/weather/thick-wildfire-smoke-invades-central-illinois-reduces-air-quality-to-unhealthy-levels/)) |
| June 27, 2023 | FOX59 Indianapolis, IN | Smoky skies return to central Indiana ([link](https://fox59.com/news/smoky-skies-return-to-central-indiana/)) |
| June 28, 2023 | National Public Radio | Detroit, Chicago and the Midwest blanketed by wildfire haze from Canada ([link](https://www.npr.org/2023/06/28/1184746530/why-haze-wildfire-canada-midwest)) |
| June 28, 2023 | WILX (NBC) News central Michigan | Smoke and haze from Canadian wildfires leave Detroit with some of the worst air quality in the US ([link](https://www.wilx.com/2023/06/28/haze-over-great-lakes-region-reminds-us-residents-that-canadian-wildfires-persist/)) |
| June 28, 2023 | The Columbus Dispatach | Canadian wildfire haze drifts into Columbus. See photos ([link](https://www.dispatch.com/picture-gallery/news/2023/06/28/canadian-wildfire-haze-drifts-into-columbus-see-photos/12177063002/)) |
| June 28, 2023 | Cleveland Magazine | Clevelanders Urged to Stay Indoors As Smoke from Canadian Wildfires Hits Cleveland ([link](https://clevelandmagazine.com/in-the-cle/news/articles/clevelanders-urged-to-stay-indoors-as-smoke-from-canadian-wildfires-hits-cleveland)) |
| June 29, 2023 | FOX6 Milwaukee, WI | Air quality, weather impact Summerfest's start to 2nd weekend ([link](https://www.fox6now.com/news/summerfest-weekend-2-air-quality-to-improve-storms-possible)) |
| June 30, 2023 | NBC4 Columbus, OH | Air Quality alert in central Ohio extended through Friday ([link](https://www.nbc4i.com/news/local-news/columbus/air-quality-alert-issued-for-central-ohio-worsening-on-wednesday/)) |

Table 2‑3. Public health and air quality alerts for the late June 2023 Canadian wildfire smoke episode in the Great Lakes region

|  |  |  |
| --- | --- | --- |
| **Date** | **Agency** | **Message** |
| June 27, 2023 | Wisconsin Dept of Natural Resources | [Air Quality Alert](https://dnr.wisconsin.gov/newsroom/release/79421) |
| June 27, 2023 | Public Health Madison and Dane County (WI) | [Public Health Advisory](https://publichealthmdc.com/news/2023-06-27/dane-county-air-quality-at-unhealthy-levels-due-to-wildfire-smoke) |
| June 27, 2023 | Michigan Dept of Environment, Great Lakes, and Energy | [Air Quality Alert and Public Health Advisory](https://www.michigan.gov/egle/newsroom/press-releases/2023/06/27/michigan-aq-impacted) |
| June 27, 2023 | Ohio Dept of Health | [Public Health Alert](https://odh.ohio.gov/media-center/odh-news-releases/odh-news-release-06-27-23) |
| June 28, 2023 | City of Chicago | [Public Health Advisory](https://www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2023/june/CityOfChicagoContinuesActionsToAddressUnhealthyAirQuality.html) |
| June 28, 2023 | City of Cleveland | [Public Health Alert](https://www.clevelandhealth.org/assets/documents/air/alerts/AQ_Press_Release_6-28-2023.pdf) |
| June 29, 2023 | Detroit Health Dept | [Public Health Guidance](https://detroitmi.gov/news/detroit-health-department-guidance-update-and-respite-centers-open-help-residents-stay-safe-effects) |

# Clear Causal Relationship

[Agency to add content]

# Not Reasonably Controllable or Not Reasonably Preventable

Section 40 CFR 50.14 (c)(3)(iv)(D) requires a demonstration that the event was both not reasonably controllable and not reasonably preventable. For wildfires, it is presumed according to 40 CFR 50.14(b)(4) that wildfires on wildland will satisfy both factors of the not reasonably controllable or not reasonably preventable unless there is evidence that demonstrates otherwise. As stated in 40 CFR 50.14(b)(4):

*The Administrator shall exclude data from use in determinations of exceedances and violations where a State demonstrates to the Administrator's satisfaction that emissions from wildfires caused a specific air pollution concentration in excess of one or more national ambient air quality standard at a particular air quality monitoring location and otherwise satisfies the requirements of this section. Provided the Administrator determines that there is no compelling evidence to the contrary in the record, the Administrator will determine every wildfire occurring predominantly on wildland to have met the requirements identified in paragraph (c)(3)(iv)(D) of this section regarding the not reasonably controllable or preventable criterion.*

As shown in Figure 2‑3 and Figure 2‑4 and discussed in this exceptional event demonstration, extensive wildfire activity occurred on wildlands across Canada during the late spring and summer of 2023. The Canadian government estimates that on average 67% of the area burned in Canada from wildfires is due to lightning-caused fires[[10]](#footnote-11). CIFCC[[11]](#footnote-12) reported that on June 1, 2023 ”a major lightning strike hit Quebec, igniting 182 forest fires in a single day”.

As the late June 2023 fires in Canada were natural, wildfire smoke events, and the wildfires occurred on wildlands, they meet the not reasonably controllable and not reasonably preventable criterion in the Exceptional Event Rule. The wildfires burning in June 2023 could not have been prevented and could not have been controlled by state or federal natural resources managers in the U.S. The excessive wildfire smoke emissions that caused violations of the PM2.5 NAAQS in the Great Lakes region were caused by the wildfires and not the result of emissions from anthropogenic sources.

# Human Activity Unlikely to Recur at a Particular Location or Natural Event

The Exceptional Event Rule requires 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)(E)). The definition of wildfire in the Exceptional Events Rule is: “…is any fire started by an unplanned ignition caused by lightning; … A wildfire that predominately occurs on wildland is a natural event.” As stated in this document, the origin and evolution of the June 2023 wildfires occurred across wildlands in Ontario and Quebec Canada. As shown in Figure 2‑3 and Figure 2‑4, the fires occurred primarily on managed timberlands, which are generally considered wildland areas.

In the Exceptional Event Rule, EPA clarifies that an event could be considered a natural event by applying the reasonable interpretation that the anthropogenic source had ‘‘little’’ direct causal role.

Based on the documentation provided in this demonstration, the June 2023 events qualify as wildfires because lightning mostly likely caused the unplanned wildfire events. The EPA generally considers the emissions of PM2.5 from wildfires on wildland to meet the regulatory definition of a natural event at 40 CFR 50.1(k), defined as one ‘in which human activity plays little or no direct causal role.’ As the wildfire events that are subject of this demonstration occurred on wildlands and were caused by lightning, they were natural and should be considered for treatment as exceptional events.

# Public Notification

[Agency to add content]

# Conclusions and Recommendations

[Agency to add content]

1. Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin [↑](#footnote-ref-2)
2. Chicago IL-IN-WI, Detroit MI, Cleveland OH, St. Louis MO-IL, Indianapolis IN, Minneapolis-St. Paul MN, Cincinnati OH-IN-KY, Milwaukee WI, Rockford IL, Davenport IA-IL, Lansing MI, Madison WI, Adrian MI, Ann Arbor MI, Bloomington IL, Dayton OH, Platteville WI, Terra Haute IN, Cadillac MI, Springfield OH, Toledo OH, Springfield IL, Appleton WI [↑](#footnote-ref-3)
3. https://natural-resources.canada.ca/simply-science/canadas-record-breaking-wildfires-2023-fiery-wake-call/25303 [↑](#footnote-ref-4)
4. https://www.worldweatherattribution.org/climate-change-more-than-doubled-the-likelihood-of-extreme-fire-weather-conditions-in-eastern-canada/ [↑](#footnote-ref-5)
5. https://cwfis.cfs.nrcan.gc.ca/home [↑](#footnote-ref-6)
6. https://sopfeu.qc.ca/ [↑](#footnote-ref-7)
7. https://ciffc.net/situation/2023-06-02 [↑](#footnote-ref-8)
8. https://ciffc.net/situation/2023-06-25 [↑](#footnote-ref-9)
9. https://worldview.earthdata.nasa.gov/ [↑](#footnote-ref-10)
10. https://natural-resources.canada.ca/our-natural-resources/forests/wildland-fires-insects-disturbances/forest-fires/fire-behaviour/13145 [↑](#footnote-ref-11)
11. https://ciffc.ca/sites/default/files/2024-03/03.07.24\_CIFFC\_2023CanadaReport%20%281%29.pdf [↑](#footnote-ref-12)