# Technical Support Document (TSD) for EPA Concurrence on $O_3$ Exceedances Measured at Six Maryland Monitors on May 25 and 26, 2016 as Exceptional Events

TSD Prepared December 2017

Verena Joerger

Kia Long

Office of Air Monitoring & Analysis, 3AP40

U.S. Environmental Protection Agency, Region III

1650 Arch Street

Philadelphia, Pennsylvania 19103

_____

Reviewed by Alice H. Chow, Associate Director

Office of Air Monitoring & Analysis (3AP40)

_____

Date Signed

# Enclosure: Technical Support Document for EPA Concurrence on $O_3$ Exceedances Measured at Six Maryland Monitors on May 25 and 26, 2016 as Exceptional Events

In spring of 2016, the Maryland Department of the Environment (MDE) identified that wildfires near Fort McMurray, Alberta, Canada may have caused ozone ($O_3$) exceedances at an $O_3$ monitoring site operated by MDE on May 25 and 26, 2016. The Fort McMurray wildfire began on May 1st, 2016 and quickly expanded out of control. During a period of intense fire growth, a concentrated smoke plume was lofted and transported to the central United States. The smoke contained volatile organic compounds and nitrogen oxide emissions that underwent photochemical reactions, forming $O_3$ that was subsequently transported to the northeastern United States.

Under the Exceptional Events Rule, air agencies can request the exclusion of event-influenced data, and EPA can agree to exclude these data, from the data set used for certain regulatory decisions. The remainder of this document summarizes the Exceptional Events Rule requirements, the event and EPA's review process.

## Exceptional Events Rule Requirements

EPA promulgated the Exceptional Events Rule in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) section 319. In 2016, EPA finalized revisions to the Exceptional Events Rule. The 2007 Exceptional Events Rule and 2016 Exceptional Events Rule revisions added sections 40 CFR §50.1 (j)-(r), 50.14, and 51.930 to title 40 of the Code of Federal regulations (CFR). These sections contain definitions, criteria for EPA approval, procedural requirements, and requirements for air agency demonstrations. EPA reviews the information and analyses in the air agency's demonstration package using a weight of evidence approach and decides to concur, defer, or not concur. The demonstration must satisfy all of the Exceptional Events Rule criteria for EPA to concur with excluding the air quality data from regulatory decisions.

Under 40 CFR §50.14 (c) (3) (iv), the air agency demonstration to justify data exclusion must include:

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 (B) above;

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."[1]

In addition, the air agency must meet several procedural requirements, including:

1. Submission of an Initial Notification of Potential Exceptional Event and flagging of the affected data in EPA's Air Quality System (AQS) as described in 40 CFR §50.14(c)(2)(i),

2. Completion and documentation of the public comment process described in 40 CFR §50.14(c)(3)(v), and

3. Implementation of any applicable mitigation requirements as described in 40 CFR §51.930.

For data influenced by exceptional events to be used in initial area designations, air agencies must also meet the initial notification and demonstration submission deadlines specified in Table 2 to 40 CFR §50.14. We include below a summary of the Exceptional Events Rule criteria, including those identified in 40 CFR §50.14(c)(3)(iv).

**Regulatory Significance**

The 2016 Exceptional Events Rule includes regulatory language that applies the provisions of CAA section 319 to a specific set of regulatory actions. As identified in 40 CFR §50.14 (a)(1)(i), these regulatory actions include initial area designations and redesignations; area classifications; attainment determinations (including clean data determinations); attainment date extensions; findings of state Implementation Plan (SIP) inadequacy leading to a SIP call; and other actions on a case-by-case basis as determined by the Administrator. Air agencies and EPA should discuss the regulatory significance of an exceptional events demonstration during the Initial Notification of Potential Exceptional Event prior to the air agency submitting a demonstration for EPA's review.

[1] A natural event is further described in 40 CFR §50.1 (k) as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions."

**Narrative Conceptual Model**

The 2016 Exceptional Events Rule directs air agencies to submit, as part of the demonstration, a narrative conceptual model of the event that describes and summarizes the event in question and provides context for analyzing the required statutory and regulatory technical criteria. Air agencies may support the narrative conceptual model with summary tables or maps. For wildfire $O_3$ events, EPA recommends that the narrative conceptual model also discuss the interaction of emissions, meteorology, and chemistry of event and non-event $O_3$ formation in the area, and, under 40 CFR §50.14 (a)(1)(i), must describe the regulatory significance of the proposed data exclusion.

**Clear Causal Relationship and Supporting Analyses**

EPA considers a variety of evidence when evaluating whether there is a clear causal relationship between a specific event and the monitored exceedance or violation. For wildfire $O_3$ events, air agencies should compare the $O_3$ data requested for exclusion with seasonal and annual historical concentrations at the air quality monitor to establish a clear causal relationship between the event and monitored data. In addition to providing this information on the historical context for the event-influenced data, air agencies should further support the clear causal relationship criterion by demonstrating that the wildfire's emissions were transported to the monitor, that the emissions from the wildfire influenced the monitored concentrations, and, in some cases, air agencies may need to provide evidence of the contribution of the wildfire's emissions to the monitored $O_3$ exceedance or violation.

For wildfire $O_3$ events, EPA has published a guidance document that provides three different tiers of analyses that apply to the "clear causal relationship" criterion within an air agency's exceptional events demonstration. If a wildfire/$O_3$ event satisfies the key factors for either Tier 1 or Tier 2 clear causal analyses, then those analyses are the only analyses required to support the clear causal relationship criterion within an air agency's demonstration for that particular event. Other wildfire/$O_3$ events will be considered based on Tier 3 analyses.

- Tier 1: Wildfires that clearly influence monitored $O_3$ exceedances or violations when they occur in an area that typically experiences lower $O_3$ concentrations.
    - *Key Factor:* seasonality and/or distinctive level of the monitored $O_3$ concentration. The event-related exceedance occurs during a time of year that typically has no exceedances, or is clearly distinguishable (*e.g.,* 5-10 ppb higher) from non-event exceedances.
    - In these situations, $O_3$ impacts should be accompanied by clear evidence that the wildfire's emissions were transported to the location of the monitor.

- Tier 2: The wildfire event's $O_3$ influences are higher than non-event related concentrations, and fire emissions compared to the fire's distance from the affected monitor indicate a clear causal relationship.

- *Key Factor 1:* fire emissions and distance of fire(s) to affected monitoring site location(s). Calculated fire emissions of $NO_x$ and reactive-VOC in tons per day (Q) divided by the distance from the fire to the monitoring site (D) should be equal to or greater than 100 tons per day/kilometers (Q/D ≥ 100 tpd/km). The guidance document provides additional information on the calculation of Q/D.
- *Key Factor 2:* comparison of the event-related $O_3$ concentration with non-event related high $O_3$ concentrations. The exceedance due to the exceptional event:
  - Is in the 99$^{th}$ or higher percentile of the 5-year distribution of $O_3$ monitoring data, OR
  - Is one of the four highest $O_3$ concentrations within 1 year (among those concentrations that have not already been excluded under the Exceptional Events Rule, if any).
- In addition to the analysis required for Tier 1, the air agency should supply additional information to support the weight of evidence that emissions from the wildfire affected the monitored $O_3$ concentration.

- Tier 3: The wildfire does not fall into the specific scenarios (*i.e.,* does not meet the key factors) that qualify for Tier 1 or Tier 2, but the clear causal relationship criterion can still be satisfied by a weight of evidence showing.
  - In addition to the analyses required for Tier 1 and Tier 2, an air agency may further support the clear causal relationship with additional evidence that the fire emissions caused the $O_3$ exceedance.

**Not Reasonably Controllable or Preventable**

The Exceptional Events Rule requires that air agencies establish that the event be both not reasonably controllable and not reasonably preventable at the time the event occurred. This requirement applies to both natural events and events caused by human activities; however, it is presumed that wildfires on wildland will satisfy both factors of the "not reasonably controllable or preventable" element unless evidence in the record clearly demonstrates otherwise.[2]

[2] A wildfire is defined in 40 CFR §50.1(n) as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." Wildland is defined in 40 CFR §50.1(o) as "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."

**Natural Event or Event Caused by Human Activity that is Unlikely to Recur**

According to the CAA and the Exceptional Events Rule, an exceptional event must be "an event caused by human activity that is unlikely to recur at a particular location *or* a natural event" (emphasis added). The 2016 Exceptional Events Rule includes in the definition of wildfire that "[a] wildfire that predominantly occurs on wildland is a natural event." Once an agency provides evidence that a wildfire on wildland occurred and demonstrates that there is a clear causal relationship between the measurement under consideration and the event, EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element. EPA will address wildfires on other lands on a case-by-case basis.

## EPA Review of Exceptional Events Demonstration

On October 20, 2016, the MDE submitted an Initial Notification of Potential Exceptional Event for 2 exceedances of the 2008 8-hour $O_3$ standard that occurred at Fair Hill (240150003) in Cecil County on May 25 and 26, 2016. On May 31st, 2016, MDE submitted an exceptional events demonstration for 16 exceedances of the 2008 8-hour $O_3$ standard at the following monitors:

- Aldino (AQS: 240259001) – May 25 and 26, 2016
- Beltsville CASTNET (AQS: 240339991) – May 25, 2016
- Blackwater NWR CASTNET (AQS: 240199991) – May 26, 2016
- Edgewood (AQS: 240251001) – May 25 and 26, 2016
- Essex (AQS: 240053001) – May 25 and 26, 2016
- Fair Hill (AQS: 240150003) – May 25 and 26, 2016
- Furley (AQS: 245100054) – May 26, 2016
- Glen Burnie (AQS: 240031003) – May 26, 2016
- Horn Point (AQS: 240190004) – May 26, 2016
- Millington (AQS: 240290002) – May 25 and 26, 2016
- Padonia (AQS: 240051007) – May 26, 2016

and 12 exceedances of the 2015 8-hour $O_3$ standard that occurred at the following monitors:

- Beltsville CASTNET (AQS: 240339991) – May 26, 2016
- Calvert (AQS: 240090011) – May 26, 2016
- Furley (AQS: 245100054) – May 25, 2016
- Glen Burnie (AQS: 240031003) – May 25, 2016
- Horn Point (AQS: 240190004) – May 25, 2016
- HU-Beltsville (AQS: 240330030) – May 25 and 26, 2016
- Padonia (AQS: 240051007) – May 25, 2016
- PG Eq Cntr (AQS: 240338003) – May 25, 2016

- South Carroll (AQS: 240130001) – May 25 and 26, 2016
- S. Maryland (AQS: 240170010) – May 26, 2016

**Regulatory Significance**

EPA reviewed MDE's Initial Notification of Potential Exceptional Event and determined that the exclusion of 8-hour $O_3$ measurements from the Fair Hill monitor on May 25 and 26, 2016 had regulatory significance for the 2008 8-hour $O_3$ standard, and worked with MDE to identify any other relevant exceedances and monitoring sites affected. In consultation with EPA, MDE identified additional monitors where exclusion of the exceptional event data had regulatory significance for the 2008 and 2015 $O_3$ standards, and these monitors were added to MDE's request. Ultimately, monitor days without immediate or possible regulatory significance were also requested by MDE in their final demonstration and were either deferred or non-concurred by EPA. Table 1 summarizes the exceedances and EPA's decisions.

Table 1. EPA 8-hour $O_3$ Exceedance Summary

| Exceedance Date | Site Name | AQS ID | 8-hour Max. (ppb) | NAAQS Standard Affected | EPA Decision |
|---|---|---|---|---|---|
| May 25, 2016 | Edgewood | 240251001 | 79 | 2008 | Concur |
| May 25, 2016 | Fair Hill | 240150003 | 83 | 2008 | Concur |
| May 25, 2016 | Furley | 245100054 | 75 | 2015 | Concur |
| May 25, 2016 | Glen Burnie | 240031003 | 75 | 2015 | Concur |
| May 25, 2016 | Millington | 240290002 | 85 | 2008 | Concur |
| May 25, 2016 | PG Eq Cntr | 240338003 | 74 | 2015 | Concur |
| May 26, 2016 | Edgewood | 240251001 | 80 | 2008 | Concur |
| May 26, 2016 | Fair Hill | 240150003 | 76 | 2008 | Concur |
| May 26, 2016 | Furley | 245100054 | 78 | 2008 | Concur |
| May 26, 2016 | Glen Burnie | 240031003 | 76 | 2008 | Concur |
| May 26, 2016 | Millington | 240290002 | 76 | 2008 | Concur |
| May 25, 2016 | Aldino | 240259001 | 77 | TBD | Defer |
| May 25, 2016 | Essex | 240051001 | 78 | TBD | Defer |
| May 25, 2016 | HU-Beltsville | 240330030 | 74 | TBD | Defer |
| May 25, 2016 | South Carroll | 240130001 | 72 | TBD | Defer |
| May 26, 2016 | Aldino | 240259001 | 79 | TBD | Defer |
| May 26, 2016 | Calvert | 240090011 | 75 | TBD | Defer |
| May 26, 2016 | Essex | 240053001 | 81 | TBD | Defer |
| May 26, 2016 | HU-Beltsville | 240330030 | 74 | TBD | Defer |
| May 26, 2016 | South Carroll | 240130001 | 75 | TBD | Defer |
| May 25, 2016 | Beltsville CASTNET | 240339991 | 76 | NA | Non-concur |
| May 25, 2016 | Horn Point | 240190004 | 71 | NA | Non-concur |
| May 25, 2016 | Padonia | 240051007 | 74 | NA | Non-concur |
| May 26, 2016 | Beltsville CASTNET | 240339991 | 72 | NA | Non-concur |
| May 26, 2016 | Blackwater NWR CASTNET | 240199991 | 76 | NA | Non-concur |
| May 26, 2016 | Horn Point | 240190004 | 77 | NA | Non-concur |
| May 26, 2016 | Padonia | 240051007 | 84 | NA | Non-concur |
| May 26, 2016 | S. Maryland | 240170010 | 73 | NA | Non-concur |

## Narrative Conceptual Model

MDE's demonstration provided a narrative conceptual model to describe how emissions from Fort McMurray, Alberta, Canada caused $O_3$ exceedances at the affected monitoring stations. The conceptual model included a general overview of typical $O_3$ formation in Maryland, a literature review of studies that examine the role of wildfires on downwind $O_3$, and the meteorology, $O_3$ and $NO_x$ concentrations and satellite smoke observations for the days leading up to, during, and after the exceptional event dates.

In the demonstration, MDE explained that under typical airmass composition, $O_3$ formation in Maryland occurs "due to the photolization of volatile organic compounds (VOCs) and a combination of regional and locally sourced anthropogenic $NO_x$ in the presence of sunlight." While Maryland has urban pollution plumes, MDE's demonstration explained that "these emissions alone regularly fall short of producing ozone capable of [maximum daily 8-hour average ozone] concentrations above 70 ppb".

The Fort McMurray wildfire was fast growing and by May 19, 2016 was estimated to have burned over 500,000 hectares. Low pressure in the western United States helped to build high pressure over the Midwest, transporting the smoke from the fire (containing $O_3$ precursors) southward into the northern plains and Midwestern United States and down to the surface beginning May 20-21, where the airmass photochemically aged. By May 24, the modified airmass arrived in Maryland and elevated $O_3$ was observed across the state. The MDE demonstration noted that wildfires can affect air quality in faraway places, citing that "Canadian wildfires have increased ozone concentrations in Houston, TX and as far away as Europe".

Table 2. Documentation of Narrative Conceptual Model

| Exceedance Date | Demonstration Citation | Quality of Evidence | Criterion Met? |
|---|---|---|---|
| May 25, 2016 | Section 2: p 16-46 | Sufficient | Yes |
| May 26, 2016 | Section 2: p 16-46 | Sufficient | Yes |

## Clear Causal Relationship and Supporting Analyses

MDE's demonstration included multiple analyses to demonstrate a clear causal relationship between the Fort McMurray fire and the monitored exceedances. A selection of these analyses is listed and further discussed below.

### Trajectory Analysis

MDE included 120-hour forward and backward trajectories between May 20$^{th}$ and 25$^{th}$, 2016 using the National Oceanic and Atmospheric Administration's Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model. The forward trajectories (originating near the Fort

McMurray wildfire) generally indicated transport to the Midwest. The backward trajectories (originating in northeast Maryland) clearly indicated transport from the Midwest, which was consistent with MDE's conceptual model.

Satellite Imagery of Plume with Evidence of Plume Impacting Ground

Satellite retrievals of carbon monoxide (CO) over North America strengthened MDE's conceptual model of transport of Fort McMurray fire emissions to Maryland. CO can be used as a wildfire smoke indicator and is a precursor for $O_3$. MDE presented a series of satellite retrievals from May 18 to 26, 2016 that show a plume of CO located near the Fort McMurray wildfire travelling south and eastward into the Midwest and eventually to Maryland. The plume of CO over Maryland occurred in the same time period as elevated ground-level measurements of CO were observed at several MDE monitors, indicating that the plume impacted the ground around the same time as it was detected by satellite.

Q/d Analysis

While required for Tier 2 & 3 demonstrations, MDE felt that, "the 100 [tpd/km] value is not representative for long-range east-coast smoke events". Thus MDE not only provided a standard Q/d estimate, but also four, other estimates based on various scenarios. The standard Q/d estimated by MDE was 4.1 tpd/km – much lower than the required 100 tpd/km. Of the various scenarios presented by MDE, the only one to reach 100 tpd/km or greater was one assuming maximum fuel loading, one day of burning, with the plume impacting Minneapolis, Minnesota instead of Maryland. While the results of this analysis did not satisfy the Q/d value requirements, MDE's inclusion of additional analyses in this demonstration are adequate in fulfilling this requirement.

Comparison of Event $O_3$ Concentrations with Non-event

Several of the exceedances observed at the requested monitors on May 25 and 26, 2016 were considered remarkable in the context of the past five years (2012-2016). Of the 16 monitors for which MDE requested data exclusion, three of those monitors on May 25, 2016, and five on May 26, 2016 observed 8-hour $O_3$ concentrations that exceeded the 99$^{th}$ percentile for 2012-2016 8-hour $O_3$ data. The Millington and Furley monitors met or exceeded the 99$^{th}$ percentile on May 25, and the Furley monitor on May 26. When examining 2012-2016 8-hour $O_3$ data for May only, the number of monitors exceeding the 99$^{th}$ percentile increases to nine and twelve for May 25, 2016 and May 26, 2016, respectively. The Fair Hill, Furley, Edgewood, Millington, and PG Eq Cntr monitors were five of the nine monitors that exceeded the 99$^{th}$ percentile for May-only 8-hour $O_3$ on May 25, 2016, and the Edgewood, Furley, Glen Burnie, and Millington monitors were four of the 12 monitors that exceeded the 99$^{th}$ percentile for May-only 8-hour $O_3$ on May 26, 2016.

Evidence of Changes in Spatial/Temporal $O_3$ and/or $NO_x$ Patterns

Figure 18 of MDE's demonstration illustrated maximum daily 8-hour average $O_3$ concentrations measured by $O_3$ monitors across the eastern United States during May 18-28, 2016. $O_3$ concentrations between 50 and 65 ppb were observed in Canada and the Midwest on May 18 and 19. On later dates, this area of elevated $O_3$ concentrations, which was spatially associated with the wildfire smoke plume, moved south and intensified before moving east and further intensifying. May 25 and 26, 2016 had the highest $O_3$ concentrations in Maryland of this time period. On May 18, 2016, $O_3$ concentrations were well below the NAAQS at < 40 ppb in most of Maryland, but by May 25$^{th}$, they were between 60 and 85 ppb and either approaching or exceeding the 2015 and 2008 $O_3$ NAAQS.

Additionally, MDE included time series of $NO_x$ and total reactive nitrogen ($NO_y$) for May 2012-2016. While MDE did not indicate if the $NO_x$ and $NO_y$ concentrations are significantly higher during the exceptional event, $NO_x$ appeared much higher than many of the other observations at one of MDE's monitors, and one monitor during the exceptional event, $NO_y$ also appeared elevated relative to the rest of the 2012-2016 May data.

Concentrations of Supporting Ground-level Measurements

In addition to the elevated CO concentrations discussed previously, MDE included evidence of wildfire-related, elevated 24-hour $PM_{2.5}$ observations. MDE explained that "The entire MDE network showed a correlated increase in $PM_{2.5}$ 24-hour averages from May 24-29 which aligned with the onset of the smoke plume in Maryland. No other period of the month exhibited such a coherent increase across the entire Maryland network".

Similar Day Analysis

MDE identified three days in the time period of May-only 2012-2016 with similar meteorology that could be compared to the exceptional event days. None of the similar days were associated with $O_3$ concentrations near as high as those observed throughout Maryland on May 25, 2016. MDE explains that "spatially none of the [similar] days are comparable to the 2016 event either. More than half of the state was under code orange conditions in 2016 when in the [similar] 2013 case only four monitors were above 70 ppb, in 2014, none, and in 2015 only two".

Photochemical Model

The Community Multi-Scale Air Quality (CMAQ) $O_3$ model can predict quantitatively and spatially $O_3$ concentrations. In 2016 when MDE ran CMAQ in support of their exceptional event demonstration, the model did not include 2016 wildfire emissions in the $O_3$ chemical creation mechanism. Therefore, the model results could be compared to the observed $O_3$ concentrations. If CMAQ significantly underpredicts daily maximum 8-hour $O_3$, it is indicative that there were $O_3$ sources that were not accounted for. Therefore, MDE writes, "the NOAA

operational CMAQ model represented a prediction of ozone in the absence of smoke under normal conditions".

Similar to the plume of CO discussed above, MDE's demonstration included figures showing an area of underpredicted maximum daily 8-hour $O_3$ in the Midwest around May 18-24, 2016. By May 25, the area of underprediction had spread east, and by May 26, 2016 the entire state of Maryland was included in the area of underprediction. The areas of underprediction ranged from 5 to 20 ppb below observed concentrations as the plume moved over the Mid-West and into Maryland. The underprediction of $O_3$ by CMAQ (suggesting unexpected $O_3$ source(s)) was underscored in MDE's demonstration because, as MDE writes, "it tends to slightly over-forecast ozone concentrations".

Conclusions

MDE stated that the evidence presented demonstrates "that the Fort McMurray wildfire affected air quality in such a way that there exists a clear causal relationship between the event (Fort McMurray fire) and the monitored ozone exceedances in Maryland on May 25 and 26, 2016 and thus satisfies the clear causal relationship criterion for recognition as an exceptional event".

The analyses included in the demonstration, specifically, the similar day analysis and comparison of modeled (without fire emissions) with observed $O_3$ concentrations, sufficiently demonstrated a clear causal relationship between the emissions generated by the Fort McMurray wildfire and the exceedances measured at the Fair Hill, Furley, Glen Burnie, PG Eq Cntr, Edgewood, and Millington monitors.

Table 3. Documentation of Clear Causal Relationship and the Supporting Analyses

| Exceedance Date | Demonstration Citation | Quality of Evidence | Criterion Met? |
|---|---|---|---|
| May 25, 2016 | Section 3: p 47-99 | Sufficient | Yes |
| May 26, 2016 | Section 3: p 47-99 | Sufficient | Yes |

**Not Reasonably Controllable or Preventable**

The Exceptional Events Rule presumes that wildfire events on wildland are not reasonably controllable or preventable (40 CFR §50.14(b)(4)). MDE's demonstration provided evidence that the wildfire event meets definition of wildfire. Specifically, MDE states that "[these fires] were outside the United States, and were therefore neither reasonably controllable or preventable by the state of Maryland. No policy that Maryland enacted could have prevented the fire or smoke which it caused, to enter the United States or Maryland. MDE was not aware of any evidence clearly demonstrating that prevention or control efforts beyond those actually made

would have been reasonable." Therefore, the documentation provided sufficiently demonstrates that the event was not reasonably controllable and not reasonably preventable.

Table 4. Documentation of not Reasonably Controllable or Preventable

| Exceedance Date | Demonstration Citation | Quality of Evidence | Criterion Met? |
|---|---|---|---|
| May 25, 2016 | Section 5: p 100 | Sufficient | Yes |
| May 26, 2016 | Section 5: p 100 | Sufficient | Yes |

**Natural Event or Event Caused by Human Activity that is Unlikely to Recur**

The definition of "wildfire" at 40 CFR §50.1(n) states, "A wildfire that predominantly occurs on wildland is a natural event." MDE's demonstration includes documentation that the event meets the definition of a wildfire and occurred predominantly on wildland. MDE has therefore shown that the event was a natural event.

Table 5. Documentation of Natural Event

| Exceedance Date | Demonstration Citation | Quality of Evidence | Criterion Met? |
|---|---|---|---|
| May 25, 2016 | Section 4: p 100 | Sufficient | Yes |
| May 26, 2016 | Section 4: p 100 | Sufficient | Yes |

**Schedule and Procedural Requirements**

In addition to technical demonstration requirements, 40 CFR §50.14(c) and 40 CFR §51.930 specify schedule and procedural requirements an air agency must follow to request data exclusion. Table 6 outlines EPA's evaluation of these requirements.

Table 6: Schedules and Procedural Criteria

| Criterion | Reference | Demonstration Citation | Criterion Met? |
|---|---|---|---|
| Did the agency provide prompt public notification of the event? | 40 CFR §50.14 (c)(1)(i) | Section 6: p 100 | Yes |
| Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data | 40 CFR §50.14 (c)(2)(i) | NA | Yes |

| | | | |
|---|---|---|---|
| in EPA's Air Quality System (AQS) | | | |
| Did the initial notification and demonstration submittals meet the deadlines for data influenced by exceptional events for use in initial area designations, if applicable? Or the deadlines established by EPA during the Initial Notification of Potential Exceptional Events process, if applicable? | 40 CFR §50.14 Table 2 40 CFR §50.14(c)(2)(i)(B) | May 31, 2017 | Yes |
| Was the public comment process followed and documented?<br>• Did the agency document that the comment period was open for a minimum of 30 days?<br>• Did the agency submit to EPA any public comments received?<br>• Did the state address comments disputing or contradicting factual evidence provided in the demonstration? | 40 CFR §50.14 (c)(3)(v) | Section 6: p 100 | Yes |

| | | | |
|---|---|---|---|
| Has the agency met requirements regarding submission of a mitigation plan, if applicable? | 40 CFR §50.1930(b) | NA | NA |

**Conclusion**

EPA has reviewed the documentation provided by MDE to support claims that smoke from wildfires in Fort McMurray, Alberta, Canada caused exceedances of the 2008 8-hour $O_3$ standard at the Fair Hill, Glen Burnie, PG Eq Cntr, Edgewood, Furley, and Millington monitoring sites on May 25, 2016 and at the Fair Hill, Glen Burnie, Edgewood, Furley, and Millington monitoring sites on May 26, 2016. EPA has determined that the flagged exceedances at these monitoring sites on May 25 and 26 satisfy the exceptional event criteria: the event was a natural event, which affected air quality in such a way that there exists a clear causal relationship between the event and the monitored exceedance, and was not reasonably controllable or preventable. EPA has also determined that MDE has satisfied the procedural requirements for data exclusion.