UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

August 8, 2019

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations

FROM: Scott Mathias, Acting Director,
Air Quality Policy Division

Richard Wayland, Director,
Air Quality Assessment Division

TO: Regional Air Division Directors, Regions 1 – 10

The purpose of this memorandum is to distribute a non-binding guidance document titled, "Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations" (*Prescribed Fire Guidance*).

The EPA Headquarters and EPA Regional offices collaborated in the development of this guidance to assist air agencies with preparing exceptional events demonstrations for prescribed fire influences that meet the requirements of Clean Air Act section 319(b) and the Exceptional Events Rule signed on September 16, 2016, and posted on EPA's website at: *https://www.epa.gov/air-quality-analysis/final-2016-exceptional-events-rule-supporting-guidance-documents-updated-faqs#guidance*. The *Prescribed Fire Guidance* was developed as an addendum to the previously released document titled, "Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations," which is available online at: *https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_guidance_9-16-16_final.pdf*.

Please share this memorandum with appropriate contacts at state, local and tribal air agencies. If you have questions concerning this document, please contact Denise Scott at (919) 541-4280 or *scott.denise@epa.gov* for further information.

Attachment

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Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations

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Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Policy Division
Air Quality Assessment Division
Research Triangle Park, NC

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Acronyms

AQS	Air Quality System
BSMP	Basic smoke management practices
CAA	Clean Air Act
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FLM	Federal Land Manager
FR	Federal Register
NAAQS	National Ambient Air Quality Standard or Standards
O_3	Ozone
PM	Particulate matter
Q/D	Quantity of emissions from the fire(s) divided by the Distance of the fire(s) from the affected monitor
SMP	Smoke management program

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Exceptional Events Guidance: Prescribed Fire on Wildland that May Influence Ozone and Particulate Matter Concentrations

A.1 Highlights

A.1.1 Purpose

This document is an addendum to the "Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations" (*Wildfire Ozone Guidance*). This addendum provides information to support development of demonstrations under the Exceptional Events Rule pertaining to prescribed fires that influence Ozone (O_3) and particulate matter (PM) concentrations.[1] The 2016 Exceptional Events Rule revisions included fire-related regulatory language and preamble text, including regulatory provisions addressing prescribed fire on wildland. The regulatory language states that prescribed fire on wildland can be a human-caused event eligible for treatment as an exceptional event.

The Environmental Protection Agency (EPA) recognizes the importance of prescribed fire on wildland and welcomes continued dialogue on related issues among state, tribal and local air agencies,[2] EPA, and other federal agencies, including federal land managers (FLMs).[3] This dialogue is important to ensure that land managers have adequate available tools to support ecosystem development, restoration, and management of wildland vegetation, including the use of planned prescribed fires and allowing some wildfires to proceed naturally, and to ensure that use of these tools is protective of public health.

EPA also recognizes that a properly managed prescribed fire is generally less likely than a wildfire to cause or contribute to an exceedance or a violation of the National Ambient Air Quality Standards (NAAQS). In order to minimize the air quality impacts of prescribed fire, it is important that air agencies, fire managers, and FLMs communicate and collaborate regarding burn management practices, expectations, and processes for gathering and sharing information. Initiating and sustaining periodic communication before an event occurs may also significantly streamline the exceptional events demonstration development process after an event occurs.

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[1] References to "PM" include both PM_{10} (particles with diameters 10 micrometers and smaller) and $PM_{2.5}$ (particles with diameters 2.5 micrometers and smaller).

[2] References to "air agencies" include state, local and tribal air agencies responsible for implementing the Exceptional Events Rule. The regulatory text in the 2007 Exceptional Events Rule often uses "state" to apply to "air agencies."

[3] In the context of flagging data and preparing and submitting demonstrations, the role of and options available to air agencies may also apply to FLMs of Class I areas and other federal agencies managing federal land where (1) the FLM or federal agency either operates a regulatory monitor that has been affected by an exceptional event or manages land on which an exceptional event occurred that influenced a monitored concentration at a regulatory monitor; and (2) the air agency concurs with the FLM or other federal agency's submittal. 40 CFR 50.14(a)(1)(ii). Therefore, for purposes of this guidance, references to "air agencies" regarding roles and actions in the context of preparing and submitting exceptional events demonstrations could also include FLMs in situations where the above conditions are met. This guidance neither reduces nor expands the role of air agencies or the potential role of FLMs with respect to the exceptional events demonstration process as described in the 2016 Exceptional Events Rule and its preamble.

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The 2016 Exceptional Events Rule at 40 CFR 50.14(c)(3) states that an exceptional events demonstration must include the following elements:

1) 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);
2) 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;
3) Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times. The Administrator shall not require a state to prove a specific percentile point in the distribution of data;
4) A demonstration that the event was both not reasonably controllable and not reasonably preventable;
5) A demonstration that the event was caused by human activity that is unlikely to recur at a particular location or was a natural event; and
6) Documentation that the submitting air agency followed the public comment process.

EPA evaluates exceptional events demonstrations using a "weight of evidence" approach, meaning that EPA believes it is appropriate to consider all relevant evidence and qualitatively "weigh" this evidence based on its relevance to the Exceptional Events Rule criterion being addressed, the degree of certainty, its persuasiveness, and other considerations appropriate to the individual pollutant and the nature and type of event. As appropriate under a weight-of-evidence approach, one purpose of this document is to help air agencies determine the appropriate kind of information and analyses to include in a demonstration, which will vary on a case-by-case basis depending on the nature and severity of the event. Ultimately, the goal of EPA, in collaboration with air agencies and federal partners, including FLMs, is to ensure that exceptional events demonstrations satisfy the rule criteria and support the regulatory determination(s) for which they are significant.

Although portions of this guidance addendum focus on prescribed fire events that may influence O_3 concentrations, there is no difference between how demonstrations for events influencing PM concentrations and O_3 concentrations would address both the "human activity that is unlikely to recur at a particular location" criterion (see Section A.4) and the "not reasonably controllable and preventable" criterion (see Section A.5). Additionally, a narrative conceptual model (see Section A.2) and a public comment process (see Section A.6) for an O_3-related event would require the same kinds of information and/or process steps as they would for a PM-related even. Therefore, the guidance provided in Sections A.2, A.4, A.5, and A.6 of this document is fully applicable to both O_3 and PM.

With regard to satisfying the "clear causal relationship" criterion (see Section A.3), this guidance references a tiered approach from the *Wildfire Ozone Guidance* that is applicable only to O_3 events, and not PM. However, nearly all of the individual types of analyses useful for establishing a clear causal relationship for O_3 events could also be applicable to establishing a clear causal relationship for PM events. Therefore, a separate wildfire or prescribed fire guidance document for PM would be largely redundant to the *Wildfire Ozone Guidance* and this addendum for prescribed fire.

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EPA does not intend for this guidance to be used for preparing exceptional events demonstrations related to burns conducted for agricultural purposes or on lands used primarily for agricultural purposes. Any air agency considering such a demonstration should consult with its EPA Regional office.

A.1.2 Prescribed Fire Definitions and Terminology

This addendum uses the following fire-related terminology:

- *Air agency* refers to state, local, or tribal air agencies.
- *Burn manager* or *fire manager* refers to the party responsible for supervising a prescribed fire from ignition through fire extinguishing and cleanup, or another party in the same organization who represents, supervises or is supervised by said party and can be a communications pathway to and from such person.
- *Event* includes the fire (or fires) and its emissions (including precursor emissions).
- *Evidence* includes, but is not limited to, measurements and analyses based on measurements.
- *Exceptional event* means an event(s) and its resulting emissions that affect air quality in such a way that there exists a clear causal relationship between the specific event(s) and the monitored exceedance(s) or violation(s), is not reasonably controllable or preventable, is an event(s) caused by human activity that is unlikely to recur at a particular location or a natural event(s), and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event. It does not include air pollution relating to source noncompliance. Stagnation of air masses and meteorological inversions do not directly cause pollutant emissions and are not exceptional events. Meteorological events involving high temperatures or lack of precipitation (*i.e.*, severe, extreme or exceptional drought) also do not directly cause pollutant emissions and are not considered exceptional events. However, conditions involving high temperatures or lack of precipitation may promote occurrences of particular types of exceptional events, such as wildfires or high wind events, which do directly cause emissions. See promulgated definition at 40 CFR 50.1(j).
- *Federal land manager* means, consistent with the definition in 40 CFR 51.301, the Secretary of the department with authority over the Federal Class I area (or the Secretary's designee) or, with respect to Roosevelt-Campobello International Park, the Chairman of the Roosevelt-Campobello International Park Commission.
- *Fire*: While this document refers to "a fire" or "the fire," we recognize that there could be multiple individual fires that, when aggregated, affect O_3 or PM concentrations at a given monitoring site.
- *Prescribed fire* is "any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific land or resource management objectives."[4]
- *Wildfire* is "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental human-caused actions, or a

[4] 40 CFR 50.1(m).

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prescribed fire that has developed into a wildfire"[5] (emphasis added). As we clarified in the preamble to the final rule, when considering prevention and control for purposes of exceptional event categorization, a prescribed fire effectively becomes like a wildfire when, for example, the prescribed fire escapes secure containment due to unforeseen circumstances (*e.g.,* a sudden shift in prevailing winds).[6] In these instances, the burn manager would no longer control the path of the fire. Thus, the fact that the initial fire was deliberately ignited should not result in the entire burn (*e.g.,* the duration and extent of the burn) being classified as a prescribed fire on wildland.

- *Wildland* is "an area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities. Structures, if any, are widely scattered."[7] Land within national parks, national forests, wilderness areas, state forests, state parks, and state wilderness areas are generally considered wildland. Land outside cantonment areas on military bases may also be considered wildland. For purposes of this guidance, and as further clarified in the preamble to the 2016 Exceptional Events Rule, wildland includes lands that are predominantly wildland, such as land in the wildland-urban interface.[8,9]EPA expects to evaluate the eligibility of prescribed fires on other lands, including private lands, as possible exceptional events on a case-by-case basis. We suggest such circumstances be discussed with the appropriate EPA Regional office before a demonstration is prepared.

Figure 1 below illustrates when it may be appropriate for an air agency to develop an exceptional events demonstration based on the information provided in this addendum, as well as expected timeframes for EPA's response.

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[5] 40 CFR 50.1(n).

[6] Treatment of Data Influenced by Exceptional Events, 81 FR 68216, 68250 (October 3, 2016).

[7] 40 CFR 50.1(o).

[8] The wildland-urban interface is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The term describes an area within or adjacent to private and public property where mitigation actions can prevent damage or loss from wildfire. *See*, Glossary of Wildland Fire Terminology, PMS 205. October 2014. The final 2016 Exceptional Events Rule retained EPA's proposed definition of the wildland and EPA's proposed description of the wildland-urban interface although the NWCG subsequently revised its October 2014 glossary. The October 2015 glossary, which became available after the November 2015 exceptional events proposal, is available at *http://www.nwcg.gov/glossary-of-wildland-fire-terminology*.

[9] EPA would generally treat a large prescribed fire in a wildland-urban interface area as a prescribed fire on wildland, subject to the prescribed fire provisions described in this document. EPA does not expect a small prescribed fire in an interface area (*e.g.*, a prescribed fire ignited by a single landowner on his/her personal property) to generate emissions that would raise exceptional events issues.

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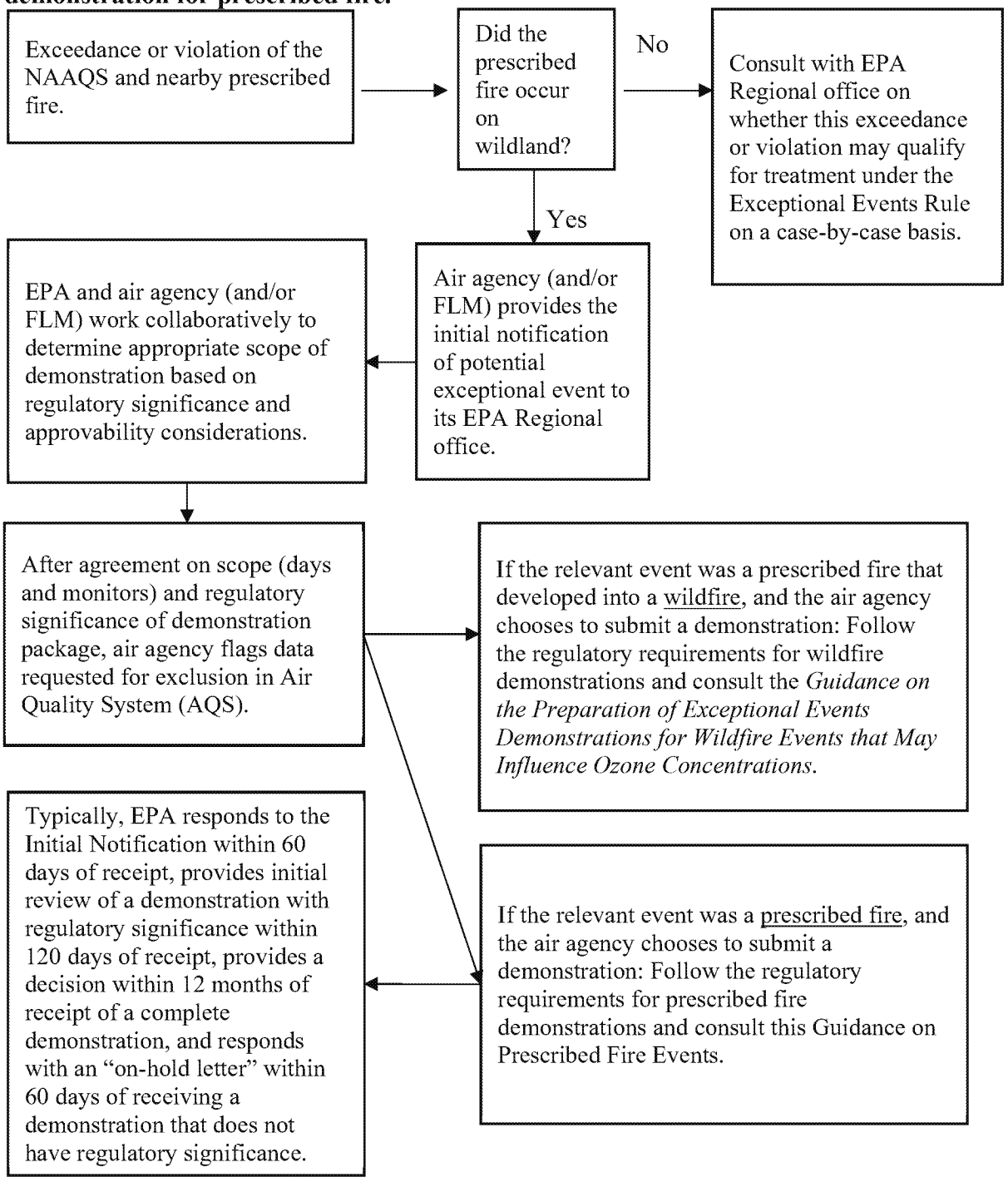
Figure 1. Flowchart illustrating when it is appropriate to develop an exceptional events demonstration for prescribed fire. [10]



[10] EPA encourages air agencies, fire managers, and FLMs to communicate, collaborate, and preplan regarding burn management practices, expectations, and processes for gathering and sharing information that may be helpful to support a possible exceptional events demonstration in the future. Initiating and sustaining periodic communication before an event occurs may help streamline the exceptional events demonstration development process.

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A.2 Narrative Conceptual Model of Event

A.2.1 Overview and Exceptional Events Rule Provisions

As discussed in Section 2 of the *Wildfire Ozone Guidance*, the Exceptional Events Rule at 40 CFR 50.14(c)(3)(iv)(A) requires that demonstrations include a narrative conceptual model describing the event. This narrative conceptual model would typically discuss the interaction of emissions, meteorology, and chemistry of event and non-event NAAQS pollutant formation in the area. This narrative typically appears at or near the beginning of a demonstration and is expected to describe the event formation and its influence on monitored pollutant concentrations prior to introducing the technical evidence to support the requested data exclusion in subsequent sections of the demonstration. Much of the information the air agency discussed with or submitted to EPA during the Initial Notification process, including a description of the regulatory significance of the proposed data exclusion, may also be useful in the narrative conceptual model section of a demonstration.

A.2.2 Examples of Supporting Documentation

The *Wildfire Ozone Guidance* describes evidence and technical analyses that air agencies can include in an exceptional events demonstration. For these analyses to be meaningful and clearly interpreted, they should be consistent with a simple narrative describing how emissions from a prescribed fire (or group of fires) caused exceedances or violations at a particular location and how these event-related emissions and resulting exceedances or violations differ from typical high episodes in the area. The narrative conceptual model for a prescribed fire demonstration could include information similar to the example evidence and analyses described in Section 2.2 of the *Wildfire Ozone Guidance*, and the examples of information listed therein would also apply to a PM-related event.

The narrative conceptual model should include a brief description of the intended objective for the prescribed fire. One example of an objective, as discussed in Section A.4, could be to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire. The narrative conceptual model should also identify whether the prescribed fire followed an established natural fire return interval or was conducted to conform with a fire return interval established in accordance with a multi-year land or resource management plan. The relevant information in a multi-year land or resource management plan may be contained in a variety of documents, particularly when a prescribed fire has been conducted on private lands. EPA is not limiting what types of documents air agencies can use to identify the natural fire return interval as part of this guidance addendum. In addition, the conceptual model should address whether the prescribed fire was conducted in compliance with either a state-certified smoke management program (SMP) or basic smoke management practices (BSMP).

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A.3 Clear Causal Relationship between the Specific Event and the Monitored Concentration

A.3.1 Overview and Exceptional Events Rule Provisions

The Exceptional Events Rule requires that demonstrations address the technical criterion 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." [11] Air agencies should support the clear causal relationship, in part, with a comparison of the data requested for exclusion with historical concentrations at the air quality monitor. In addition to comparing event-related concentrations with historical concentrations, air agencies should further support the clear causal relationship criterion by demonstrating that the prescribed fire emissions were transported to the monitor (*i.e.*, that the emissions were transported to the area and reached down to the level of the monitor), demonstrating that the emissions from fire(s) influenced the monitored concentrations, and, in some cases, quantifying the contribution of the fire emissions to the monitored exceedance or violation.

With respect to O_3, the *Wildfire Ozone Guidance* identifies a tiered strategy with three tiers of analyses for the clear causal relationship criterion, which acknowledges that some fire events can be extreme or otherwise clearly stand out from normally occurring O_3 concentrations and, thus, may necessitate less evidence for the clear causal relationship analysis. This same tiered approach is also applicable to prescribed fires that influence O_3 concentrations, and it is discussed further in this section. EPA acknowledges that since prescribed fires tend to be small-scale and well-defined, they are less likely than a wildfire to be severe or extreme enough for Tier 1 or Tier 2 analyses. However, these same features also mean that the supporting data to satisfy the clear causal relationship criterion for a Tier 3 analysis should be more readily available and quantifiable than it typically would be for a wildfire.

Although the individual types of analyses discussed in this section and in the *Wildfire Ozone Guidance* can be used to help establish a clear causal relationship for prescribed fire events that influence either O_3 or PM concentrations, the tiering approach described in the *Wildfire Ozone Guidance* applies only to events that influence O_3 concentrations. Table 1 below further clarifies this distinction. All else equal, EPA generally expects that prescribed fire events that influence PM concentrations will require less sophisticated analysis to satisfy the 'clear causal relationship' criterion than for O_3 due to the absence of the photochemistry process inherent to O_3 formation.

Demonstrating a clear causal relationship between a prescribed fire (or fires) on wildland and a monitored exceedance or violation of either ozone or PM involves evidence and technical analyses similar to those that could be used for a wildfire on wildland demonstration, as discussed in Section 3 of the *Wildfire Ozone Guidance*. Air agencies (and/or FLMs with air agency concurrence) should discuss these analyses with their EPA Regional office to ensure the demonstration includes sufficient and appropriate analyses.

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[11] *See* 40 CFR 50.14(c)(3)(iv)(B)-(C).

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Sections A.3.2 – A.3.5 summarize the expected components of the clear causal relationship portion of a demonstration.

A.3.2 Comparison of Event-Related Concentrations to Historical Concentrations

Part of demonstrating a clear causal relationship between the event and the monitored exceedance involves comparing the event-related exceedance with historical concentrations measured at the affected monitor or at other monitors in the area. Air agencies should compare the data requested for exclusion with the historical concentrations at the monitor, including all other "high" values in the relevant historical record.

As described in the preamble of the Exceptional Events Rule, EPA encourages air agencies to, where applicable in historical concentration plots, label past high data points as being associated with previously concurred exceptional events, suspected exceptional events, other unusual occurrences, or high pollution days due to normal emissions. EPA recommends providing basic evidence to support the identification of suspected past events when possible. Additional suggestions for this process can be found in the answer to Question B.5. of the *Updated Frequently Asked Questions* document for exceptional events.[12]

In addition to showing how the level of the event exceedance compares with historical data, air agencies can also show how the typically observed non-event diurnal or seasonal pattern differs, if such a deviation occurred, due to the event. Effective statistical summaries that characterize non-event, high-concentration day historical data and the differences seen on event days would carry more weight than anecdotal or general assertions of when non-event behavior occurs, without evidence or quantification. The data used in the comparison of historical concentrations analysis should focus on concentrations of O_3 or PM at the influenced monitor and nearby monitors if appropriate.

As described in 40 CFR 50.14(c)(3)(iv)(C), there is no pass or fail threshold for the historical concentrations data presentation. However, these comparisons may inform whether the air agency needs to provide additional evidence to successfully establish the clear causal relationship element. For example, historical comparisons conclusively showing that the event-influenced concentration was outside the range of historical concentrations could indicate that less additional evidence may be needed to demonstrate the clear causal relationship. Additionally, a history of concentrations above the standard could indicate that more additional evidence may be needed to demonstrate the clear causal relationship between the exceedance or violation and the prescribed fire event.

Section 3.2.1 of the *Wildfire Ozone Guidance* provides examples of analyses that can be used to support a comparison to historical concentrations.

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[12] *2016 Revisions to the Exceptional Events Rule: Updated Frequently Asked Questions* is available at https://www.epa.gov/sites/production/files/2018-10/documents/updated_faqs_for_exceptional_events_final_september_2018.pdf.

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A.3.3 Evidence that the Fire Emissions Affected the Monitor(s)

To satisfy the clear causal relationship criterion, a demonstration should provide evidence that the prescribed fire emissions affected the monitor. Evidence would typically include analyses that show changes in spatial or temporal patterns of O_3 or PM concentrations or supporting ground level measurements (*e.g.,* carbon monoxide, nitrogen oxide, or other fire-related compounds). Each additional piece of information that supports the event's influence on the exceedance at the monitor will strengthen the air agency's position.

A.3.4 Evidence that the Fire Emissions were Transported to the Monitor(s)

To demonstrate a clear causal relationship between the event's emissions and the monitored exceedance, air agencies should show that the emissions from the fire were transported to the monitor. This will likely require a trajectory analysis or a satellite plume analysis, as described in Section 3.5.3 of the *Wildfire Ozone Guidance*. Additional information, such as analyses of relevant meteorological conditions (e.g., wind speed and direction at the height of the smoke plume), could further support the clear causal relationship rule element.

A.3.5 Additional Evidence that the Fire Emissions Caused the Exceedance

Depending on the nature of the event, an air agency may need to further support the clear causal relationship between the fire and the exceedance with additional analysis. Some potentially useful supporting analyses include matching day analyses, statistical regression models, or photochemical models, all of which are described in more detail in Section 3.6.4 of the *Wildfire Ozone Guidance*. Air agencies interested in developing demonstrations should engage with their EPA Regional office to determine what additional evidence is necessary based on the specific circumstances of the prescribed fire(s) in question.

A.3.6 Analytical Tiering Structure for O_3

The *Wildfire Ozone Guidance* identifies a tiering structure with three tiers of analyses for the clear causal relationship criterion for wildfires on wildland that influence O_3 concentrations. This tiering structure acknowledges that some wildfire events can be extreme or otherwise clearly stand out from normally occurring O_3 concentrations and, thus, may necessitate less evidence for the clear causal relationship analysis. The O_3 tiering structure is intended to encourage a step-wise approach to developing the weight of evidence for a right-sized demonstration in which air agencies, in collaboration with EPA, incorporate analyses starting with the least complex and stopping once the weight of evidence satisfies the Exceptional Events Rule criteria. EPA recommends using this same tiering structure for prescribed fire events that influence ozone concentrations, but it is not applicable to PM.

There are three tiers within the O_3 tiering structure, and events with the clearest clear causal relationship between the event and monitored O_3 concentrations may find that Tier 1 analyses are appropriate. Tier 1 analyses for the clear causal relationship are likely appropriate for fires (wildfires and prescribed fires) located in close proximity to a monitor, and which occur in an area or during a time (*i.e.*, season) of year with typically low O_3 concentrations. Tier 1 analyses would likely need the least amount of evidence. Tier 2 analyses should include more evidence

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than Tier 1 analyses to show a clear causal relationship and should be used in situations with less clear wildfire impacts. Tier 3 analyses are appropriate when the relationship between the fire and the monitored O_3 exceedances or violations is more complex. Sections 3.3-3.6 of the *Wildfire Ozone Guidance* discuss the three tiers and associated analyses in more detail.

As described in the *Wildfire Ozone Guidance*, the tiers build on one another. In other words, EPA expects that Tier 2 analyses would include the Tier 1 analyses with the addition of those analyses specific to Tier 2. Similarly, Tier 3 analyses would include both Tier 1 and Tier 2 analyses with the addition of *one or more* (as determined on a case-by-case basis) of the analyses specific to Tier 3.

Based on the controlled nature of prescribed fires, they are generally less likely than wildfires to be extreme or have clear impacts on a monitored exceedance or violation. Thus, Tier 3 analyses are more likely to be appropriate to demonstrate a clear causal relationship for a prescribed fire event that influences O_3 concentrations.

As a key factor for Tier 2 analysis of O_3-related wildfires, Section 3.5.1 of the *Wildfire Ozone Guidance* discusses analyzing a fire using O_3 precursor emissions from the fire(s) divided by the distance of the fire from the affected monitor (Q/D). Prescribed fire events are controlled, typically small, and contained so they are unlikely to have a Q/D greater than or equal to 100 tons per day/kilometer (the critical threshold for O_3-related wildfires to qualify for Tier 2 analyses). However, air agencies may still choose to conduct a Q/D analysis to support the clear causal relationship rule criterion if the air agency believes the findings will help support its demonstration.

The *Wildfire Ozone Guidance* also describes aggregating the emissions from multiple fires to calculate the Q/D of an event.[13] This may be useful when several individual prescribed burns occur at the same time and, in aggregate, cause an exceedance or violation. Analyzing the Q/D of the total emissions from these prescribed fires may be useful in demonstrating that the combined influence of the prescribed fires clearly caused the O_3 monitored exceedance(s) or violation(s).

A.3.7 Summary of Analyses that may Demonstrate a Clear Causal Relationship for Prescribed Fire Events

Table 1 below lists the most common types of example analyses that may be helpful in demonstrating a clear causal relationship between a prescribed fire or wildfire event and an exceedance or violation at a monitor. The list of analyses is not intended to be exhaustive, and EPA expects that in nearly all cases air agencies would *not* need to conduct every type of analysis in the list to demonstrate a clear causal relationship. Table 1 is, instead, intended to serve as a menu of common possible options, recognizing that not all analyses will be necessary in most cases and not all analyses will be appropriate in all cases, depending on the nature of the event.

[13] Pages 17 through 19 in Section 3.5.1 of *Wildfire Ozone Guidance* provide a formula for aggregating multiple burns as part of a Q/D analysis.

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In the case of a single prescribed fire with a near-field impact on a monitor, which may have fewer of the types of information listed in Table 1 available, air agencies (and/or FLMs with air agency concurrence) should discuss with their EPA Regional office what information and analyses would be appropriate to include in an exceptional events demonstration.

Table 1 lists analyses that could be useful for fire events that influence both O_3 and PM concentrations to help highlight the potential similarities and differences between possible approaches to demonstrating a clear causal relationship for the two pollutants. The tiering approach segmented in Table 1 applies only to O_3, and not to PM. Additional guidance and details on the types of analyses listed in Table 1 can be found in the exceptional events *Wildfire Ozone Guidance* and the *Updated Frequently Asked Questions* documents.

Although the O_3-specific tiering structure does not apply to PM, nearly all of the same types of individual analyses may apply to PM, as summarized below in Table 1. For both O_3 and PM, EPA recommends that air agencies, in consultation with their EPA Regional office, use a simple-to-complex step-wise approach for integrating only those analyses that are appropriate and necessary to satisfy the "clear causal relationship" criterion. This approach is intended to help conserve air agency resources and support the goal of right-sized demonstrations.

As stated previously in Section A.1.1. of this document, there is no difference between O_3 and PM for how a demonstration would address the "not reasonably controllable and preventable" criterion and the "human activity that is unlikely to recur at a particular location" criterion.

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Table 1: Analyses that May Demonstrate a Clear Causal Relationship for Fire Events ***(Tiering structure applies only to O_3)***

Type of Analysis	Potential Applicability to O_3	Potential Applicability to PM
O_3 *Tier 1*		
Comparison of event-related concentration(s) to historical concentrations (one or more): • Comparison of concentration on the claimed event day(s) with past annual and/or seasonal data, ideally from at least 5 years • Comparison of concentration on the claimed event day(s) with a set of similar days • Percentile of event-related concentration(s) relative to annual and/or seasonal data	X	X
Atmospheric trajectory analysis / modeling	X	X[14]
Satellite imagery of plume with evidence of plume impacting the ground	X	X[15]
O_3 *Tier 2 (includes Tier 1 analyses plus the analyses below)*		These analyses may be useful for PM, but the tiering structure and key factor thresholds used for O_3 would not apply to PM.
Key Factor #1 – Q/D analysis	X	
Key Factor #2 – 99th percentile over 5 years or fourth highest within one year	X	

[14] A small distance from fire source to monitor and horizontal resolution of input meteorology may minimize the utility of this technique under certain circumstances. Additionally, meteorological factors affecting both the accumulation and transport of smoke may render typical trajectory modeling practice inappropriate under certain circumstances (such as nocturnal accumulation and passive advection of smoke down drainages too small for conventional forecast meteorology to account for in trajectory modeling).

[15] Air agencies may consider use of GOES or other such FRP products to confirm presence of fire when visible imagery not available (night-time).

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Evidence that the fire emissions affected the monitor(s) (one or more of the following, as appropriate and where available): • Photographic evidence of ground-level smoke at the monitor [16] • Plots of elevated fire-related species near the monitor (e.g., PM, CO) • Elevated light extinction measurements at or near the monitoring site • The timing and spatial distribution of fire-related pollutants shown with data from multiple monitoring sites • Differences in $CO:NO_X$ ratios [17] • PM speciation data that indicate fire impacts [18]	X	X
O_3 *Tier 3 (includes Tier 1 and 2 plus one or more of the analyses below)*		X[19]
Analysis of unusual diurnal patterns	X	
Comparison of concentrations on similar days	X	X
Statistical regression modeling	X	X
Photochemical modeling	X	X[20]

[16] Daytime impacts only.
[17] Urban or IMPROVE monitors or gravimetric monitors (presence of levoglucosan using a non-routine analysis).
[18] PM speciation data may be limited by temporal (typically operates on 1 in 3 or 1 in 6 schedule) and spatial paucity, and therefore may not be available for times and locations where prescribed burns occur. Positive Matrix Factorization could be used on PM speciation data to deduce biomass burning speciation profile and temporal strength of the profile signal in the time series.
[19] Only if PM2.5 continuous monitoring data available.
[20] Although PM is directly emitted and does not undergo the same complex photochemical process as O_3, certain photochemical models can model complex 3D wind flows to help isolate and estimate fire impacts.

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A.3.8 Example Conclusion Statement

In summarizing the clear causal relationship section of its demonstration, it is helpful when the air agency concludes with the following type of statement, which explains how the demonstration meets the relevant statutory and regulatory criteria:

"On [day/time] an [event type] occurred that generated pollutant X or its precursors resulting in elevated concentrations at [monitoring location(s)]. The monitored [pollutant] concentrations of [ZZ] were [describe the comparison to historical concentrations including the percentile rank over an annual (seasonal) basis]. Meteorological conditions were not consistent with historically high concentrations at the relevant monitoring sites, [plus describe additional evidence of a comparison of the event-related exceedance to historical concentrations, if this evidence provides additional insight]. In addition, the comparisons and analyses, provided in [Section X] of this demonstration support our position that the prescribed fire 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 on [dates/time of data requested for exclusion, or reference to summary table in demonstration] and thus satisfies the clear causal relationship criterion."

A.4 Addressing the Human Activity Unlikely to Recur at a Particular Location or a Natural Event Criterion

A.4.1 Overview and Exceptional Events Rule Provisions

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." The final rule acknowledges that prescribed fires are events caused by human activity and, therefore, to be considered an exceptional event, every prescribed fire demonstration must address the "human activity unlikely to recur at a particular location" criterion.[21] EPA will not treat a prescribed fire as a natural event under the Exceptional Events Rule unless the prescribed fire develops into a wildfire. Additionally, in the event an air agency believes that prescribed fires and wildfires simultaneously impacted a monitor, EPA encourages the air agency to discuss possible approaches for a combined demonstration with its EPA Regional office.

The general benchmark for recurrence (*i.e.*, three events in 3 years) for most "human activities that are unlikely to recur" does not apply to prescribed fires, and in some situations prescribed fires happening more frequently than three times in 3 years can be considered unlikely to recur.[22] Rather than using this general benchmark for prescribed fire on wildland, the Exceptional Events Rule states that recurrence for prescribed fires is defined by either "the natural fire return interval or the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem contained in a multi-year land or resource management plan with a stated objective to establish, restore and/or maintain a sustainable and resilient wildland

[21] *See* 40 CFR 50.14(b)(3) and 81 FR 68216, 68251 (October 3, 2016).
[22] *See* 81 FR 68216, 68255.

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ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire."[23] Thus, the recurrence frequency for prescribed fire is specific to the ecosystem and resource needs of the affected area. Sections 4.2-4.4 provide additional guidance on documenting actual event frequency satisfying the 'not likely to recur' criterion.

This recurrence provision for prescribed fire on wildland[24] is intended to recognize natural fire's vital role in sustaining ecosystems and reducing the risk of catastrophic wildfire, and to recognize that land managers often pursue these benefits through a program of prescribed fire. Notably, there are uses of prescribed fire for purposes other than maintaining a sustainable and resilient wildland ecosystem or to preserve endangered or threatened species. These other purposes include, but are not limited to, burning of land clearing debris, agricultural burning, and burning of logging slash on land where the primary purpose of the logging is for commercial timber sale. Fires for these other purposes may not be described in a multi-year land or resource management plan with a stated objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire, but the interval with which they are conducted could nevertheless be consistent with the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem contained in such a plan.

Providing a demonstration that assesses the natural fire return interval does not preclude the air agency from also assessing the prescribed fire frequency needed to establish, restore, and/or maintain a sustainable and resilient wildland ecosystem. These two methods of defining recurrence are not necessarily mutually exclusive; they may provide support for one another.[25] Air agencies should consult with their EPA Regional office when considering this rule criterion to ensure that they are providing appropriate and sufficient evidence.

EPA recognizes that a single event, natural or caused by human activity (to include prescribed fire events), can span multiple days and result in an air agency flagging multiple monitor-day values in AQS (*i.e.,* multiple exceedances of a given NAAQS at a single monitor on one or more days or multiple NAAQS exceedances at multiple monitors on multiple days).[26] In the case of prescribed fire, a multi-day event may involve separate burns conducted during multiple and possibly consecutive days on the same land area. However, EPA expects that multi-day exceedances or violations would rarely occur when a prescribed fire is properly managed. When a multi-day event does occur, a demonstration may assess recurrence based on the whole event, rather than analyzing each exceedance day separately in the context of event recurrence. EPA

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[23] 40 CFR 50.14(b)(3)(iii). "Historically documented" or "known seasonal" events include events of the same type and pollutant (*e.g.,* high wind dust/ PM or wildfire/O_3) that recur every year, either seasonally or throughout the year.

[24] Prescribed fire may include, but is not limited to, broadcast burns, underburns, and pile burns.

[25] For example, an area's natural fire return interval may be a strong indicator of the fire frequency necessary to maintain a sustainable and resilient wildland ecosystem. However, the prescribed burn frequency necessary to allow certain native plants and animal species to establish themselves, as analyzed in a multi-year land or resource management plan, may be more frequent than the natural fire return interval. In this context, an air agency could describe the natural fire return interval and how it relates to the necessary burn frequency, and then describe the specific reasons why more frequent burning is necessary.

[26] 81 FR 68216, 68233 (October 3, 2016).

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similarly counts events rather than each individual exceedance or violation associated with the same event for purposes of identifying areas that require an exceptional events mitigation plan.[27]

EPA evaluates exceptional events demonstrations using a "weight-of-evidence" approach.[28] In accordance with this approach, EPA will also evaluate whether a prescribed fire satisfies the human activity unlikely to recur criterion based on the weight of evidence.

Air agencies should consult with their EPA Regional office regarding how to characterize a "particular location" for purposes of addressing the 'human activity unlikely to recur at a particular location' criterion. Ultimately, EPA will determine the bounds for "a particular location."[29] In the context of prescribed fire and its associated emissions, the boundaries of "a particular location" for purposes of recurrence, if not already clearly defined by the documented fire perimeter, will likely be influenced by landscape, ecosystem, and fuel loading characteristics.

A.4.2 Describing the Actual Frequency with Which a Prescribed Fire Was Conducted

Every demonstration must describe the actual frequency with which the prescribed fire was conducted. This description typically includes the following information: (1) geographical parameters of the fire, including latitude/longitude and physical description of the area(s) burned; (2) date of the burn(s) that is the subject of the demonstration; (3) the dates of past burns in the same area; (4) time of initial ignition; (5) approximate time of end of burn; (6) total acres burned; and (7) a description of dominant fuel type burned. EPA encourages regular communication between air agencies and land managers to facilitate sharing of this information. Typical resources for this information include:

- A copy of the burn plan and/or burn permit under which the prescribed fire program was conducted, including documentation that the plan was implemented for the prescribed fire(s) in question.
- A copy of the post-burn review or report from the burn manager.
- Additional forms of evidence in consultation with EPA Regional Offices.

On days when meteorology is conducive for conducting prescribed burns, many separate (and, ideally, coordinated) fires may be started over a wide area. In such scenarios, a demonstration may also include daily satellite overpasses to estimate the number of acres burned on a daily, multiple day, or weekly timeframe. The usefulness of this type of analysis depends on meteorological conditions during the satellite overpass time. Such evidence may be appropriate based on consultation with EPA Regional offices.

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[27] *See* 40 CFR 51.930 for information about mitigation plan requirements under the 2016 Exceptional Events Rule.
[28] EPA will consider all relevant evidence and qualitatively ''weigh'' this evidence based on its relevance to the Exceptional Events Rule criterion being addressed, the degree of certainty, its persuasiveness, and other considerations appropriate to the individual pollutant and the nature and type of event. *See id.* at 68230.
[29] *Id.* at 68272.

A.4.3 Addressing Recurrence by Relying on the Natural Fire Return Interval

An assessment of whether the prescribed fire meets the "unlikely to recur" criterion based on an area's natural fire return interval should include (1) a review of the number of years between successive naturally occurring fires for a given vegetation type and (2) a review showing that the actual frequency by which the prescribed fires were conducted matches the natural fire return interval.

Multi-year land or resource management plans prepared by the land management agency or any private property owner generally include documentation of these established fire intervals and possibly broad targets for prescribed fire frequency. A demonstration should include the interval language from the plan, if applicable. EPA is not defining a specific form for multi-year land management plans and recognizes the natural fire return interval information may be contained in a number of different documents (*e.g.*, scientific literature).

While EPA will generally defer to the interval described in these plans, the actual burn frequency is not required to match the described interval exactly to satisfy human activity unlikely to recur criterion. Natural fire return intervals may vary based on specific conditions and circumstances in each area. The natural fire return interval may also be different from the recent frequency of wildfire. On a case-by-case basis, natural fire return interval information may also be established from scientific literature or scientific studies based on modeling or longer-term historical analyses outside of human records (*e.g.*, geological indicators).

An example of a multi-year land or resource management plan is the "Range-wide Conservation Plan for Longleaf Pine"[30] (Longleaf Conservation Plan). Longleaf pine ecosystems have historically covered over 90 million acres in the Southeastern United States Coastal Plains, but have been reduced to less than three percent of their original area. The Longleaf Conservation Plan indicates that frequent prescribed fire is essential to achieving the goal of restoring 5 million acres of longleaf pine ecosystems by 2025. According to the Longleaf Conservation Plan, a study of fire regimes in southern forests conducted by the U.S. Forest Service found that the historical natural fire return interval for longleaf pine ecosystems is one to four years.[31] References to this type of information may be helpful for addressing the natural fire return interval criterion.

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[30] America's Longleaf, A Restoration Initiative for the Southern Longleaf Pine Forest, "Range-wide Conservation Plan for Longleaf Pine," March 19, 2009, available at *http://www.americaslongleaf.org/media/86/conservation_plan.pdf*.

[31] *See* Table 25.1 on page 611 of: Stanturf, J.A.; Wade, D.D.; Waldrop, T.A.; Kennard, D.K.; Achtemeier, G.L. 2002. Background paper: fire in southern forest landscapes. In: Wear, D.N.; Greis, J.G. Southern forest resource assessment. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 607-622.

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A.4.4 Addressing Recurrence by Relying on the Prescribed Fire Frequency Needed to Establish, Restore and/or Maintain a Sustainable and Resilient Wildland Ecosystem

Fire recurrence may also be addressed by identifying the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species. EPA acknowledges that, in some cases, land managers may deviate from the general targets in a multi-year plan due to unexpected differences between planned and actual fire behavior, landscape or ecosystem characteristics, fuel loading patterns and weather patterns.[32] EPA therefore intends to compare the actual frequency of prescribed fires on the land with the pattern described in the applicable multi-year plan in a general way rather than as a precise schedule.

If the air agency intends to satisfy this criterion by referencing the fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland[33] ecosystem and/or to preserve endangered or threatened species, the demonstration typically should include the following information (in addition to the information specified in Section 4.2) from the area's multi-year land or resource management plan:

- A description of the plant and/or animal life that the fire will impact.
- An analysis of the intended impacts of prescribed fire in the area, emphasizing biological diversity and wildlife habitat.

On a case-by-case basis, in the absence of a multi-year land or resource management plan, an air agency may also show the necessary prescribed fire frequency based on scientific literature. When preparing its demonstration, the air agency should discuss this literature review with its EPA Regional office.

The Longleaf Conservation Plan discussed in Section 4.3 also serves as an example for addressing recurrence by relying on the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem. The plan indicates that periodic fire is critical for creating and maintaining an environment where longleaf pine ecosystems can thrive and provide valuable habitat for threatened and endangered species, including the red-cockaded woodpecker and gopher tortoise. Additional scientific literature supports the need for frequent prescribed fire for restoring and maintaining longleaf pine ecosystems.[34] A fire return frequency of one to four years is needed for a healthy longleaf ecosystem.[19]

A.4.5 Example Conclusion Statement

Including a conclusion statement similar to the language below is helpful to demonstrate that the prescribed fire on wildland satisfied the human activity unlikely to recur at a particular location criterion.

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[32] 81 FR 68216, 68252 (October 3, 2016).
[33] Wildland can encompass many vegetation types such as forestland, shrubland, grassland, and wetlands.
[34] Forest Encyclopedia Network, "Managing Longleaf Pine with Prescribed Fire" *http://www.forestencyclopedia.net/p/p227*.

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"Based on the documentation provided in [Section X] of this submittal, the prescribed fire event satisfied the human activity unlikely to recur at a particular location criterion by describing the actual frequency with which a burn was conducted and showed how this burn frequency [Pick one: mimics the natural fire return interval OR follows the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem contained in a multi-year land or resource management plan with a stated objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire]. Specifically, the demonstration described the burn frequency as being [every 3 years…]. The land management plan [identify the specific plan name] indicates that the [natural OR necessary] fire return interval is 3-5 years."

Where appropriate, the conclusion statement should clarify whether appropriate burn frequencies vary within the ecosystem. For example, for a "natural ecosystem" where the encroachment of vegetation that harms the ecosystem is greater along the perimeter, submitter might say that to maintain the "natural, historic" ecosystem you need annual burning along the perimeter (defined as X miles/acres) and burning every 2-3 years in the interior.

A.5 Addressing the Not Reasonably Controllable or Preventable Criterion

A.5.1 Overview and Exceptional Events Rule Provisions

According to the CAA and the Exceptional Events Rule, an exceptional event must be "not reasonably controllable or preventable." The final rule clarifies that EPA interprets this requirement to contain two prongs: the event must be both (1) not reasonably controllable and (2) not reasonably preventable at the time the event occurred.[35]

A.5.2 Addressing the "Not Reasonably Controllable" Prong

A demonstration satisfies the controllability prong based on the manner by which the fire was conducted. The controllability prong of the not reasonably controllable or preventable criterion can be satisfied if (1) the prescribed fire was conducted under an adopted and implemented certified SMP, or (2) the prescribed fire was conducted with appropriate BSMP.[36] The state must either certify to the Administrator that it has adopted and is implementing an SMP *or* the state must demonstrate that the burn manager employed appropriate BSMPs. *See* table 1 to 40 CFR 50.14.[37]

Notably, air agencies do not need to provide a case-specific justification to support the "not reasonably controllable or preventable" criterion for emissions-generating activity that occurs outside of the State's jurisdictional boundaries within which the concentration at issue was monitored. *See* 40 CFR 50.14(b)(8)(vii).

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[35] *See* 40 CFR 50.14(c)(3)(D) and 81 FR 68216, 68235.
[36] *See* 40 CFR 50.14(a)(3)(ii)(A).
[37] *Id.*

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Demonstrating the Controllability Prong by Implementing a Smoke Management Program (SMP)

EPA has previously explained that SMPs establish a basic framework of procedures for managing smoke from prescribed fires and are typically developed by air agencies in collaboration with wildland owners/managers. SMPs are intended to foster stakeholder cooperation and responsible management of smoke from prescribed fire with the goal of minimizing negative impacts on public health and welfare.

If an air agency demonstration relies on an SMP to address the "not reasonably controllable" prong of the "not reasonably controllable or preventable" criterion, the air agency must certify the SMP before the date of the event. Because EPA does not approve or disapprove SMPs for purposes of exceptional events, the air agency, rather than EPA, certifies the SMP. "Certification" requires that a responsible state or delegated local agency certify in a letter to the EPA Administrator, or an EPA Regional Administrator, that it has adopted and is implementing an SMP.[38] Past certifications provided to EPA through this process are sufficient to meet the "certified" SMP language in the Exceptional Events Rule. SMPs that have been incorporated into a SIP and were implemented at the time of the event are another example of "certified" SMPs for the purposes of an exceptional events demonstration.[39]

An air agency with a current SMP that has not already been certified through one of the ways described above could pursue certification.[40] EPA anticipates that any person within an air agency responsible for submitting exceptional events demonstrations or SIP revisions could also be responsible for certifying an SMP.[41]

States with SMPs typically have robust communications between officials who manage air quality impacts and land managers who conduct prescribed fires. These groups communicate during the development of the SMP, during the day-to-day burn authorization process, and in the periodic review and potential revision of the SMP. EPA encourages these groups to also communicate with their EPA Regional offices to ensure that the SMP addresses prescribed fire in a manner that satisfies Exceptional Events Rule criteria. EPA also encourages SMPs to be updated periodically to reflect the current state of science and technology.

EPA recommends that a certified SMP that addresses prescribed fire on wildland for the purpose of satisfying Exceptional Events Rule criteria include the following six components, which are provided as guidance in the preamble to the 2016 Exceptional Events Rule:

1. *Authorization to burn:*[42] Includes a process for authorizing or granting approval to manage prescribed fires on wildland within a region, state or on tribal lands and identifies

[38] *See* 50 CFR 50.14(b)(3)(ii)(A) and 81 FR 68216, 68252 (October 3, 2016).
[39] *See* 81 FR at 68252.
[40] *Id.* at 68251.
[41] *See* 81 FR at 68252 n.74.
[42] The authorization to burn element does not mean that a SMP must require permits for prescribed fire to satisfy the not reasonably controllable or preventable criterion. We have clarified that while this component must include a

a central authority responsible for implementing the program. The authorization process could, but is not required to, include burn permits or other forms of instruction for conducting burns that consider air quality and the ability of the airshed to disperse emissions.

2. *Minimizing air pollutant emissions*: Encourages wildland owners/managers to consider and evaluate alternative treatments to fire, but if fire is the selected approach to follow appropriate emission reduction techniques.
3. *Smoke management components of burn plans*: If the smoke management program requires burn plans, then the burn plan should include the following components: Actions to minimize fire emissions, approaches to evaluate smoke dispersion, public notification and exposure reduction procedures, and air quality monitoring.
4. *Public education and awareness*: Establishes the criteria for issuing health advisories when necessary and procedures for notifying potentially affected populations.
5. *Surveillance and enforcement*: Includes procedures to ensure compliance with the terms of the SMP.
6. *Program evaluation*: Provides for periodic review by interested stakeholders of the SMP effectiveness and program revision as necessary. A review of effectiveness should consider the role of prescribed fire in meeting the goals in a multi-year land or resource management plan with a stated objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species. Effectiveness reviews should also consider air quality impacts as well as any received post-burn reports, which may describe implemented contingency plans due to smoke impacts or use of BSMP and recommendations for future improvements. SMP procedures for reevaluation should address a frequency of review (*e.g.,* every 3 to 5 years, or as needed); participants in the review process (*e.g.,* original program developers to include land owners/ managers, air quality managers, the public, etc.); and program objectives over the review period (*e.g.,* acres burned, anticipated/desired future acres burned, needed modifications). [43]

If prescribed fires on private land contribute to an exceedance in an exceptional events demonstration, and the air agency submitting a demonstration is relying on a certified SMP to satisfy the not reasonably controllable prong, then the SMP should address fires on privately-owned lands.

The demonstration can be supported by including the SMP itself or a reference to a website containing the SMP with adequate information to ensure that EPA and the public can access the SMP. The demonstration should also include a letter from the responsible state, tribe, or

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process for authorizing or granting approval for fires with resource benefits, this authorization process may or may not include burn-specific permits. For example, the authorization could be day-by-day and apply to all burners, or to burners in defined areas, with no transaction between the implementing agency and particular burner other than to convey this general information. *See* Responses to Significant Comments on the 2015 Proposed Rule Revisions to the Treatment of Data Influenced by Exceptional Events, page 73 (September 2016), Docket Number EPA-HQ-OAR-2013-0572. Available at *https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_rtc_09132016_final.pdf.*

[43] 81 FR 68216, 68252 (October 3, 2016).

delegated local agency certifying that it has adopted and is implementing the SMP.[44] Additionally, EPA recommends that the demonstration include a copy of the burn plan and post-burn report, if available.

SMPs may also meet some or all requirements for an exceptional events mitigation plan. For areas that may be required to develop a mitigation plan, they can leverage existing requirements from an SMP towards meeting the obligations of a mitigation plan. If an exceptional event triggers a mitigation plan requirement, air agencies may wish to consult with FLMs and/or other entities familiar with the SMP and should engage with their EPA Regional office to determine whether existing programs meet mitigation requirements.

Demonstrating the Controllability Prong by Relying on Basic Smoke Management Practices (BSMP)

If the air agency has not implemented an SMP that would address the not reasonably controllable prong, or it does not wish to rely on the SMP in the demonstration, it may instead satisfy this criterion by providing evidence as described below that the burn manager[45] employed appropriate BSMP.[46]

The Exceptional Events Rule requires interagency collaboration for air agencies employing BSMP to satisfy the not reasonably controllable criterion.[47] If the air agency anticipates satisfying this rule criterion by documenting the implementation of BSMP, then the air agency, FLMs, and other entities as appropriate, must periodically collaborate with burn managers operating within the jurisdiction of the state or tribe to discuss and document the process by which air agencies and land managers will work together to protect public health and manage air quality impacts during the conduct of prescribed fires on wildland.[48] While EPA is not defining the full scope of these discussions or the mechanism by which they are conducted or documented, they must include outreach and education regarding general expectations for the selection and application of appropriate BSMP and goals for advancing strategies and increasing adoption and communication of the benefits of appropriate BSMP. This mechanism could be

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[44] Examples of certified SMPs include programs for the state of Georgia at *https://epd.georgia.gov/air/sites/epd.georgia.gov.air/files/related_files/document/SMPMOU.pdf*, and for the state of Florida at *http://www.freshfromflorida.com/content/download/35388/831285/Florida's_Certified_Smoke_Management_Plan_2014.pdf*.

[45] The terms "burn manager" or "fire manager" mean the party responsible for supervising a prescribed fire from ignition through fire extinguishing and cleanup, or another party in the same organization who represents, supervises or is supervised by said party and can be a communications pathway to and from such person. Many agencies have their own definition of or terminology for a burn manager, some of which include certification requirements. We are deferring and relying on states to use the appropriate terminology. *See* Responses to Significant Comments on the 2015 Proposed Rule Revisions to the Treatment of Data Influenced by Exceptional Events, page 72 (September 2016), Docket Number EPA-HQ-OAR-2013-0572. Available at *https://www.epa.gov/sites/production/files/2016-09/documents/exceptional_events_rtc_09132016_final.pdf*.

[46] 40 CFR 50.14(b)(3)(ii)(A).

[47] 40 CFR 50.14(b)(3)(ii)(B)(1).

[48] 40 CFR 50.14(b)(3)(ii)(B).

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formal, such as a Memorandum of Understanding or an Interagency Agreement, or it could be a more informal letter of agreement or other documentation.[49]

The Exceptional Events Rule provided an initial implementation period (*e.g.*, 2 years from the effective date of the 2016 Exceptional Events Rule) for this collaboration to allow air agencies and land managers to develop and incorporate the collaboration process into operational management. Event demonstrations submitted on or before September 30, 2018, were not subject to the collaboration requirement. Event demonstrations submitted after September 30, 2018, are subject to the collaboration requirements, and thus FLMs and burn managers must have discussed and documented a process that includes outreach and education regarding general expectations for the selection and application of appropriate BSMP and goals for advancing strategies and increasing adoption and communication of the benefits of appropriate BSMP.[50] Under the rule, EPA cannot concur with a demonstration for prescribed fire that submitted after September 30, 2018, that relies on BSMP until this collaboration has been conducted and documented. The collaboration may take place after an event in a demonstration takes place, but must take place before EPA will concur on the demonstration (assuming it satisfies all other Exceptional Events Rule criteria). EPA does not require that collaboration results in a prescriptive list of every BSMP that must be applied to comply with the Exceptional Events rule. Rather, these collaborations serve as a mechanism to ensure air agencies and federals are working together to implement the Exceptional Events Rule.

As discussed in the preamble to the final rule, EPA does not expect the collaborative discussions on BSMP to occur prior to each prescribed fire on wildland. Furthermore, goals for applicability should remain flexible to allow for onsite variation and site-specific conditions that can be variable on the day of the prescribed fire.[51] EPA also does not expect air agencies to create new processes for engaging with burn managers where such processes already exist. Where air agencies have an existing, documented process or program under which air agencies, federal land managers, state fire agencies and other entities engage with burn managers regarding the protection of public health and air quality and general expectations for the selection, application and benefits of appropriate BSMP, they may rely upon and reference this process or program when addressing the not reasonably controllable or preventable criterion for an exceptional events demonstration for a prescribed fire.[52]

EPA identified generally appropriate BSMP in Table 1 at 40 CFR § 50.14 in the 2016 Exceptional Events Rule.[53] This table, which is reproduced below as Table 2 in this addendum, is not intended to be all-inclusive. Burn managers and air agencies have flexibility and discretion to consider other appropriate BSMP as they become available due to technological advancement or programmatic refinement.[54] As part of an exceptional events demonstration, the air agency must document that the BSMPs were implemented for the fire(s) that are the subjects of the demonstration. This documentation may be available in a burn plan or post-burn report.

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[49] 81 FR 68216, 68254 (October 3, 2016).
[50] 40 CFR 50.14(b)(3) and 81 FR 68216, 68254.
[51] 81 FR 68216, 68254.
[52] *Id.*
[53] *Id.* at 68252.
[54] *Id.*

Neither this prescribed fire addendum to the *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations* nor the Exceptional Events Rule is intended to limit the type of practices that may constitute BSMP.

If a prescribed fire occurs and exceeds or violates a NAAQS and becomes the subject of an exceptional events demonstration, the air agency that employed the BSMP must participate in a "lessons learned" review of the event, and examine why an exceedance or violation occurred in spite of the use of BSMP.[55] The air agency and the burn manager must conduct a retrospective review of the prescribed fire event and the employed BSMP to ensure the protection of air quality and public health and progress towards restoring and/or maintaining a sustainable and resilient wildland ecosystem. Either the air agency or the burn manager could initiate such a retrospective review. If the prescribed fire becomes the subject of an exceptional events demonstration, the demonstration must include documentation of the post-burn review before EPA will concur with a demonstration.[56]

Table 2: Summary of Basic Smoke Management Practices, Benefit Achieved with the BSMP, and When It Is Applied[a]

Basic Smoke Management Practice [b]	Benefit achieved with the BSMP	When the BSMP is applied—before/during/after the burn
Evaluate Smoke Dispersion Conditions	Minimize smoke impacts	Before, During, After.
Monitor Effects on Air Quality	Be aware of where the smoke is going and degree it impacts air quality.	Before, During, After.
Record-Keeping/Maintain a Burn/Smoke Journal.	Retain information about the weather, burn and smoke. If air quality problems occur, documentation helps analyze and address air regulatory issues	Before, During, After.
Communication—Public Notification	Notify neighbors and those potentially impacted by smoke, especially sensitive receptors.	Before, During.
Consider Emission Reduction Techniques	Reducing emissions through mechanisms such as reducing fuel loading can reduce downwind impacts.	Before, During, After.
Share the Airshed—Coordination of Area Burning.	Coordinate multiple burns in the area to manage exposure of the public to smoke.	Before, During, After.

[a] EPA believes that elements of these BSMP could also be practical and beneficial to apply to wildfires for areas likely to experience recurring wildfires.
[b] The list of BSMP in this table is not intended to be all-inclusive. Not all BSMP are appropriate for all burns. Goals for applicability should retain flexibility to allow for onsite variation and site-specific conditions that can be variable on the day of the burn. Burn managers can consider other appropriate BSMP as they become available due to technological advancement or programmatic refinement.

If an air agency is supporting its demonstration that the prescribed fire was not reasonably controllable through a showing that the burn manager employed appropriate BSMP, the demonstration should provide evidence of interagency collaboration. Additionally, the demonstration must include documentation of a post-burn review.[57] The demonstration must also include documentation that appropriate BSMP were employed during the event. The air agency

[55] *See* 40 CFR 50.14(b)(3)(ii).
[56] 81 FR 68216, 68254 (October 3, 2016).
[57] *Id.* at 68254 and 40 CFR 50.14(b)(3)(ii)(A).

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may rely on a statement or other documentation provided by the burn manager that he or she employed BSMP. Burn plans and post-burn reports are two examples of documentation that air agencies can use in their exceptional events demonstrations for prescribed fires to show the implementation of BSMP. Table 3 provides examples of elements that may be included in burn plans and post-burn reports.

Table 3: Elements that May Be Included in Burn Plans and Post-Burn Reports for Prescribed Fires Submitted as Exceptional Events[58]

Element	Burn plan	Post-Burn report
Fire Name [a]	Include	Include
Permit number (if appropriate)	Include	Include.
Latitude/longitude and physical description	Include	Include.
Date of burn, ignition time and completion time (duration of burn)	Include	Include
AQI status on burn day, if available (both in the vicinity of the fire and in the affected upwind area)	Predicted	Actual
Acres burned	Planned	Actual (blackened)
Description of fuel loading	Estimated	Actual (tons consumed)
Meteorological data (weather conditions, wind speed and direction, dispersion)	Predicted conditions (including predicted dispersion).	Actual conditions (including actual dispersion)
Smoke Impacts	Anticipated smoke impacts	Observed or reported smoke impacts (include nature, duration, spatial extent and copies of received complaints)
BSMP actions to reduce impacts	Expected BSMP actions	Actual BSMP actions
Recommendations for future burns in similar areas		Include
Analytics (modeled/actual fire spread, satellite imagery and analysis, webcam/video, PM/O_3 concentrations over the course of the fire)		Include

[a] The "Fire Name" should be unique and referenced, to the greatest extent possible, in all exceptional events-related documentation, including the event name in AQS. The fire name could simply consist of the county, state and date in which the burn occurred (*e.g.,* County X, State Y Prescribed Fire on Date Z) if no other name has been assigned.

A.5.3 Addressing the "Not Reasonably Preventable" Prong

A demonstration can satisfy the not reasonably preventable prong by describing the benefits that would have been foregone if the fire were not conducted.[59] To provide this information, the air agency can rely on a multi-year land or resource management plan for a wildland area with a

[58] *See* 81 FR at 68253, Table 4.
[59] *Id.* at 68256.

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stated objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire.[60] The "foregone benefits" are those objectives in a multi-year plan that establish, restore and/or maintain a sustainable and resilient wildland ecosystem. Air agencies can either include a copy of the plan or an internet link to the plan in the demonstration with adequate information to ensure EPA and the public can access the plan.[61] This documentation may be similar to evidence supporting that the prescribed fire was human activity unlikely to recur. Thus, a demonstration can cite to where this information was already identified.

If a prescribed fire on private land causes or contributes to an exceedance or violation, an exceptional events demonstration may rely on a multi-year land or resource management plan that addresses the specific privately-owned lands. As noted previously, on a case-by-case basis, in the absence of a multi-year plan, the EPA would also consider a prescribed fire on wildland conducted on a fire return interval established according to scientific literature to satisfy the not reasonably controllable or preventable criterion provided the prescribed fire was also conducted with the objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and conducted in compliance with either a state-certified SMP or BSMP.

For example, the Longleaf Conservation Plan discussed in Section A.4.4 above also serves as an example for addressing the "not reasonably preventable" rule criterion. The plan indicates that periodic fire is critical for creating and maintaining an environment where longleaf pine ecosystems can thrive and provide valuable habitat for threatened and endangered species, including the red-cockaded woodpecker and gopher tortoise. According to the plan, additional scientific literature supports the need for frequent prescribed fire for restoring and maintaining longleaf pine ecosystems.[62] In this instance, prescribed burns performed for restoring or maintaining longleaf pine ecosystems may reference the appropriate portions of the Longleaf Conservation Plan to address this rule criterion.

A.5.4 Example Conclusion Statement

A conclusion statement similar to the language below is helpful to demonstrate that the prescribed fire on wildland satisfied the not reasonably controllable or preventable criterion.

"Based on the documentation provided in [Section X] of this submittal, the prescribed fire event satisfied the not reasonably controllable or preventable criterion. The event was not reasonably controllable because it was [conducted under a certified and implemented Smoke Management Program / the burn manager employed appropriate basic smoke management practices]. The event was not reasonably preventable because the prescribed fire was necessary to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire, as evidenced by [multi-year land or resource management plan contained in Section (X) / scientific literature contained in Section (X)]."

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[60] 40 CFR 50.14(b)(ii)(C).
[61] 81 FR at 68250.
[62] Forest Encyclopedia Network, "Managing Longleaf Pine with Prescribed Fire" http://www.forestencyclopedia.net/p/p227.

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A.6 Air Agency's Public Comment Process

A.6.1 Overview and Exceptional Events Rule Provisions

According to 40 CFR 50.14(c)(3)(v), air agencies must "[d]ocument [in their exceptional events demonstration] that the [air agency] followed the public comment process and that the comment period was open for a minimum of 30 days…." Further, air agencies must submit any received public comments to EPA and address in their submission those comments disputing or contradicting the factual evidence in the demonstration. Air agencies with recurring events may also be subject to the mitigation requirements at 40 CFR 51.930. Air agencies subject to these requirements have additional obligations including preparation of a mitigation plan which must provide for public notification and education.[63]

A.6.2 Examples of Supporting Documentation

Air agencies typically include in their exceptional events demonstration the details of the public comment process including newspaper listings, website postings, and/or places (library, agency office) where the hardcopy was available.

A.6.3 Example Conclusion Statement

In addition to the supporting information suggested in Section 6.2, a conclusion statement similar to the language below is helpful to demonstrate that the air agency followed the public comment process.

"The [air agency] posted notice of this exceptional events demonstration on [date posted] in the following counties/locations: [list counties affected and locations posted]. [Number] public comments were received and have been included in [Section X] of the demonstration, along with [air agency's] responses to these comments."

A.7 Key Messages

EPA recognizes the limited resources of the air agencies that prepare and submit exceptional events demonstrations and of the EPA Regional offices that review these demonstrations. Prior to submitting a demonstration, the initial notification process is intended to promote early and frequent communication between air agencies and EPA Regional offices when air agencies first begin to consider developing an exceptional events demonstration. During the initial notification process, EPA expects to discuss potential event-influenced monitored concentrations with an affected air agency prior to the air agency (and/or FLM, with air agency concurrence) preparing and submitting a demonstration. For prescribed fire events, this "initial notification" is expected to focus, in part, on whether the event is human activity unlikely to recur and is not reasonably controllable or preventable, based on the specific manner these provisions are applied to prescribed fire.

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[63] *See* 40 CFR 51.930(b).

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During the initial notification process, EPA and the air agency will also begin discussions regarding the appropriate analyses and approach to use for evidence in support of the clear causal relationship between the event and the exceedance or violation. For prescribed fire, the types of analyses used to establish a clear causal relationship will be the same as those described in the *Wildfire Ozone Guidance*, and the same types of analyses appropriate for O_3 can also generally be used for PM.

For prescribed fire events on wildland, the human activity unlikely to recur at a particular location criterion is demonstrated by comparing the actual frequency with which a burn was conducted with an assessment of the natural fire return interval or the prescribed fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem contained in a multi-year land or resource management plan with a stated objective to establish, restore and/or maintain a sustainable and resilient wildland ecosystem and/or to preserve endangered or threatened species through a program of prescribed fire.

The not reasonably controllable or preventable criterion for demonstrations involving prescribed fires on wildland is demonstrated based on evidence indicating (1) the prescribed fire was conducted under an adopted and implemented certified SMP, or (2) the prescribed fire was conducted with appropriate BSMP, as well as an analysis of the benefits that would have been foregone if the fire had not been conducted.

One of EPA's goals in developing this document is to establish clear expectations to enable agencies to better manage resources as they prepare the documentation required under the 2016 Exceptional Events Rule and to avoid the preparation and submission of extraneous information. Submitters should prepare and submit the appropriate level of supporting documentation, which will vary on a case-by-case basis depending on the nature and severity of the event, as appropriate under a weight-of-evidence approach.

The 2016 Exceptional Events Rule includes mechanisms to facilitate collaboration with air agencies (and between air agencies, FLMs, and other relevant entities and officials) to ensure that exceptional events demonstrations satisfy the rule criteria and support the regulatory determination(s) for which they are significant. This document is intended to help air agencies determine the appropriate kind of information and analyses to include in a demonstration considering the weight-of-evidence approach.

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