ENCLOSURE: TECHNICAL SUPPORT DOCUMENT FOR EPA NONCONCURRENCE ON O_3 EXCEEDANCES MEASURED IN CLARK COUNTY, NEVADA ON JUNE 19-20, 2018 AS AN EXCEPTIONAL EVENT

On July 1, 2021, Clark County Department of Environment and Sustainability (CCDES) submitted an exceptional event demonstration for exceedances of the 2015 8-hour ozone (O_3) National Ambient Air Quality Standards (NAAQS) of 0.070 parts per million (ppm) that occurred at the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites on June 19-20, 2018.[1] The demonstration submitted by CCDES stated that the exceedances measured on June 19-20, 2018 were caused by multiple wildfires, including the Planada Fire in central California and the Upper Colony Fire in Smith Valley, Nevada.[2] Under the Exceptional Events Rule, air agencies can request the exclusion of event-influenced data, and the EPA can agree to exclude these data, from the data set used for certain regulatory decisions only if the EPA determines that the agencies have demonstrated that the event meets the rule criteria and requirements.

As described further in this document, EPA has concluded that this event does not meet the requirements in the Exceptional Events Rule because the demonstration has not sufficiently shown a clear causal relationship between the specific event and the monitored exceedances. This conclusion was based on review of the extensive evidence presented in the demonstration, including meteorological information, fire emission information, trajectory analysis, smoke modeling data, ground level monitoring data, and statistical modeling analysis. The data and analyses presented in the demonstration, though extensive, do not support that wildfire emissions were transported to the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites and impacted air quality so as to cause exceedances of the NAAQS. In addition, the evidence presented in the demonstration does not adequately support that the event was not reasonably controllable or preventable and that the event was a natural event, as insufficient information was provided to verify that the fires in question meet the definition of wildfires on wildland in the Exceptional Events Rule. As a result, the EPA is nonconcurring on this exceptional event demonstration.

The remainder of this document summarizes the Exceptional Events Rule requirements, the event that is the subject of the submitted demonstration, the EPA's review process, and the bases for the EPA's determinations regarding the event.

EXCEPTIONAL EVENTS RULE REQUIREMENTS

The EPA promulgated the Exceptional Events Rule in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) Section 319. In 2016, the 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. The EPA reviews the information

[1] "Exceptional Event Demonstration for Ozone Exceedances in Clark County, Nevada – June 19-20, 2018," (July 2021) ("demonstration").
[2] See demonstration, p. 1-1.

and analyses in the air agency's demonstration package using a weight of evidence approach and decides to concur or not concur. The demonstration must satisfy all of the Exceptional Events Rule criteria for the EPA to concur with excluding the air quality data from regulatory decisions. If any one of the criteria are not met, the EPA will nonconcur with the demonstration.

Under 40 CFR §50.14(c)(3)(iv), the air agency demonstration to justify exclusion of data 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 requirement (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."[3]

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 the 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 relevant mitigation requirements as described in 40 CFR §51.930.

For data influenced by exceptional events to be excluded from use 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).

[3] 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."

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 the 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 the EPA's review.

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, the 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

The 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, the 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.[4] This tiered approach recognizes that some wildfire events may be more clear and/or extreme and, therefore, require relatively less evidence to satisfy the rule requirements. 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.

[4] "Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations" (September 2016) ("wildfire O_3 guidance document").

- 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 parts per billion (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. If both key factors are met, then a Tier 2 demonstration will likely be sufficient.
    - *Key Factor 1*: fire emissions and distance of fire(s) to affected monitoring site location(s). Calculated fire emissions of nitrogen oxides (NO_x) and reactive-volatile organic compounds (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 ($Q/D \geq 100$ 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 99th or higher percentile of the five-year distribution of O_3 monitoring data, OR
        - is one of the four highest O_3 concentrations within one 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 evidence 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.[5]

Natural Event

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, the EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element. The EPA will address wildfires on other lands on a case-by-case basis.

EPA REVIEW OF EXCEPTIONAL EVENTS DEMONSTRATION

On November 30, 2020, CCDES submitted an Initial Notification of a potential Exceptional Event for numerous exceedances of the 2015 8-hour O_3 NAAQS that occurred at monitoring sites within Clark County, Nevada during 2018 and 2020.[6] On July 1, 2021, CCDES submitted an exceptional event demonstration for seven exceedances of the 2015 8-hour O_3 NAAQS that occurred at the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites within Clark County, Nevada on June 19-20, 2018.[7]

Regulatory Significance

The EPA determined that data exclusion of some of the exceedances referenced in the Initial Notification may have a regulatory significance for an attainment date extension or determination of attainment by the Marginal area attainment date for the Las Vegas nonattainment area (NAA) for the 2015 8-hour O_3 NAAQS and worked with CCDES to identify the relevant exceedances and monitoring sites affected.[8] Table 1 summarizes the exceedances that CCDES included in the demonstration.

Table 1: 2015 8-hour O_3 NAAQS Exceedance Summary

Exceedance Date	Monitoring Site Name	AQS ID	2015 8-hour Avg. (ppm)
June 19, 2018	Paul Meyer	32-003-0043	0.072
June 19, 2018	Walter Johnson	32-003-0071	0.072

[5] 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."

[6] See email from Araceli Pruett, CCDES, to multiple staff at EPA Region 9, dated November 30, 2020. Note that the Jerome Mack site was not explicitly listed in the initial notification of the event; however, the site was included in the final demonstration submission and is addressed in this TSD accordingly.

[7] See letter from Marci Henson, CCDES, to Elizabeth Adams, EPA Region 9, dated July 1, 2021.

[8] See letters from Elizabeth Adams, EPA Region 9, to Michael Sword, CCDES, dated January 26, 2021, and to Marci Henson, CCDES, dated April 26, 2021 and May 4, 2021.

Exceedance Date	Monitoring Site Name	AQS ID	2015 8-hour Avg. (ppm)
June 19, 2018	Green Valley	32-003-0298	0.077
June 19, 2018	Jerome Mack	32-003-0540	0.075
June 20, 2018	Paul Meyer	32-003-0043	0.071
June 20, 2018	Walter Johnson	32-003-0071	0.074
June 20, 2018	Joe Neal	32-003-0075	0.072

Narrative Conceptual Model

The demonstration submitted by CCDES provided a narrative conceptual model in Section 3.0 "Event Summary and Conceptual Model" to describe how emissions caused by the Planada Fire in central California and the Upper Colony Fire in Smith Valley, Nevada caused the O_3 exceedances at the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites.[9] The narrative conceptual model included descriptions of the wildfire event, smoke forecasts based on the meteorology and burn conditions, and description of the meteorology data near the affected monitors. The demonstration also provided information on the characteristics of the Las Vegas NAA and surrounding areas in Section 2.0, including descriptions of typical O_3 formation, the ambient O_3 monitoring network, meteorology, geography, topography, and seasonal O_3 variations.[10]

The demonstration described event-related characteristics and included a short summary of the conditions and factors that led to the Planada Fire in central California and the Upper Colony Fire in Smith Valley, Nevada, and the exceedances on July 19-20, 2018. In addition to the Upper Colony Fire and the Planada Fire, the demonstration also cited several smaller unnamed fires in California as contributing to the exceedances on these days.[11] The demonstration included a summary of events, noting that several wildfires broke out across California, Nevada and Arizona in mid-June, including the Planada and Upper Colony fires. The Planada Fire burned a total of 4,563 acres between June 15 and June 21; the Upper Colony Fire burned 1,202 acres between June 17 and June 22.[12] The demonstration included consistent references to these two larger fires while also including limited information on and references to other unspecified wildfires in California. The demonstration also included images showing National Oceanic Atmospheric Administration (NOAA) daily Hazard Mapping System (HMS) smoke contours on June 17-18.[13] The images show small smoke plumes emanating from the Upper Colony Fire on June 17 and the Planada Fire on June 18 that do not reach the Las Vegas Valley (LVV), along with a few other, smaller smoke plumes emanating from fires in California or Arizona; no HMS smoke contour figures were provided for the exceedance days. CCDES released an air quality advisory for high O_3 concentrations on June 20, 2018; the advisory did not attribute the high O_3 to wildfires, but rather to "current weather conditions that contribute to the formation of ground-level ozone in the Las Vegas Valley."[14]

[9] See demonstration, pp. 3-10 to 3-20.
[10] See demonstration, pp. 2-1 to 2-9.
[11] See demonstration, pp. 1-1, 3-11.
[12] See demonstration, pp. 3-11 to 3-12.
[13] See demonstration, p. 3-12.
[14] See demonstration, Appendix B: Public Notification, p. B-6.

The demonstration included synoptic and surface weather maps from June 15-20, 2018, along with plots showing surface weather conditions in the LVV, Skew-T diagrams, and surface wind speeds and direction.[15] The demonstration characterized the meteorology in the LVV on June 19 and 20 as consisting of high temperature, a lack of clouds, and light, variable winds, all of which are favorable to O_3 formation, including locally within the LVV.[16] This is consistent with data on surface weather shown in Figure 3-10, which indicates that daily high temperatures were increasingly warm on June 18-20 and weather was sunny with calm winds.[17] The demonstration noted that an upper-level high pressure system was moving from the Pacific Ocean towards the California coast during June 15-20, and asserted that the associated the westerly and northwesterly airflow transported smoke to southern and eastern Nevada. The demonstration further stated that a stationary front passing through central Nevada arrived in southern Nevada on June 18 and forced smoky air down to the surface.[18] The demonstration also presented graphs of hourly O_3 concentrations between June 15-20, 2018 at the Great Basin site in central-eastern Nevada and for the six O_3 monitors within the LVV.[19] The demonstration concluded that, "[a]s a result of stable weather dominance and the transport of ozone and ozone precursors from wildfires into the LVV, four monitors in Clark County on June 19, and three monitors on June 20, recorded exceedances" of the 2015 8-hour O_3 NAAQS.[20]

Overall, the demonstration contained the elements required for inclusion in the conceptual model portion of the exceptional events demonstration.

Table 2: Documentation of the Narrative Conceptual Model

Exceedance Date	**Demonstration Citation**	**Quality of Evidence**	**Criterion Met?**
June 19-20, 2018	Section 1: p. 1-1 Section 2: pp. 2-1 to 2-9 Section 3: pp. 3-10 to 3-20 Appendix B	Sufficient	Yes

Clear Causal Relationship

The demonstration included several analyses intended to support a clear causal relationship between the wildfire event and the monitored exceedances. These analyses are presented in Section 4.0 of the demonstration.

Comparison with historical concentrations

The demonstration included a comparison with historical concentrations, as required by 40 CFR §50.14(c)(3)(iv)(C). The demonstration compared the event-related O_3 concentrations for each monitor in question with the 95th and 99th percentile concentrations calculated using that monitor's 2014-2018 data.[21] The plots provided show that the daily maximum 8-hour O_3 concentrations on June 19-20, 2018 were below the five-year 99th percentile value for all exceeding monitors, except for the Green Valley monitor on June 19. At most sites,

[15] See demonstration, pp. 3-14 to 3-19.
[16] See demonstration, p. 3-13.
[17] See demonstration, p. 3-17.
[18] See demonstration, pp. 3-13, 3-20.
[19] See demonstration, pp. 3-16 to 3-17.
[20] See demonstration, p. 3-19.
[21] See demonstration, pp. 4-3 to 4-6.

concentrations recorded on June 19 and June 20 were equal to or above the 95th percentile value for the exceeding monitors, except for Walter Johnson on June 19 and Joe Neal on June 20, which were below the 95th percentile.

Tier 1: Key Factor

To meet the key factor for a Tier 1 analysis, exceedances should be clearly higher than other non-event related exceedances or occur during a time of year that typically experiences no exceedances. The event-related exceedances identified in this demonstration occurred during the regular O_3 season, during times when other exceedances similar in magnitude were measured.[22] Therefore, the exceedances do not meet the Tier 1 Key Factor and additional evidence beyond a Tier 1 analysis is needed to support the clear causal relationship.[23]

Tier 2: Key Factors

The demonstration included an evaluation of the Tier 2 Key Factors. For the Tier 2 Key Factor 1, the demonstration provided an analysis of fire emissions (Q) and distance (D) of the wildfires to the monitoring site locations.[24] The demonstration used CalFire and BlueSky Playground to calculate the emissions of NO_x and VOCs from the relevant fires. The demonstration evaluated Q as the sum of emissions over a two-day period, June 17-18, for the Upper Colony Fire, and as the sum of a three-day period, June 16-18, for the Planada Fire. The wildfire O_3 guidance document describes using a single day of emissions to calculate Q/D;[25] the demonstration did not include justification for including emissions from over a longer period of time. The total emissions of NO_x were 3.95 tons from the Upper Colony Fire and 154.54 tons from the Planada Fire; the total emissions of VOCs were 20.75 tons from the Upper Colony Fire and 903.59 tons from the Planada Fire. For comparison, the typical summer weekday emissions within Clark County are 98.03 tons of NO_x and 238.98 tons of VOCs.[26] The demonstration calculated a distance of approximately 483 km and 479 km from the center of the Las Vegas NAA to the Planada and Upper Colony fires, respectively.[27]

The demonstration also included calculations of Q/D for "other unnamed central/southern California fires."[28] The demonstration did not name or identify specific locations for these fires or otherwise provide specific, verifiable information regarding fire activity (e.g., acres burned, timing of fires). The analysis assumed each of these unnamed fires to be 100 km from the monitors "in order to obtain the maximum Q/d value for all other unnamed central/southern California fires." Nearly all of the unnamed central/southern California fires shown on the maps appear to be much more than 100 km from the LVV; [29] no data was provided to support the use of 100 km for all fires. The demonstration calculated emissions for these unnamed fires as the

[22] See demonstration, pp. 4-8 to 4-9.
[23] See demonstration, p. 4-8. The demonstration similarly concludes that the exceedances do not meet the Tier 1 Key Factor.
[24] See demonstration, p. 4-9.
[25] See wildfire O_3 guidance document, p. 17-21.
[26] See demonstration, p. 2-5.
[27] The demonstration calculated a single distance for all monitors in the area, rather than distances for each specific monitor, and stated specifically that Paul Meyer, Walter Johnson, and Green Valley are located near the center of the NAA and were located at approximately the distances specified (see demonstration, p. 4-9). The demonstration did not include analysis for the other exceeding monitors (Joe Neal and Jerome Mack). See demonstration, p. 2-2 for a map showing the location of the O_3 monitors. All monitors are within approximately 30 km of one another and therefore within approximately 30 km of the distances provided between the center of the NAA and the Upper Colony and Planada fires.
[28] See demonstration, p. 4-9.
[29] See demonstration, p. 3-12.

sum over a three-day period, June 16-18; again, no justification was provided to support use of multiple days of emissions. The total emissions of NO_x for these unnamed fires were 62.82 tons, while the total emission of VOCs were 331.49 tons. We note that the NO_x and VOC emissions total across three days for all of the unnamed central/southern California fires are less than half (around 40%) of those predicted for the Planada Fire.

Using these values, the demonstration presented an aggregated value for Q/D of 6.2 tpd/km for the Planada and Upper Colony fires and the "other unnamed central/southern California fires" over multiple days. The approach used in the demonstration overestimates the true Q/D since the approach aggregates multiple days of emissions without justification, includes miscellaneous fires that are not well characterized and inconsistently discussed within the demonstration, and assumes that those miscellaneous fires were much closer to the Las Vegas NAA than they actually were. While not presented explicitly in the demonstration, it is possible to calculate Q/D separately for the Planada, Upper Colony, and other unnamed fires based on the Q and D values reported in the demonstration. These values are 2.19 tons/km, 0.05 tons/km, and 3.94 tons/km for the Planada, Upper Colony, and other fires respectively, and include emissions over 2-3 days. The distance-weighted sums presented in the demonstration and calculated here are all well below the Tier 2 Key Factor 1 screening value of 100 tpd/km. Therefore, the event exceedances do not meet the Tier 2 Key Factor 1.[30]

For the Tier 2 Key Factor 2, the demonstration included evidence that the exceedances are not at or above the 99th percentile from the past five years of O_3 season data (2014-2018) or among the four highest concentrations measured at the sites in 2018.[31] The Green Valley monitoring site measured one O_3 exceedance at or above the five-year 99th percentile; the remaining six exceedances measured across the two days were below the five-year 99th percentile. The Green Valley and Jerome Mack monitoring sites were the only monitors to register values on June 19 or June 20, 2018 that were in the top four values measured in 2018. Therefore, the event exceedances do not meet the Tier 2 Key Factor 2.[32]

Based on the analysis of the Key Factors for Tier 2, the EPA's wildfire O_3 guidance document indicates that a Tier 3 analysis is appropriate for this event. As described below, the demonstration included analyses intended to address the required elements for a Tier 3 clear causal relationship analysis based on the EPA's wildfire O_3 guidance document. This includes evidence intended to support that (1) wildfire emissions were transported from the wildfire to the monitor; (2) wildfire emissions affected the monitor; and (3) wildfire emissions caused the O_3 exceedance(s).

<u>Tier 3 analysis: Evidence of transport of wildfire emissions from the wildfire to the monitors</u>
The demonstration presented a trajectory analysis using the Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT).[33] The demonstration also provided a map of fire locations on June 15-18 from the National Aeronautics and Space Administration (NASA) Fire Information for Resource Management System (FIRMS) and smoke plumes with fire locations from the Upper Colony and Planada fires on June 17 and June 18 using data from the NOAA

[30] See demonstration, p. 4-9. The demonstration similarly concludes that the exceedances do not meet the Tier 2 Key Factor 1.
[31] See demonstration, p. 4-10.
[32] See demonstration, p. 4-10. The demonstration similarly concludes that the exceedances do not meet the Tier 2 Key Factor 2.
[33] See demonstration, pp. 4-14 to 4-15.

HMS.[34] The demonstration's HYSPLIT analysis included 24-hour back trajectories for two of the affected monitoring sites, Walter Johnson and Green Valley, at 100 and 1000 meter (m) altitudes inititated at 2100 Coordinated Universal Time (UTC), or 1:00 PM Pacific Standard Time (PST), on June 16-20, 2018.[35] The HYSPLIT back trajectories in this demonstration generally indicate transport from a southwesterly direction for June 16-18, which then shifted northerly on June 19-20. The 100 m trajectories do not show transport from the areas where the Upper Colony or Planada fires were burning; trajectories ending at 1:00 PM PST on June 19 show transport from the north and west, in the general direction of the fires, but the trajectories do not extend to the fire locations. While the June 19 trajectory from Walter Johnson appears to reach areas where Figure 3-5 shows a smoke plume from the Upper Colony Fire on June 17, the timing of the trajectory (24 hours) is inconsistent with the timing of that smoke plume; no smoke plume is shown in Figure 3-5 from the Upper Colony Fire for June 18, which would be consistent with the trajectory timing.[36] Similarly, the 1000 m trajectories on June 19 do not show transport from areas where the Upper Colony or Planada fires were burning, and are inconsistent with the timing of the HMS smoke plume shown for the Upper Colony Fire on June 17.[37] The 1000 m trajectories on June 20 do appear to pass through the area near where the Planada Fire was burning northwest of the LVV in California. However, when considering the emissions and timing of the fires as compared to the trajectories, it appears unlikely that the trajectories passed by the fires at times when significant emissions were produced. For example, as previously discussed, the Q/D analysis included emissions from the Upper Colony Fire for June 17-18, and for the Planada Fire for June 16-18; emissions from June 19, which correspond with the timing of when June 20 trajectories were passing near the fires, were not included, likely because the fires were nearly contained and emissions on that day were very low. As previously mentioned, the demonstration refers to unnamed smaller fires in central/southern California. Based on the fires shown in Figure 3-5, the HYSPLIT trajectory analysis similarly does not show transport from areas near any of these other unnamed fires, which as previously discussed, were small compared to the Planada Fire.[38] The demonstration also did not assess the altitude of the trajectories relative to the smoke emissions. The HMS contours also do not indicate any smoke being over or near the Las Vegas NAA on June 17 or 18 (HMS smoke contours for other days were not included).

The demonstration also included maps of predicted ground-level smoke based on 48-hour predictions from the U.S. Forest Service (USFS) AirFire BlueSky framework for June 14-20, 2018.[39] These maps are experimental forecast maps that predict where smoke may be transported, rather than providing direct observations of smoke, and have known uncertainties.[40] The maps themselves include a statement that "[t]he output contained within this KMZ represents experimental model output that may or may not be accurate. Use at your own risk."

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[34] See demonstration, p. 3-12.
[35] See demonstration, p. 4-14. HYSPLIT presents results in UTC, which is shown at the top of the HYSPLIT figures included in the demonstration. However, times in the demonstration appear to be given in PST. In June 2018, the local time zone for Las Vegas was Pacific Daylight Time (PDT). However, for consistency with the demonstration, this TSD will use PST. The offset from PDT to PST is one hour later (*i.e.*, 12:00 PM in PST is 1:00 PM in PDT).
[36] See demonstration, p. 3-12.
[37] See demonstration, p. 4-15.
[38] See demonstration, p. 3-12.
[39] See demonstration, pp. 4-11 to 4-13.
[40] Further information on the BlueSky Daily Run Viewer is available at https://info.airfire.org/daily-run-viewer. This includes the statement that: "Tools are provided for research purposes only, and may not accurately reflect what happened/will happen due to numerous reasons. Data are provisional and subject to change. Use at own risk."

The BlueSky smoke maps show little to no smoke over the LVV from June 14-20. The figures show that smoke is not present in most of the area around LVV, with a few small areas showing potential contributions in the lowest smoke concentration indicated in the model (less than 5 micrograms per cubic meter ($\mu g/m^3$) of particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$)) on June 19-20, 2018. Given the forecast nature of the BlueSky predictions and high uncertainty in the model and absolute smoke values, this analysis does not provide strong evidence for the presence of smoke in the LVV and the NAA.

The demonstration also analyzed data retrieved from the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) satellite. Using an examination of CALIPSO's orbital track over the southwest U.S, the demonstration categorized the identified aerosol types over southern Nevada as polluted continental/smoke, slight elevated smoke, and large polluted dust around 1:30 PM PST on June 16.[41] The demonstration argued that the polluted dust category is overused and may represent smoke. However, no evidence was provided to support that the category likely includes smoke as opposed to a different category of aerosol; in desert environments such as the areas around Clark County, dust is a common aerosol source. The demonstration used a Skew-T diagram from the University of Wyoming to estimate that the mixing height in the LVV was slightly above 3080 meters at 4:00 PM on June 16.[42] The demonstration suggested that the CALIPSO data in conjunction with the deep mixing height indicated by the Skew-T diagram provided evidence that elevated smoke could be mixed down to the ground level in the LVV. However, the CALIPSO data does not provide strong evidence that smoke was present over the LVV, especially when considering the other analyses in the demonstration (*e.g.*, smoke modeling, HMS, HYSPLIT trajectories), which do not support the presence of significant smoke over the LVV on any of the days leading up to and including the June 19-20, 2018 exceedances. The timing of the Skew-T analysis and CALIPSO overpass (June 16) is also inconsistent with the timing of the exceedance days (June 19-20).

As described earlier in this document, the total emissions of NO_x and VOCs from the Planada and Upper Colony fires over multiple days were approximately 158 tons of NO_x and 924 tons of VOCs. This is approximately 1.6 times the daily emissions of NO_x and approximately 3.9 times the daily emissions of VOCs in the LVV. If adding the unnamed central/southern California fire emissions estimate provided in the demonstration, the total emissions were approximately 221 tons of NO_x and 1,256 tons of VOCs, or approximately 2.3 times the daily emissions of NO_x and approximately 5.3 times the daily emissions of VOCs in the LVV. These wildfire emission numbers reflect emissions totaled across three days from fires spread across southern and central California and Nevada and are therefore a generous estimate of the emissions available for transport to any location, including the LVV. The relatively low emissions from these distant fires implies that a substantial fraction of the total smoke from the fires would need to have been transported to the LVV to cause a significant increase in the quantity of precursors in the LVV from smoke impacts. Given the evidence presented on smoke transport along with the relatively small size of these fires, the low total emissions, and the significant distance between the fires

[41] See demonstration, pp. 4-15 to 4-16.
[42] See demonstration, p. 4-17.

and the LVV, the likelihood that significant smoke from these fires reached the exceeding monitors in the LVV is very low.

Overall, the HYSPLIT trajectory analyses, satellite data, CALIPSO data, Skew-T analysis, and analysis of fire emissions compared to local sources in the LVV do not support a conclusion that emissions from either the Planada Fire, the Upper Colony Fire, or the various unidentified other central/southern California fires were transported to the Las Vegas NAA and affected monitoring sites in sufficient quantities to cause O_3 increases and exceedances in the LVV.

Tier 3 analysis: Evidence that the wildfire emissions affected the monitors

The demonstration provided graphs of the daily maximum 8-hour average O_3 concentrations from June 15 through June 21, 2018 for six monitors within the LVV, including the five monitors experiencing exceedances during this time, and select monitors outside the LVV (Mojave National Park, Death Valley National Park, Great Basin National Park, Jean, and Mesquite).[43] Two of these monitors, Mojave National Park and Jean, are located to the southwest of the LVV between the South Coast Air Basin (which includes Los Angeles and surrounding areas) and the LVV, while the other monitors are to the west-northwest (Death Valley National Park), east-northeast (Mesquite), or north-northeast (Great Basin National Park) of the LVV. The data presented shows a rise in O_3 values during the weekday for monitors in the LVV, with the highest values generally occuring on June 19-20. The monitors outside the LVV generally did not measure O_3 values as high as the monitors within the LVV, with monitors to the southwest showing the highest values on June 19 or 20, similar to the LVV, while the other monitors peaked at different times.[44] The demonstration included comparisons between each exceedance value and the 50th and 95th percentiles of concentrations for that monitor from 2014-2018 during the O_3 season. For the sites shown, concentrations during the June 17-21, 2018 period were typically above the 50th percentile value but in most cases fell below the 95th percentile, with a few individual exceptions, mostly within the LVV. The demonstration attributes O_3 concentrations across all sites during this period to widespread smoke; however, increases in O_3 at some of these sites, particularly the Jean and Mojave National Park sites, may reflect transport of anthropogenic emissions from California which would impact both these sites and the LVV. Also, more extreme concentrations within the LVV as compared to the more remote sites may reflect increases in local O_3 production within the LVV, possibly due to increased biogenic emissions associated with high temperatures and other meteorological factors.

The demonstration also provided an analysis of diurnal O_3, nitrogen dioxide (NO_2), carbon monoxide (CO), and $PM_{2.5}$ concentrations, along with hourly wind speeds, for June 15-21, 2018 at the Jerome Mack monitoring site.[45] Included were plots of hourly concentrations of each pollutant with historical concentrations at the 5th, 50th and 95th percentile. The demonstration also included plots of NO_2 concentrations from the near-road Rancho and Teddy site and wind speeds from both Jerome Mack and Rancho and Teddy.[46] In Figure 4-25, O_3 measured at Jerome Mack on June 17 and 18 is labeled as "Transported O_3" and low O_3 overnight between June 18 and

[43] See demonstration, p. 4-18.

[44] The Mesquite monitor, to the east-northeast of the LVV, measured its highest value on both June 18 and 19, peaking earlier than the LVV sites. The Death Valley National Park and Great Basin National Park monitors measured peak concentrations between June 16-18.

[45] See demonstration, pp. 4-19 to 4-21.

[46] See demonstration, p. 4-21.

June 19 is labeled with "Additional NO_2 leading to scavenged ozone."[47] The shape and pattern of the O_3 hourly concentrations is consistent with local production due to high precursor concentrations and meteorological conditions favorable to O_3 production (*i.e.*, high temperatures, ample sunlight, and stagnant winds). The demonstration notes elevated concentrations of $PM_{2.5}$ on June 15-17, increasing NO_2 concentrations on June 18-21, and elevated CO values on June 19-21 at the Jerome Mack site, and states that "comparing the backward trajectories and time series of wildfire plume components show the smoke were [sic] transported to the LVV from central/southern California fires and Upper Colony Fire during June 15-18."[48] Outside of the noted increased periods for NO_2, $PM_{2.5}$, and CO, concentrations of these three pollutants were primarily below the 95th percentile values and close to the 50th percentile (*i.e.*, appeared well within the range of normal variability for the area). The inconsistency in timing of these pollutant increases suggests that they have different sources and are not attributable to wildfire smoke impacting the LVV.

NO_2 in particular is a poor tracer for fire because it is not specific to fire emissions and is emitted in large amounts by several anthropogenic sources. Data from the Rancho and Teddy near-road monitor also shows elevated NO_2 levels on June 18-21, suggesting the increase in concentrations may be due to anthropogenic mobile source emissions and meteorology.[49] The plot of wind speeds also shows a dramatic drop in wind speed overnight between June 17 and June 18, which is consistent with local stagnation, causing local anthropogenic pollutant concentrations to increase. The increase is also consistent with day of week effects, as June 16-17 was a weekend and increasing concentrations of NO_2 and CO over the following days most likely reflect increased emissions with weekday traffic, as well as meteorology favorable to increased concentrations. As described above, the trajectory analysis presented in the demonstration did not support that smoke was transported from the Planada and/or Upper Colony fires on June 16 or 17. The increase in $PM_{2.5}$ on June 16 and 17 is therefore inconsistent with the timing of any potential evidence of transport from the Planada and Upper Colony fires (we also note that the Upper Colony Fire did not start until June 17) and may be related to local dust produced from the elevated wind speeds measured on those days. $PM_{2.5}$ levels measured at Jerome Mack on the exceedance days of June 19 and 20 were considerably lower – all values were below the 95th percentile and were closer to the 50th percentile for most hours on these days.[50] Overall, this analysis does not support the conclusion that any wildfire smoke, including wildfire smoke specifically from the Upper Colony and Planada fires, affected air quality monitors in the Las Vegas NAA on June 19 and 20, 2018.

The demonstration also provided an analysis of $PM_{2.5}$ carbon speciation data as captured by the Jerome Mack monitor and the Rubidoux, CA monitor, which is located in the South Coast Air Basin, an area that is frequently upwind of the LVV.[51] These measurements are collected once every three days, and within the period of June 14-21, 2018 are available for the dates of June 16 and 19. The demonstration included a description of the significance of the ratio of organic carbon (OC) to elemental carbon (EC) as a wildfire tracer: "The ratio of $PM_{2.5}$ OC and EC has been used to differentiate combustion sources of biomass burning and mobile sources, since

[47] See demonstration, p. 4-20.
[48] See demonstration, p. 4-19.
[49] See demonstration, p. 4-21.
[50] See demonstration, p. 4-20.
[51] See demonstration, pp. 4-6 to 4-7, 4-19.

biomass burning usually has higher OC/EC ratio (7-15) (Lee et al., 2005; Pio et al., 2008) than gasoline (3.0-4.0) or diesel vehicles (<1.0) (Lee and Russell, 2007; Zheng et al., 2007)."[52] The OC/EC ratio at the Jerome Mack site on June 19 was less than 5. This value was below the median OC/EC ratio value of 5.4 for May through August measured at the Jerome Mack site using 2015-2017 and 2019 data.[53] The OC/EC ratio measured at Jerome Mack on June 16 was close to 11, which was above the median value for May through August, but since no further statistical information was provided, it is unclear if the ratio was within the range of normal variability or not (*e.g.*, outside of the 95th or 99th percentile). The higher OC/EC ratio on June 16 is similar to other high values detected in May, July, and August of 2018 that are not clearly identified as associated with wildfire smoke.[54] In addition, as further explained above, there is no established connection between the elevated $PM_{2.5}$ measured on June 16-17 and the elevated O_3 several days later on June 19-20, which appear to be associated with increasing NO_2 concentrations (most likely from local anthropogenic sources as described above), and meteorology favorable to local O_3 production.

Levoglucosan is a tracer that is commonly indicative of emissions from wood smoke and fires. This demonstration did not discuss levoglucosan. CCDES collected data with concentrations of levoglucosan measured from filters at two sites in the LVV, Jerome Mack and Sunrise Acres. The raw levoglucosan data from 2018-2020 was provided by CCDES to the EPA on request.[55] On June 19, 2018, samples were collected and analyzed for levoglucosan from the Jerome Mack and Sunrise Acres sites. Both sites did not record detectable concentrations of levoglucosan. This further suggests that measurable smoke did not impact the Las Vegas NAA on June 19, 2018.

Overall, the concentrations of $PM_{2.5}$, OC/EC, and levoglucosan in the Las Vegas NAA (which were similar to non-event concentrations) on June 19 and 20, 2018, along with CO, NO_2, and O_3 concentrations that were consistent with day-of-week effects and meteorological data, do not support that wildfire emissions reached ground level and impacted the exceeding monitors.

<u>Tier 3 analysis: Additional evidence that the wildfire emissions caused the O_3 exceedances</u>
The demonstration included additional evidence intended to support the assertion that wildfire emissions caused elevated O_3 concentrations at the exceeding Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites and caused the O_3 exceedances.

This evidence included analysis of output from a Generalized Additive Model (GAM) that was developed for monitors in the LVV.[56] GAMs are statistical models intended to allow for prediction of a response (in this case, maximum daily 8-hour O_3 concentrations) based on linear and non-linear effects from multiple input variables. The demonstration did not include detailed information on the development and performance of the GAM model; however, the demonstration supported its analysis with a reference to CCDES's June 22, 2020 demonstration,

[52] See demonstration, p. 4-6.
[53] See demonstration, p. 4-7. Data presented on p. 4-19 similarly shows the value is below the "mean" for this site, but no detailed information is provided on how the mean was calculated. The value appears to be similar to the median and may be misstated as the mean instead of the median.
[54] See demonstration, p. 4-7.
[55] See "20210720_LVG_Data_2018-2020.xlsx," containing the raw levoglucosan data provided by CCDES.
[56] See demonstration, pp. 4-22 to 4-23.

where this model was described more fully.[57] As described in the June 22, 2020 demonstration, the GAM model used 16 separate input variables, primarily meteorological in nature, to predict O_3 concentrations each day at eight monitors in the LVV.

The June 22, 2020 demonstration provided several analyses to evaluate the GAM performance. An analysis of GAM residuals (*i.e.*, the difference between the observed concentration and the predicted concentration) found that residuals were close to zero (less than 0.5 ppb) when averaged across the dataset, and similarly when considering all days that were not flagged as exceptional events.[58] The flagged day residuals were larger; average residuals across all 2018 and 2020 flagged days ranged between 6-9 ppb for the five sites within the Las Vegas NAA, and were higher (over 12 ppb) for the sites within Clark County and operated by CCDES but outside of the NAA.[59] Values for sites outside of the NAA were based on a much smaller number of dates (2-4 as opposed to 11-22) as the monitors outside of the NAA did not exceed on most of the flagged days. As demonstrated by the R^2 values ranging from 0.55 to 0.61 for the various sites, the data presented show that there is a large amount of variability in concentrations that remains after considering the variables selected.

The wildfire O_3 guidance document states: "Users of regression models should consider the uncertainties in the model's prediction abilities, specifically at high concentrations, before making conclusions based on the modeled results. A key question when considering model uncertainty is whether the model predicts O_3 both higher and lower than monitored values at high concentrations (above 65 or 70 ppb) or whether the model displays systematic bias on these high monitored days."[60] The analysis included in the June 22, 2020 demonstration attempted to address this concern. The June 22, 2020 demonstration included a calculation of the average residual of points not flagged as exceptional events with measured concentrations at or above 60 ppb.[61] The average residuals of these higher concentration points were higher than the averages of all residuals and of the non-flagged day residuals, in the range of 3-5 ppb for all sites. This suggests that at least some of the 6-9 ppb average residuals reported for the flagged dates at the sites within the Las Vegas NAA can be explained by the performance of the statistical model at high concentrations, which were typically measured on these dates. This is common in regression models, as implied by the text in the wildfire O_3 guidance document; points considered for exceptional events demonstrations are typically among the highest observed concentrations at the monitor, and selecting points with high observed concentrations, whether exceptional events or not, will not result in a selection that is normally distributed around the mean of the regression model. Therefore, a positive residual is expected for data with high observed concentrations, even considering the typical performance of the model. In other words, the positive residual is not itself indicative of an unusual source of O_3 affecting the monitors.

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[57] See demonstration, p. 4-22; "Exceptional Event Demonstration for Ozone Exceedances in Clark County, Nevada – June 22, 2020," (July 2021) ("June 22, 2020 demonstration"), pp. 3-65 to 3-83.
[58] See June 22, 2020 demonstration, p. 3-71.
[59] Of the sites included in the GAM analysis, the sites that fall within the Las Vegas NAA boundaries are Green Valley, Jerome Mack, Joe Neal, Paul Meyer, and Walter Johnson. The GAM analysis also included three sites (Jean, Indian Springs, and Boulder City) which are operated by CCDES and fall outside of the NAA boundaries but are still within Clark County, and are located to the southwest, northwest, and southeast of the NAA, respectively. Refer to p. 2-2 of the demonstration for a map showing the relative locations of the monitors.
[60] See wildfire O_3 guidance document, p. 28.
[61] See June 22, 2020 demonstration, p. 3-71.

The June 22, 2020 demonstration also included a case study analysis of days not flagged as exceptional events where most monitors measured concentrations above 60 ppb, to evaluate the model performance at higher concentrations.[62] The median residuals across all monitors for each case study day ranged from 0.24 ppb to 3.89 ppb. The demonstration also gave the range (minimum and maximum) of residuals for individual monitors on each case study day. On every case study day, the highest residual for an individual monitor was between 3 ppb and 7 ppb. This further supports that a positive residual of several ppb is common for any individual monitor on higher O_3 days outside of any potential exceptional event impact. In addition, on the case study days selected, the highest concentration measured by any monitor was 72 ppb; residuals might be higher on days that measured higher concentrations.

In order to account for the normal variability inherent in the statistical model, the wildfire O_3 guidance document states that the proper calculation to estimate the contribution from an atypical source of O_3 is to compare the sum of the predicted O_3 concentration and the 95th percentile of the residuals for the model to the observed concentration, rather than the direct comparison of the predicted O_3 concentration to the observation.[63] None of the residuals presented in the demonstration met the wildfire O_3 guidance document criteria of being greater than the 95th percentile, with the residuals ranging from 50th to 93rd percentile.[64] Using the 95th percentile value for the residuals as described in the wildfire O_3 guidance document, the following fire contributions were found: -5.3 ppb for the Paul Meyer site, -5.9 ppb for the Walter Johnson site, and -0.5 for the Green Valley site for June 19, 2018; and -7.1 ppb for the Paul Meyer site, -5.4 for the Walter Johnson site, and -2.9 ppb for the Joe Neal site for June 20, 2018. The negative predicted fire influence for each exceedance indicates that wildfire smoke (or any other unusual source) did not cause any measurable increase in O_3 concentrations. Therefore, the model does not support that an unusual O_3 source affected monitors in the LVV on June 19-20, 2018 sufficiently to cause exceedances of the NAAQS; the sites measured O_3 concentrations exceeding the NAAQS independent of any apparent fire contributions calculated for these sites.

The demonstration did not include a matching day analysis, which is an analysis suggested in the wildfire O_3 guidance document comparing O_3 concentrations on meteorologically similar days without wildfire smoke impacts to better evaluate whether the monitors would have exceeded the NAAQS without the impacts of wildfire smoke in the area. O_3 formation and transport are highly dependent upon meteorology. In the days leading up to and including June 19-20, 2018, a stable weather system consisting of increasingly high temperatures, a lack of clouds, and light variable winds was developing in the LVV.[65] These conditions are conducive to O_3 formation, and measured O_3 exceedances due to local anthropogenic emissions are common under such meteorological conditions in urban areas like the LVV.

Overall, the results from the GAM model analysis and the concurrent meteorological data do not support that an unusual source, such as a fire, caused the O_3 exceedances measured at monitoring sites in the Las Vegas NAA on June 19-20, 2018.

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[62] See June 22, 2020 demonstration, p. 3-74.
[63] See wildfire O_3 guidance document, p. 28.
[64] See demonstration, p. 4-23.
[65] See demonstration, p. 3-17.

Conclusion regarding the clear causal relationship criterion

The analyses included in the demonstration do not sufficiently demonstrate a clear causal relationship between the emissions generated by the Planada Fire in central California, the Upper Colony Fire in Smith Valley, Nevada, or several unnamed central/southern California fires and the exceedances measured at the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites. Specifically, the evidence presented to show transport (*i.e.*, HYSPLIT analyses, fire emissions data, and BlueSky smoke modeling forecasts), smoke impacts at the monitors (*i.e.*, precursor concentration analysis and $PM_{2.5}$ speciation data), and quantification of smoke impacts (*i.e.*, GAM modeling results), in combination with analysis of meteorological conditions during the exceedance days and levoglucosan data showing no evidence of smoke, are inadequate to demonstrate a clear causal relationship between the emissions generated by the specific fires named and the exceedances measured at the respective monitoring sites. Meteorological conditions during the period leading up to and including the exceedances were favorable to local O_3 production due to typical sources in the LVV; the demonstration did not present sufficient evidence to establish that the named wildfires were the cause of the observed exceedances on June 19 and 20, 2018.

Table 3: Documentation of the Clear Causal Relationship criterion

Exceedance Date	**Demonstration Citation**	**Quality of Evidence**	**Criterion Met?**
June 19-20, 2018	Section 2: p. 2-5 Section 3: p. 3-12 Section 4: pp. 4-1 to 4-23 June 22, 2020 demonstration: pp. 3-65 to 3-83	Insufficient	No

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)]. The demonstration did not provide sufficient evidence that the wildfire event meets the definition of wildfire [40 CFR §50.1(n)]. Specifically, the demonstration included statements that the wildfires were caused by lightning or unknown causes and provided general information on the counties in which the fires were located;[66] however, the demonstration did not provide the exact locations of the fires or any supporting evidence that the fires occurred on wildland. While information on the (named) Planada and Upper Colony fires might be able to be independently verified, insufficient information was provided regarding the "unnamed California fires" to independently verify whether the fires meet the definition of wildfires on wildland in the Exceptional Events Rule. Therefore, the documentation does not sufficiently demonstrate that the wildfire event was not reasonably controllable and not reasonably preventable.

Table 4: Documentation of the Not Reasonably Controllable or Preventable criterion

Exceedance Date	**Demonstration Citation**	**Quality of Evidence**	**Criterion Met?**
June 19-20, 2018	Section 6: p. 6-2 Section 3: pp. 3-11 to 3-12	Insufficient	No

[66] See demonstration, pp. 3-11 to 3-12, p. 6-2.

Natural Event

The definition of "wildfire" at 40 CFR §50.1(n) states, "A wildfire that predominantly occurs on wildland is a natural event." As previously described, the demonstration did not include sufficient documentation that the event meets the definition of a wildfire and occurred predominantly on wildland and has therefore not shown that the event was a natural event.

Table 5: Documentation of the Natural Event criterion

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 19-20, 2018	Section 5: p. 5-1	Insufficient	No

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 the EPA's evaluation of these requirements.

Table 6: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the agency provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Appendix B "Public Notification"	No. Notifications were for elevated levels of O_3, but not specific to the wildfires identified in the demonstration or any other wildfires.
Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data in the EPA's Air Quality System (AQS)?	40 CFR §50.14 (c)(2)(i)	November 30, 2020 email[67]	Yes
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 the 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)	July 1, 2021 Letter[68]	Yes
Was the public comment process followed and documented? • Did the agency document that the comment period was open for a minimum of 30 days?	40 CFR §50.14 (c)(3)(v)	August 11, 2021 Letter;[69] Appendix C, "Documentation of Public Comment	Yes

[67] Email from Araceli Pruett, CCDES, to multiple staff at EPA Region 9, dated November 30, 2020.
[68] Letter from Marci Henson, CCDES, to Elizabeth Adams, EPA Region 9, dated July 1, 2021.
[69] Letter from Marci Henson, CCDES, to Elizabeth Adams, EPA Region 9, dated August 11, 2021.

	Reference	Demonstration Citation	Criterion Met?
• Did the agency submit to the EPA any public comments received? • Did the state address comments disputing or contradicting factual evidence provided in the demonstration?		Process June 19-20, 2018 Demonstration"	
Has the agency met requirements regarding submission of a mitigation plan, if applicable?	40 CFR §51.930 (b)	October 22, 2018 Letter;[70] December 17, 2018 Letter.[71]	Yes

Conclusion

The EPA has reviewed the documentation provided by CCDES to support claims that smoke from the Planada Fire in central California, the Upper Colony Fire in Smith Valley, Nevada, and other unnamed smaller fires throughout central/southern California caused exceedances of the 2015 8-hour O_3 NAAQS at the Jerome Mack, Paul Meyer, Joe Neal, Walter Johnson, and Green Valley monitoring sites on June 19-20, 2018. EPA has determined that the flagged exceedances at these monitoring sites on these days do not satisfy the exceptional event criteria. Specifically, the demonstration failed to show that there exists a clear causal relationship between the event and the monitored exceedances. This conclusion was based on the review of the evidence presented in the demonstration, including meteorological information, fire emission information, HYSPLIT trajectories, smoke modeling data, ground level monitoring data, and statistical modeling analysis. The two exceedance days were dominated by typical LVV urban emissions and conditions favorable to local O_3 production within the normal summer O_3 season; the data and analyses presented in the demonstration do not support that wildfire emissions were transported to the LVV and caused the monitored exceedances of the NAAQS. In addition, the demonstration failed to show that the event was not reasonably controllable or preventable and that the event was a natural event, as insufficient information was provided to verify that the fires in question meet the definition in the Exceptional Events Rule of wildfires on wildland. As the demonstration failed to show that there exists a clear causal relationship between any of the wildfire events and the June 19 and 20, 2018 monitored exceedances at O_3 monitors in the Las Vegas NAA, EPA is nonconcurring on this exceptional event demonstration.

[70] Letter from Mike Sword, CCDES, to Elizabeth Adams, EPA Region 9, dated October 22, 2018.
[71] Letter from Elizabeth Adams, EPA Region 9, to Mike Sword, CCDES, dated December 17, 2018.