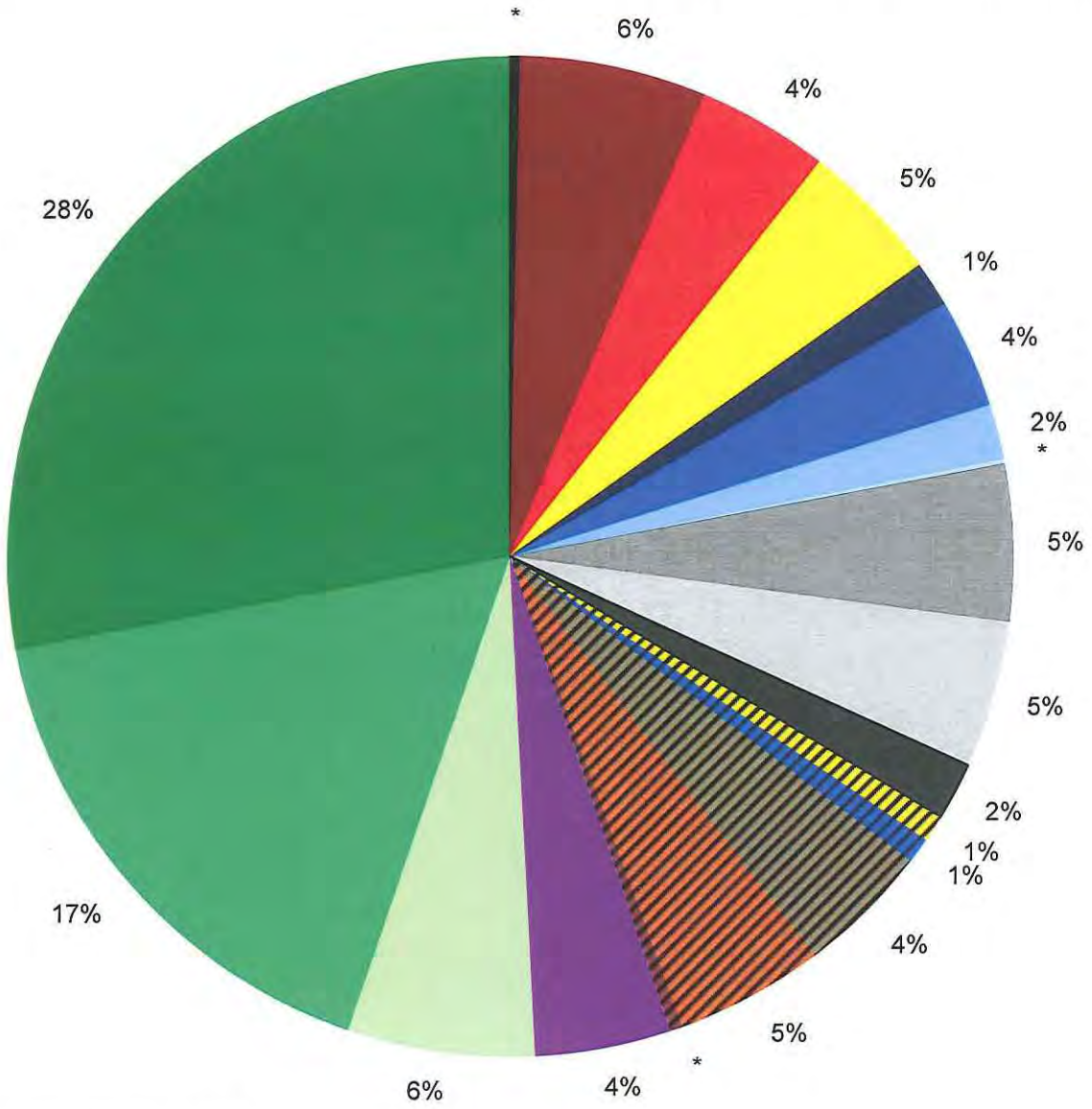
Agenda Item #8

DRAFT PROJECTED 2011 PM_{10} Emissions Inventory (May 2011)

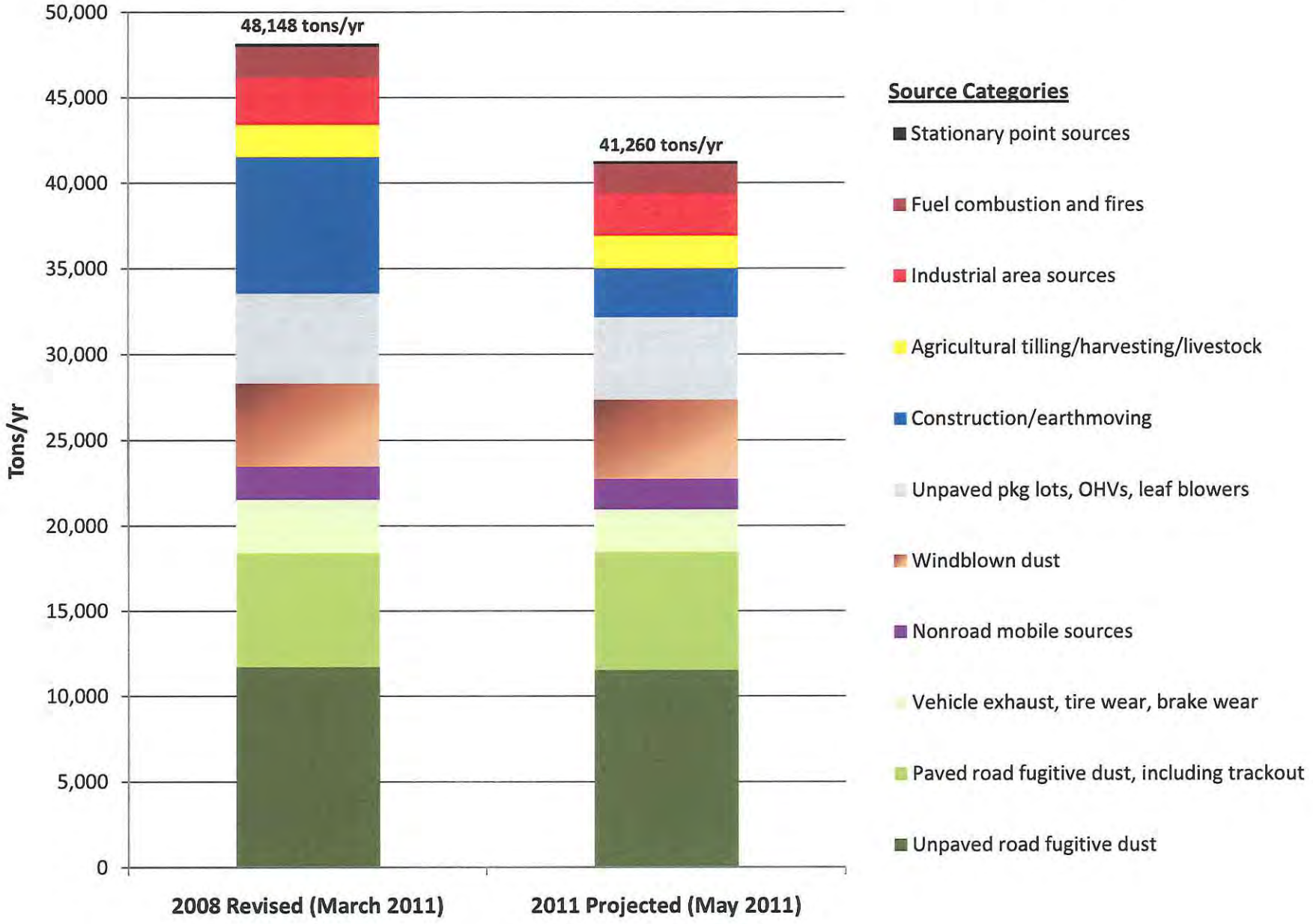
PM_{10} NAA Total = 41,260 tons/yr



Source Categories	%
Major stationary point sources	(<0.5%)
All other industrial processes	(6%)
Fuel combustion and fires	(4%)
Agricultural tilling/harvesting/livestock	(5%)
Construction, residential	(1%)
Construction, commercial	(4%)
Construction, road	(2%)
Other earthmvg: trenching, weed control	(<0.5%)
Travel on unpaved parking lots	(5%)
Offroad recreational vehicles fugitive dust	(5%)
Leaf blowers fugitive dust	(2%)
Windblown: agricultural land	(1%)
Windblown: developing land	(1%)
Windblown: vacant land	(4%)
Windblown: open areas	(5%)
Windblown: S&G, landfills, test tracks	(<0.5%)
Nonroad mobile sources	(4%)
Vehicle exhaust, tire wear, brake wear	(6%)
Paved road fugitive dust, including trackout	(17%)
Unpaved road fugitive dust	(28%)

* Source category comprises less than 0.5% of total.

Comparison of Revised 2008 PM10 Emissions and Draft Projected 2011 PM10 Emissions



Note to State/Local/Tribal Agency Reviewers
May 2, 2011

Overview of Draft Guidance Documents on the Implementation of the Exceptional Events Rule

This overview document and its attachments[1] clarify key provisions of the 2007 Exceptional Events Rule (EER) to respond to questions and issues that have arisen since the rule was promulgated. The draft guidance in this document and the attachments, along with examples of approved demonstrations on EPA's website[2], are provided to facilitate review of these materials by outside parties, to help ensure that EPA's final guidance provides an efficient and effective process to make determinations regarding air quality data affected by events. Please direct comments on these draft guidance documents to EEGuidanceComments@epa.gov by June 30, 2011. For guidance-related questions, please contact Beth Palma at 919-541-5432.

These draft guidance materials identify the four independent criteria on which exclusion of event-affected data depends, describe the administrative process and associated timing for submittal and review of demonstrations, provide answers to frequently asked questions, and provide previously reviewed demonstrations and best practice components. EPA recognizes the challenges that states face in preparing exceptional event demonstration packages. Exceptional events are varied with differing characteristics and must be addressed on a case-by-case basis making the development of general guidance with bright lines difficult. Neither states[3] nor regions want to prepare or review numerous versions of a single event demonstration package.

This draft guidance overview document and its attachments are based on the following principles:

1. States should not be held accountable for exceedances due to events that were beyond their control at the time of the event.
2. It is desirable to implement reasonable controls to protect public health.[4]
3. Clear expectations will enable EPA and other air agencies to better manage resources related to the exceptional events process.

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[1] Attachment 1, "Draft Exceptional Events Rule Frequently Asked Questions" (the draft Q&A document) and Attachment 2, "Draft Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Events Rule" (the draft High Winds Guidance document).

[2] Additional information and examples of exceptional event submissions and best practice components can be found at EPA's Exceptional Events website locate at http://www.epa.gov/ttn/analysis/exevents.htm.

[3] This and all subsequent references to "state" are meant to include state, local and tribal agencies responsible for implementing the EER.

[4] With respect to exceptional events, Section 319 of the Clean Air Act states the following guiding principles (among others);

(i) the principle that protection of public health is the highest priority

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(iv) the principle that each State must take necessary measures to safeguard public health regardless of the source of the air pollution

Exceptional Event Rule Provisions

On March 22, 2007, EPA promulgated the "Treatment of Data Influenced by Exceptional Events; Final Rule" (72 FR at 13560) pursuant to the 2005 amendment of Clean Air Act (CAA) Section 319. This rule, known as the Exceptional Events Rule, superseded EPA's previous natural events guidance and interim fire policy documents.[5] The EER created a regulatory process codified at 40 CFR parts 50 and 51 (50.1, 50.14 and 51.930). These regulatory sections contain definitions, procedural requirements, requirements for state demonstrations, and criteria for EPA approval for the exclusion of air quality data from regulatory decisions under the EER.

The definition of an exceptional event at 40 CFR §50.1(j) repeats the CAA definition which provides that an exceptional event is one that affects air quality, is not reasonably controllable or preventable, and is caused by human activity that is unlikely to recur at a particular location or a natural event. Additional requirements in 40 CFR §50.14(a)(2) and (b)(1) identify that a state must demonstrate "a clear causal relationship between the measured exceedance or violation of such standard and the event" and that "an exceptional event caused a specific air pollution concentration in excess of one or more national ambient air quality standards." The rule further requires at 40 CFR §50.14(c)(3)(iv) that the demonstration to justify data exclusion shall provide evidence that the event is associated with a measured concentration in excess of normal historical fluctuations, including background, and evidence that there would have been no exceedance or violation but for the event.

Treatment of Technical Criteria for Exclusion of Data Affected by Events

When considered together, the EER provisions summarized above identify the following six elements that states must address when requesting that EPA exclude event-related concentrations from regulatory determinations:

- the event affected air quality
- the event was not reasonably controllable or preventable
- the event was caused by human activity that is unlikely to recur at a particular location, or was a natural event
- there exists a clear causal relationship between the specific event and the monitored concentration
- the event is associated with a measured concentration in excess of normal historical fluctuations including background

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[5]Previous guidance and policy documents that either implied or documented the need for identifying data affected by an exceptional event include:
i) "Guideline for Interpretation of Air Quality Standards," U.S. EPA, OAQPS No. 1.2-008, Revised February 1977.
ii) "Guideline On the Identification and Use of Air Quality Data Affected by Exceptional Events" (the Exceptional Events Policy), U.S. EPA, OAQPS, July 1986.
iii) "Areas Affected by PM10 Natural Events" (the PM10 Natural Events Policy), memorandum from Mary D. Nichols, Assistant Administrator for Air and Radiation, to EPA Regional Offices, May 30, 1996.
iv) "The Interim Air Quality Policy on Wildland and Prescribed Fires" (the Interim Fire Policy), memorandum from Richard D. Wilson, Acting Assistant Administrator for Air and Radiation, to EPA Regional Administrators, May 15, 1998.
v) "Guideline on Data Handling Conventions for the PM NAAQS," U.S. EPA, OAQPS, EPA-454/R-98-017, December 1998.

- there would have been no exceedance or violation but for the event

In reviewing exceptional events demonstration packages, EPA has found that the following EER elements, along with historical fluctuations, play a significant role in the states' supporting documentation:

1. not reasonably controllable or preventable
2. if the event was caused by human activity, that human activity is unlikely to recur at a particular location[6]
3. clear causal relationship between specific event and monitored concentration
4. no exceedance or violation but for the event[7]

As described in the draft guidance documents, EPA's technical review of a demonstration package would therefore focus on these elements. While the EER requires and EPA expects complete demonstration packages to contain narrative and evidence supporting all six elements, EPA's position would be that these four elements represent distinct facts that states must demonstrate for EPA to concur on an event claim.[8] Note that if an event is natural then the second element is not considered in a demonstration review. In the case of an event that is initiated by a natural process, such as a volcano or high wind dust event, the event would be considered a natural event if sources are entirely natural or contributing anthropogenic sources are reasonably controlled.[9] This concept is explained in more detail in Attachment 2, the draft High Winds Guidance document.

EPA recognizes the inherent links between all six elements and expects that some sections of a demonstration package (e.g., affects air quality, natural event) may repeat or refer to other sections of the demonstration package (e.g., clear causal relationship, but for). Further, each potential event can have varied and differing characteristics, and thus would usually require a case-specific demonstration and evaluation. Therefore, the EPA would use a "weight of evidence" approach in evaluating each element within an exceptional event demonstration package.

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[6] The remaining part of this criterion, "or a natural event" is intentionally omitted here.

[7] Criteria 1, 3, and 4 on this list, along with historical fluctuations, are considered "independent elements" in the draft High Winds Guidance document.

[8] While the "historical fluctuations element" is considered an independent element, it also plays an important role in the "clear causal relationship" and "no exceedance but for" demonstrations. EPA has not set pass/fail criteria for this element but will use a weight of evidence approach to assess each demonstration on a case-by-case basis. The state's role in satisfying this element is to provide analyses and statistics comparing the event-affected concentration to normal historical fluctuations. EPA will use the information provided by the state to determine whether the event was in excess of normal historical fluctuations. "Normal historical fluctuations" will generally be defined by those days without events for the previous years. It is not the state's role to show that the event was above a particular threshold since EPA is not establishing a threshold. EPA acknowledges that natural events can recur and still be eligible for exclusion under the EER; therefore, events do not necessarily have to be rare to satisfy this element. EPA expects that failure of the "historical fluctuations" element indicates likely failure for "clear causal relationship" and/or "no exceedance but for" as well, and thus does not expect that demonstration submittal non-concurrence will result from failure of this element alone.

[9] Human activity would be considered to have played little or no *direct* causal role in causing the entrainment of the dust by high wind if contributing anthropogenic sources of dust are reasonably controlled, and thus the event would be considered a natural event. If anthropogenic sources contributed significantly to a measured concentration and these same emissions from anthropogenic sources are affected by an event and are reasonably controllable but did not have those reasonable controls applied at the time of the event, then the event would not be considered a natural event.

In the draft guidance documents, the requirement that the event was not reasonably controllable or preventable, which is part of the definition of an exceptional event in both the Clean Air Act and the EER, would mean that if a set of control measures *could reasonably have been in place* for contributing sources at the time of the event, then they *must* have been in place for the event to qualify as an exceptional event under the EER. Among other factors to consider, reasonableness would need to be judged in light of the technical information available to the state at the time the event occurred. EPA would expect for nonattainment areas to already have the technical information needed to reasonably control sources in their jurisdiction. It would be important that each demonstration package address the question of reasonable controls. As with the other elements, whether an event was not reasonably controllable or preventable would be evaluated on a case-by-case basis. In general, reasonable controls would not include any control on emissions-generating activity outside of the state or tribal boundaries of the state (or tribal lands) within which the concentration at issue was monitored.

Timing of EER Demonstration Package Submittal and Review

EPA understands that the initial identification of data affected by exceptional events and the subsequent preparation, submittal, and review of demonstration packages is a resource intensive process. Delays in processing and making decisions on submitted packages increase the workload for both the submitting agency and EPA and create regulatory uncertainty. In addition, the backlog of pending actions makes retrieval of data to support new submittals potentially more difficult. Further, states and EPA often face timelines by which they must make regulatory decisions that can be affected by the inclusion or exclusion of event-affected data.

EPA will work with states as they prepare complete demonstration packages that meet the requirements of the EER. In an effort to streamline this identification, preparation, submittal, and review process, EPA has developed the following draft guidelines.

1. **Identification of data affected by exceptional events in AQS** – Although states may flag any data in AQS that they wish to flag, EPA encourages states to flag only data that might have a regulatory consequence and for which an approvable demonstration is likely. Should states wish to flag values for informational purposes, EPA prefers that they use the AQS flags intended for this purpose.

2. **State submittal of letter of intent to submit a package *(optional)*** – EPA recommends that states intending to submit a demonstration package for flagged data in AQS alert EPA of their intention within 12 months of the event occurrence. This action will prompt EPA to notify the state whether and when EPA plans to act on the claimed exceptional event. This initial notification can assist both the state and EPA in the planning and prioritization process.

3. **EPA response to state letter of intent** – EPA anticipates responding to the state's letter of intent within 60 days of receipt informing the state of EPA's intended review timeframe if needed for regulatory action.

4. **State submittal of exceptional event demonstration packages** – EPA encourages states to submit the optional letter of intent. States choosing not to follow this more formal planning recommendation are still encouraged to contact their EPA Regional Office to alert it of the forthcoming demonstration submittal. Submitting agencies that believe their demonstration packages are tied to near-term regulatory actions should submit their demonstration packages well in advance of the regulatory deadline. States should also identify the relationship between the exceptional event-related flagged data and the anticipated regulatory action in the cover letter that accompanies their initial submittal package to the reviewing EPA Regional Office.

5. **EPA prioritization of submitted demonstration packages** – EPA will generally give priority to exceptional event determinations that may affect near-term regulatory decisions, such as SIP submittal actions, National Ambient Air Quality Standards (NAAQS) designations, and clean data findings, and may defer review of demonstration packages that are not associated with near-term regulatory decisions.

6. **EPA review of prioritized demonstration packages** – EPA generally intends to conduct its initial review of a submitted exceptional event demonstration package within 120 days of receipt. During this time, EPA will generally determine whether to review the package in the near-term or to defer review. For those packages that are reviewed in the near-term, EPA will generally also assess completeness. Following this initial review, EPA will generally send a letter to the submitting agency that includes the status of review. For those packages that EPA will review in the near-term, EPA will generally include the following: a completeness determination and/or a request for additional information, a deadline by which the supplemental information should be submitted (if applicable), and an indicator of the timing of EPA's final review.[10] EPA encourages states to provide supplemental information if needed and requested by EPA. EPA anticipates a 60-day response time for states to provide additional requested information. EPA intends to make a decision regarding event concurrence within 18 months of submittal of a complete package, or sooner if required by a near-term regulatory action. Determinations on Exceptional Event demonstrations do not constitute final agency action until they are relied upon in a regulatory decision such as a finding of attainment or nonattainment which will be conducted through notice-and-comment rulemaking procedures. EPA does not generally intend to consider additional information after the concurrence decision has been made, except in the context of such a rulemaking procedure.

[10] If an agency did not send a letter of intent to submit a demonstration package, then EPA may respond to the agency with a letter indicating that EPA intends to defer review for the near-term. In this case, EPA will generally not address completeness of the package or timing of final review.

Exceptional Events Rule Frequently Asked Questions Document (Attachment 1)

The "Draft Exceptional Events Rule Frequently Asked Questions" document (the draft Q&A document) provides draft responses to questions that have arisen since the EER was promulgated. The questions are grouped into six broad areas. EPA encourages those involved in flagging data and preparing demonstration packages to review all the draft questions and answers, and to provide input regarding their usefulness and appropriateness and regarding additional questions which need answers. The following bullets identify key points of interest in the draft Q&A document:

- A natural event would not have to be infrequent to qualify as an exceptional event under the EER. Frequent events with natural triggers that have a contribution from anthropogenic activities that are reasonably controlled could be eligible "exceptional" events, provided the events meet the demonstration requirements for the technical criteria.

- The EER does not prohibit states from flagging individual concentration values below the level of the NAAQS. However, in general, only such data that contribute to a violation of the NAAQS are excludable. Questions 29-31 of the attached Q&A document describe the few, limited situations in which concentration values below the level of the NAAQS contribute to violations of the NAAQS.

- Whether an event is associated with a measured concentration "in excess of normal historical fluctuations" would be evaluated on a weight of evidence basis. The comparison of the measured concentration to normal historical concentrations would also influence how much information is needed to successfully meet other technical elements. For example, when the observed concentration is high compared to historical concentrations, EPA may require less additional evidence to demonstrate the "but for" finding. The draft Q&A document provides recommendations for showing how the observed concentration compares to the distribution of historical concentrations.

- Question 6 in the draft Q&A document describes types of evidence that could be submitted as part of a demonstration showing that an ozone exceedance would not have occurred but for the effect of a fire event. In particular, statistical or photochemical dispersion model predictions of the ozone concentration that would have occurred in the absence of the fire would be a relevant type of evidence, provided the demonstration package is transparent about the technical basis for the model and its uncertainties.

- When the available evidence indicates that there would have been an exceedance of a NAAQS even in the absence of the event, the event is not "exceptional" under the EER because the "no exceedance but for" criterion is not satisfied. Yet, this event-related concentration could still affect the design value for an area. If the event-affected design value is used for an ozone nonattainment area at the time of classification under Subpart 2 of Part D of Title I of the CAA, then it may seem that the area should be classified into a higher category (e.g., serious instead of moderate). Similarly, a state incorporating the event-related concentration in a design value used for an attainment demonstration might seem to need more emission reductions to attain the NAAQS than is actually the case.

Under the draft guidance, states faced with either of these situations could document any analysis of the event and justify any special approach to the treatment of such concentration data as part of their attainment demonstration or area classification. (See Question13 of the Q&A document for additional information.)

- To remove any possible confusion, the passages of the preamble that were declared to be a legal nullity by the court that reviewed the EER are specifically identified in Question 20 in the draft Q&A document. While states cannot rely solely on these passages as EPA guidance on interpretation of the EER, this draft guidance overview document and its attachments are consistent with those sections.

High Winds Guidance Document (Attachment 2)

The attached "Draft Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Events Rule" (the High Winds Guidance document) when finalized will be a resource for states when flagging data and preparing demonstrations packages for high wind dust events that have affected PM_{10} and $PM_{2.5}$. The draft document applies the provisions of the EER and the general guidance conveyed in this draft guidance overview document and in the draft Q&A document to the particular situation of a high wind dust event. While the document is specific to high wind dust events, it outlines how EPA intends to implement the preparation and review process for exceptional events and, therefore, may have relevance for agencies that do not deal with high wind dust events. The following are some of the highlights of the draft High Winds Guidance document:

- In nonattainment areas, a reference point for considering what constitutes reasonable control of wind-blown dust during high wind events would be the set of measures that are identified as RACM or BACM in the approved SIPs of other areas with similar wind-blown dust conditions, depending on area classification. USDA best management practices for soil conservation would also be considered if applicable to the dust source. Also, RACM or BACM measures in an area's own approved SIP should be considered part of the reasonable set. However, the assessment of whether an event was not reasonably controllable will be made on a case-by-case basis considering all the facts.

- Reasonable controls generally would not include efforts to control wind-blown dust from undisturbed natural landscapes or previously disturbed landscapes that are being allowed to return to natural conditions.

- For purposes of qualifying for the exclusion of data affected by initial (non-recurring) wind events with sustained wind speeds above 25 miles per hour (or above another threshold determined to be appropriate for a particular area), the implementation of reasonable controls applied to disturbed landscapes and other anthropogenic sources of dust could be less important because: (1) the contribution from undisturbed lands is likely to be high and, (2) at such high wind speeds many available controls may have been ineffective in significantly reducing wind-generated dust emissions.

- EPA would encourage states to work with EPA Regional Offices to develop prospective high wind action plans, which need not be incorporated into the SIP, as a way to develop a mutual understanding of what controls are reasonable to implement in light of foreseeable high wind conditions.

On-line Availability of Exceptional Event Packages and Best Practice Components

To assist states in deciding what type and how much evidence/technical analysis to include in their demonstration packages, EPA has developed a public website at http://www.epa.gov/ttn/analysis/exevents.htm that contains demonstration packages that have been approved by EPA and links to best-practice components. This website will evolve as additional demonstration packages are submitted and reviewed.

Draft Guidance Documents Still under Development

EPA is currently developing a separate draft guidance document addressing the preparation of demonstrations to support wildfire-related event claims, including events that may have affected ozone concentrations. We are also developing a draft document that when finalized would replace the Interim Fire Policy, that will contain additional guidance on basic smoke management practices for prescribed fires. We expect to provide opportunities for stakeholder input on these draft documents.

Conclusion

EPA expects to adhere to the draft guidance provided in this overview document and its attachments during the review and document finalization process, because we believe it is consistent with the Exceptional Events rule and the guidance already provided in the preamble to the rule. Although EPA hopes to formalize the concepts in these guidance documents by issuing final guidance, EPA has not excluded the possibility of issuing rule revisions.

EPA's Office of Air Quality Planning and Standards and EPA's Regional Offices are available for assistance and consultation. Questions and comments on this guidance may be directed to EEGuidanceComments@epa.gov.

Attachments:

1. Draft Exceptional Events Rule Frequently Asked Questions

2. Draft Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Events Rule

ATTACHMENT 1

Exceptional Events Rule Frequently Asked Questions

The Exceptional Events Rule of 2007[1] supersedes EPA's previous Exceptional Events guidance and policy documents and creates a regulatory process codified at 40 CFR parts 50 and 51 (50.1, 50.14 and 51.930). The Exceptional Events Rule (EER) recognizes that each potential event can have different or unique characteristics, and thus, requires a case-by-case demonstration and evaluation. Therefore, the EER adopts a "weight of evidence" approach in evaluating each demonstration to justify excluding data affected by an exceptional event.

Technical questions and issues related to implementation have arisen since the EER was promulgated. This Question and Answer (Q&A) document is intended to respond to some of these frequently asked questions and to provide instruction and clarification to state[2], local, and tribal agencies implementing the EER. For organizational ease, this document has been divided into the following topical sections:

A. Historical Fluctuations
B. "But For" Test
C. Exceptional Event Data Flagging Schedules
D. General AQS Procedures
E. General Exceptional Events Rule Applicability and Implementation Issues
F. Exceptional Event Data Flagging for Air Quality Concentrations that Could Contribute to an Exceedance or Violation of the National Ambient Air Quality Standards

Each section contains related questions. Readers of this document can find additional information at EPA's Exceptional Events website located at http://www.epa.gov/ttn/analysis/exevents.htm.

Disclaimer
The Exceptional Events Rule is the source of the regulatory requirements for exceptional events and exceptional event demonstrations. This Q&A document provides guidance and interpretation of the Exceptional Events Rule rather than imposing any new requirements and shall not be considered binding on any party.

[1] "Treatment of Data Influenced by Exceptional Events; final Rule," 72 FR at 13563, March 22, 2007.
[2] All subsequent references to "state" are meant to include state, local and tribal agencies responsible for implementing the EER.

A. Historical Fluctuations

40 CFR 50.14(c)(3)(iv): "The demonstration to justify data exclusion shall provide evidence that:
* * *
(C) The event is associated with a measured concentration in excess of normal historical fluctuations, including background;

1. **Question**: Is the Exceptional Events Rule demonstration requirement to provide evidence to support "a measured concentration in excess of normal historical fluctuations, including background" a test that can be "passed" or "failed" based on the outcome of the statistical comparison? For example, must the concentration affected by an event exceed a specific percentile point in the historical data?

   Answer: It is a test, but there is no specific percentile point that EPA will use to determine whether the test has been passed. EPA has not set pass/fail statistical criteria for this element but will use a weight of evidence approach to assess each demonstration on a case-by-case basis. The state's role in satisfying this element is to provide analyses and statistics. EPA will use the information provided by the state to determine whether the event was in excess of normal historical fluctuations. "Normal historical fluctuations" will generally be defined by those days without events for the previous years. It is not the state's role to show that the event was above a particular threshold since EPA is not establishing a threshold. EPA acknowledges that natural events can recur and still be eligible for exclusion under the EER; therefore, events do not necessarily have to be rare to satisfy this element.

   The submittal of data showing how the event concentration compared with historical concentrations will help EPA determine whether the "clear causal relationship," "but for," and "affects air quality" criteria have been satisfied. These EER criteria, as well as "not reasonably controllable or preventable," need to be satisfied for EPA to concur on an exceptional event claim. EPA expects that failure on this element indicates likely failure for "clear causal relationship" and/or "but for" as well, and thus does not expect that non-concurrence will result from failure of this element alone. However, failure to submit a comparison would prevent EPA from being able to approve exclusion of the data in question.

   EPA recommends that each "historical fluctuation" demonstration submittal contain a minimum set of statistical analyses described in more detail in subsequent questions. Submission of the identified statistical analyses will be considered to have met the requirement to "provide evidence."

   It is important to note, however, that there is no outcome of the "historical fluctuation" statistical comparison that, by itself, can guarantee that the clear causal relationship and "but for" elements will also be successfully demonstrated. EPA will consider in its weight-of-evidence approach the comparison of the concentrations during event(s) in question with historical concentration data. For example, a uniquely high concentration

in an area (and season) with no previous exceedances, with a clear causal connection, and with no evidence of any other plausible explanation would be a case in which the weight-of-evidence would indicate that the "but for" criterion has been demonstrated. In contrast, if the event-affected concentration does not stand out much from normally occurring exceedance concentrations for the same place and season, the statistical comparison will not by itself provide much support for "but for" in the weight-of-evidence consideration.

2. **Question:** What evidence does EPA want included in the demonstration as part of a comparison of a measured concentration with normal historical fluctuations, including background?

   Answer: EPA would prefer an analysis showing how the observed concentration compares to the distribution of historical concentrations. To speed EPA review, avoid the need for EPA to request additional information, and ensure that EPA understands the position of the submitting agency; this analysis should consist of the following types of statistics, graphics, and explanatory text:

   - Comparison of concentrations on the claimed event day with past historical data (see Question A3 for additional detail). The historical comparisons can be made on an annual and/or seasonal basis, depending on which is more appropriate. For example, if PM or ozone data at the location show clear seasonality (i.e., exceedances are nonexistent or extremely rare in some seasons but not others, or concentrations vary according to season due to meteorological conditions), discussing that information in the demonstration is likely appropriate. In contrast, if exceedances can be expected throughout the year, analysis of annual data would likely be more appropriate. For seasonal comparisons, EPA recommends using all available seasonal data from at least three but preferably five or more years and the analysis should discuss the seasonal nature of pollution for the location being evaluated. Depending on the quantity of data, it may be appropriate to present monthly maximums; however, it is not appropriate to present monthly-averaged daily data or any other average of the daily data as this masks high values. Regardless of whether seasonal or annual data are presented, all data should be provided in the form relevant to the standard that is being considered for data exclusion (see Question 30). Specific examples of analyses of annual and seasonal data, as well as analyses of historical speciated $PM_{2.5}$ fluctuations and spatial distribution fluctuations are included in the presentation located at http://www.epa.gov/ttn/analysis/docs/IdeasforShowingEEEvidence.ppt. Examples of graphics are also included in the response to Question A3.

   Additionally, it may be useful for the comparison of concentrations on the claimed event day with past historical data to label appropriate data points as being associated with concurred exceptional events, suspected exceptional events, or other unusual occurrences. As additional evidence to use in interpreting the data, it may also be useful to include comparisons omitting such points. The intent of these comparisons is to present a time series of concentration data for the event area, thereby giving a full and accurate portrayal of the historical context for the claimed event day.

- Comparison of concentrations on the claimed event day with a narrower set of similar days: Similar days could include neighboring days (*e.g.*, a time series of two weeks) and other days with similar meteorological conditions (possibly from other years). The objective of such a comparison would be to demonstrate that the event caused higher concentrations than would be expected for given meteorological and/or local emissions conditions.

- Percentile of concentration relative to annual data. The percentile of the event-day concentration should be provided for the event day relative to all measurement days over the previous 3-5 years. To ensure statistical robustness, EPA expects a minimum of 300 data points to be included in this calculation. The daily statistic should be appropriate for the form of the standard being considered for data exclusion (see Question 30).

- Percentile of concentration relative to seasonal data. The percentile of the event-day concentration should be provided for the event day relative to all measurement days for the season (or appropriate alternative 3-month period) of the event over the previous 3-5 years. It is appropriate to use the same time horizon as used for the percentile calculated relative to annual data.

(Note: The use of percentiles is illustrative and should not be seen as a bright line to be passed or failed when comparing observed concentrations with historical values.)

3. **Question**: How will the submitted "historical fluctuations" evidence be considered when EPA assesses whether the "but for," and "clear causal relationship" criteria are met?

   Answer: EPA will review the submitted analyses showing how the observed concentration compares to the distribution of historical concentrations to determine whether the event is associated with a measured concentration in excess of normal historical fluctuations and will assess the other criteria, in part, based on this historical fluctuations comparison. When the observed concentration is higher than all or nearly all normal historical concentrations (i.e., concentrations when there was not an event), EPA may need less additional evidence to demonstrate the "but for" finding. When the concentration is similar to or higher than a larger number of normal historical values, EPA may want additional evidence (*e.g.*, PM or VOC speciation data) to support the "but for" and "clear causal relationship" demonstration requirements. The additional evidence will help differentiate the concentration increment caused by the event in question from other, non-event causes.

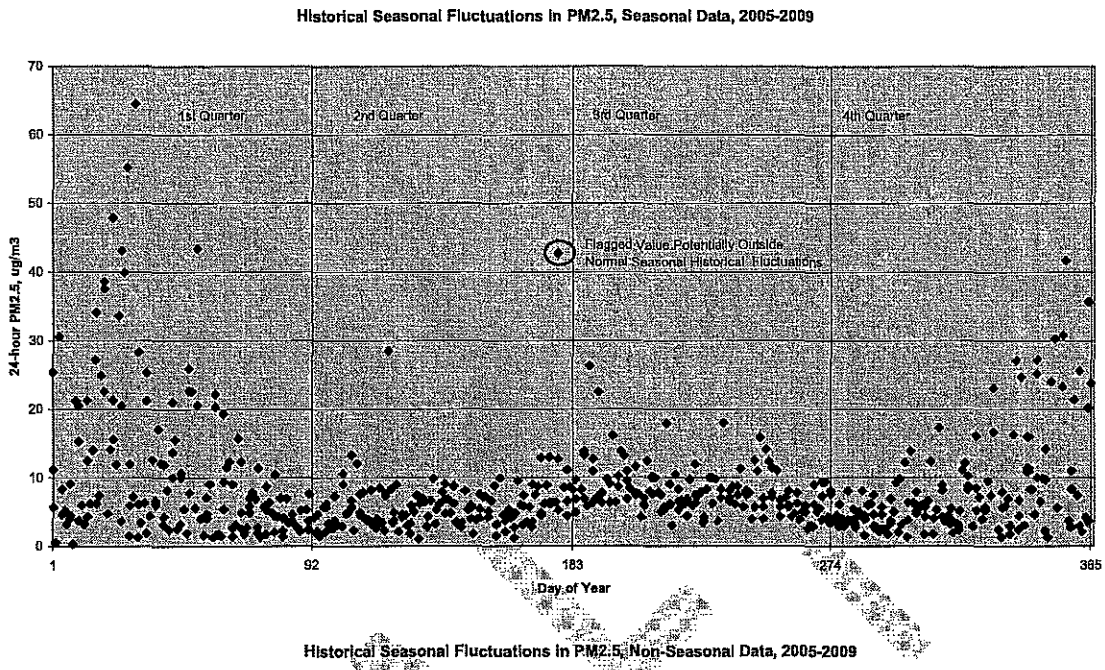
   Stated another way, EPA's intended use of the data is to determine whether the historical fluctuations prong has been met and to influence how much information of other types is needed to successfully meet the other demonstration criteria (i.e., "but for" and "clear causal relationship") of 40 CFR § 50.14 based, in part, on the degree to which the measured concentration is in excess of normal historical fluctuations.

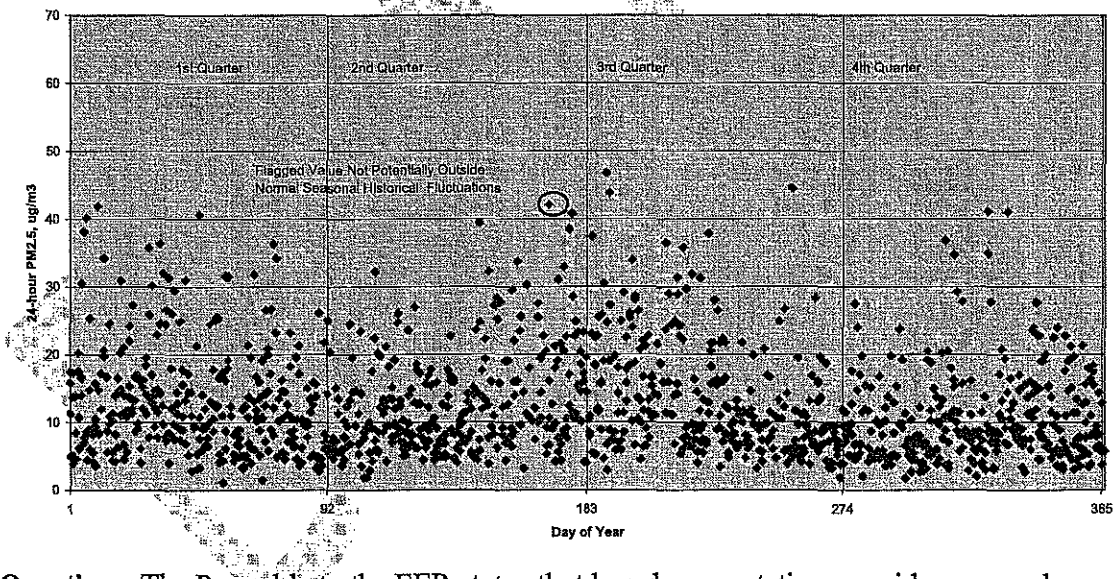
Submitting agencies are encouraged to discuss available historical fluctuation evidence with the appropriate EPA Regional Office prior to submitting the event demonstration package to determine if specific information might assist in the review process.

Additional Examples and Explanation Concerning "Historical Fluctuations" Evidence
(Note: The discussion and graphics that follow illustrate the type of analyses and discussion that are described in this question and in Question A2 and that might be included in a submittal showing that an event is associated with a measurement "in excess of normal historical fluctuations.")

The evidence comparing the event-affected concentration with historical concentrations is most helpful to a state's demonstration if it shows that the event-affected concentration is high compared to all, or nearly all, historical concentrations generated by normal emissions and ambient conditions. This scenario makes it more plausible that the event caused the observed excess concentration rather than that some other causal event occurred on the same day as the known event. If similar events have been very rare in the past, it may be possible to make this point by labeling appropriate data points as being associated with concurred exceptional events, suspected exceptional events, or other unusual occurrences. To facilitate EPA's understanding of the impact of these events, states may also include comparisons omitting such points.

The following figures demonstrate the concept of seasonal emissions fluctuations. The first figure shows an exceedance level $PM_{2.5}$ value in late spring that is outside the range of the 3 to 5-year historical data set for non-wintertime $PM_{2.5}$, while the second figure shows a similar data value for a different part of the country where similar exceedance concentrations occur throughout the year, suggesting that some non-event process(es) can cause high concentrations all during the year. In the first case, a seasonal assessment of historical fluctuations would be appropriate, while annualized data analysis might be more appropriate for the second case to provide the most robust yet also representative historical data set.





4. **Question:** The Preamble to the EER states that less documentation or evidence may be needed to demonstrate that an event affected air quality for flagged data > 95th percentile than for values > 75th percentile. For ozone, PM_{10} and 24-hour $PM_{2.5}$, in areas near the standard, exceedances are often near or above the 95th percentile of historical data. In these cases, will EPA accept less documentation to demonstrate that an event affected air quality simply because an event-affected concentration is above the 95th percentile of the historical concentrations?

Answer: The preamble statement paraphrased in the question above was intended to address National Ambient Air Quality Standards (NAAQS) that are based on averaging

periods of many days, such as annual, quarterly and/or 3-month rolling average NAAQS. NAAQS with 1-hour, 8-hour or 24-hour averaging periods only allow a small percentage of days to have concentrations above the level of the NAAQS. Flagging and excluding data falling at around the 75th percentile point of the historical concentrations can have no effect on whether an area is found to meet or violate one of these NAAQS, making a discussion of such flagging irrelevant. Data around the 75th percentile point can, however, affect compliance with NAAQS having a quarterly average, 3-month average, or annual average standard. For the annual $PM_{2.5}$ NAAQS, it is true that showing that the Exceptional Events rule criteria are met will be more difficult for values near the 75th percentile point than for values near the 95th percentile point because it is more likely that values near the 75th percentile point are related to non-event causes.

Other questions and answers in this Q&A document address situations involving NAAQS with short averaging periods.

5. **Question:** Some pollutant demonstrations do not (or poorly) characterize the historical fluctuations of the observed concentrations at the monitor affected by the event. How can one judge whether the demonstration is adequate in this regard?

   Answer: As previously stated in the response to the historical fluctuations question, EPA will review the submitted analyses showing how the observed concentration compares to the distribution of historical concentrations to assess whether the event is associated with a measured concentration in excess of normal historical fluctuations, and when assessing the exceptional event demonstration criteria of "affects air quality," "clear causal relationship," and "but for" causation. Because the "historical fluctuations" showing is not a statistical demonstration with any defined bright line, states need only submit (with appropriate descriptions and discussion) the type of statistical analyses described in the responses to Questions A2 and A3, and EPA will determine whether these analyses show that the event met this criterion. In addition, as part of its review, EPA will look at both the relationship between the claimed concentration and historical concentrations and the strength of the data set to help inform the evidence needed to demonstrate the clear causal relationship and "but for" criteria.

   In the response to Question A2, we identified that 3 to 5 years of data should be evaluated to ensure some degree of statistical validity. We recognize, however, that these data may not be available for all monitors and/or all pollutants. If data are not available, please consult with the reviewing EPA Regional Office.

B. "But For" Test

Section 319 of the Clean Air Act requires that "a clear causal relationship must exist between the measured exceedances of a national ambient air quality standard and the exceptional event to demonstrate that the exceptional event caused a specific air pollution concentration at a particular air quality monitoring location..." and that [States] can petition [EPA] to "[E]xclude data that is directly due to exceptional events from use in determinations...with respect to exceedances or violations."

The implementing language in the EER at 40 CFR 50.14(c)(3)(iv) states: "The demonstration to justify data exclusion shall provide evidence that:
* * *
(D) There would have been no exceedance or violation but for the event.

6. **Question:** What types of evidence can be included in a demonstration that ozone exceedances would not have occurred but for the effect of a forest fire event?

Answer: States may include any evidence that they consider relevant to the "but for" requirement. However, because the effects of a fire on ozone are complex, such evidence may or may not be sufficient to make a convincing demonstration. Fire can generate ozone precursors, but it can also reduce solar radiation needed to drive ozone formation. Also, fire plumes containing ozone and ozone precursors can pass over a monitoring site without mixing down to ground level and affecting the monitored concentration. Additionally, wildfires often occur during the same seasons that exhibit high ozone caused by anthropogenic precursor emissions making it difficult to separate the wildfire contribution from a high ozone event that would have occurred without the fire.

Examples of relevant evidence follow. Generally, the more types of evidence the demonstration includes, the stronger the case for the exceptional event. Demonstrations that include only one of these types of evidence are unlikely to provide sufficient evidence to enable EPA concurrence.

- Statistical evidence that shows that for the place, time of year, and prevailing weather conditions at the time of the event, past ozone data show no history of exceedances on days that were not affected by a fire event, or that shows that exceedances were so infrequent as to make the fire at issue the more likely cause of the observed exceedance.
- Unusual diurnal patterns of hourly or minute-by-minute ozone concentrations, such as a spike or peak other than at the normal time of day. This could be demonstrated by comparing the event pattern to the range of diurnal patterns exhibited on typical high ozone days.
- Evidence that the normally good correlation between the affected monitor and a monitor clearly outside the area of influence of the fire was disrupted on the day of the fire event in a manner not seen on non-fire days.
- Evidence that there were no known unusual emission releases from non-fire sources at the time of the fire event, such as from traffic due to a sports or entertainment event or source non-compliance.
- Evidence that the plume from the fire passed over the location of the monitoring site, and mixed down to ground level. This can include satellite images, wind data including HYSPLIT trajectories, visual smoke observations, and chemical analysis of PM filters showing elements and compounds that are markers for biomass burning.

- Altered pollutant amounts, ratios, or patterns that indicate the affect of the event rather than non-event sources. This information could include the level, timing and patterns of CO and PM; PM size distribution or composition; indicators of precursor composition and "age", such as oxygenated VOCs, radicals, sulfates, and timing and pattern of NO_2 and NO; and pollutant ratios, such as CO/NO_x, CO/PM_{10}, Elemental Carbon (EC)/Organic Carbon (OC), O_3/NO_y and O_3/CO.
- A prediction that the "normal" ozone concentration would have been below the level of the NAAQS. "Normal" ozone concentrations can be predicted using statistical methods based on previous-day ozone and same-day weather variables (like methods used for air quality advisories in some areas) or using air quality models. If either type of prediction is included in a demonstration, EPA will likely give it consideration only if the demonstration package also includes information on the uncertainty of the prediction methods, i.e., information on its past success in predicting normal ozone levels. The demonstration should also explain the predictive method in terms that are understandable enough to allow informed public comment.
- A prediction based on air quality/photochemical modeling of the incremental ozone concentration due to the emissions from the fire, from comparing modeling results with and without the emissions from the fire. A demonstration that includes such evidence should address the uncertainties in the emission estimates for the fire including the speciation of the VOC and NO_x emissions, and the uncertainties due to other aspects of the modeling platform such as grid cell size, etc.

EPA is preparing a separate document that provides more guidance for preparing a demonstration for wildfire events that are believed to have affected ozone concentrations. In addition, EPA will post on its exceptional events website example demonstration packages that illustrate the type and scope of analyses that constitute complete submittals for ozone-related exceptional events.[3]

C. Exceptional Event Data Flagging Schedules

7. **Question:** When EPA revises the National Ambient Air Quality Standards, how will it notify states of the schedules and deadlines for flagging and documenting exceptional event data for designations purposes?

Answer: When 40 CFR § 50.14, "Treatment of Air Quality Monitoring Data Influenced by Exceptional Events," was revised in March 2007, EPA was mindful that designations would be occurring under the then-recently revised $PM_{2.5}$ NAAQS. Exceptions to the generic deadline of July 1 of the calendar year following the datum year (see 40 CFR § 50.14(c)(2)(iii)) were included for $PM_{2.5}$ in the rule. EPA was also mindful that similar issues would arise for subsequent new or revised NAAQS. The Exceptional Events Rule at section 50.14(c)(2)(vi) indicates "when EPA sets a NAAQS for a new pollutant, or revises the NAAQS for an existing pollutant, it may revise or set a new schedule for

[3] http://www.epa.gov/ttn/analysis/exevents.htm

flagging data for initial designation of areas for those NAAQS." See as examples, the data flagging schedule identified in the SO_2 NAAQS final rule at 75 FR at 35592 or the data flagging schedule identified in the NO_2 NAAQS final rule at 75 FR at 6531.

D. General AQS Procedures

8. **Question:** May a state flag any data in EPA's ambient air quality database, Air Quality System (AQS), it wishes?

- **Answer:** Yes, but EPA encourages states to only flag data that might have a regulatory consequence and for which an approvable demonstration is likely. In particular, while the EER does not prohibit states from flagging individual concentration values below the level of the NAAQS, in general only such data that contribute to a violation of the NAAQS are excludable. See Questions 29-31 for more information. Should states wish to flag values for informational purposes, EPA prefers that they use the "I" series flags (see Question D10 below).

9. **Question:** Is it possible for an initial description to be inadequate (for example, "fires in surrounding states")?

Answer: Yes, initial descriptions could be inadequate, in which case they will need to be improved. The preamble to the Exceptional Events Rule explains: "At the time the flag is inserted into the AQS database, the State must also provide an initial description of the event in the AQS comment field. This initial description *should include such information as the direction and distance from the event to the air quality monitor in question, as well as the direction of the wind on the day in question.*" 72 FR at 13568 (emphasis added). The intent of this initial description is to provide a preliminary minimum explanation as to why the flagged data warrant consideration as exceptional events. EPA believes that providing this initial description will encourage states to only flag data that might have a regulatory consequence and for which an approvable demonstration is likely. The initial event description also notifies EPA of potential forthcoming demonstration packages and assists EPA with its review and prioritization. While EPA is not specifying pass/fail criteria for the initial description, Regional Offices should discuss with the originating submitting agency any description the Regional Office determines to be inadequate. Submitting agencies should then insert in AQS a mutually agreed-upon description.

10. **Question:** What is the difference between the "R" series flags and the "I" series flags, and how should they be used?

Answer: The "I" series flags (Information only) and "R" series flags (Request Concurrence) are both available for use by monitoring agencies. The "I" series are for information only and the "R" series are for use where the state requests or expects to request EPA concurrence. As an example, states may use an "I" series flag to initially identify values they believe were affected by an event. Once the state collects additional supporting data, they may change the flag to an "R" series flag and submit an initial event description. Or, the state may find that additional information does not support flagging

the data as an exceptional event, and the state may, therefore, delete the flag or retain the "I" series flag. EPA does not intend to review or concur on the Information Only "I" series flags. States should ensure that they have submitted the correct flag by July 1 of the calendar year following the year in which the flagged measurement occurred or by the other deadlines identified with individual NAAQS revisions (see Question C7).

11. **Question:** The "j" flag was "Construction/Demolition." The new IE/RE flag is demolition; can it also be used for construction?

    Answer: No, the IE/RE flag should not be used for construction.

    Generally, construction activity is not considered to be exceptional. Reasonable and appropriate controls capable of preventing localized NAAQS exceedances are expected to be available during most construction events. In some cases, however, construction activities may involve very high-energy emissions-generating physical processes, such as explosive excavation. This might be a scenario in which dust control measures are not adequate to prevent exceedances / violations in the vicinity of the activity.

    If an agency wishes to "flag" data related to exceedances caused by some construction activity, the agency should use the IL/RL "other" exceptional events flag. The IE/RE flag should only be used when an exceptional demolition event occurred and the agency wishes to flag the data for exclusion as an exceptional event. States using either the IE/RE (demolition) flag or the IL/RL (other, including construction) flag to identify an exceptional event would be expected to show in a demonstration submittal that all reasonable and appropriate controls were in place during the construction / demolition activity, and that those controls proved inadequate to prevent NAAQS exceedances. The demonstration would also need to meet all other requirements of the Exceptional Events Rule.

12. **Question:** The National Park Service operates ozone monitors in some locations that meet all requirements of 40 CFR part 58. Can a state request exclusion of data from such monitors under the EER, and exclusion of other data not collected by the state itself that may lead to a nonattainment finding?

    Answer: Yes. However, special steps need to be taken with regard to data handling within AQS. Under normal circumstances, a state will not have access rights to apply event flags to data from monitors operated by the National Park Service or other federal agencies. The state should first contact the agency operating the monitor to request it to flag the data in question. If the request is unsuccessful, the state should contact the EPA Regional Office for assistance. Regardless of whether the monitor operator or the EPA Regional Office flags the data in question, it is the state's responsibility to prepare the demonstration and submit it to EPA under the applicable schedule. The agency operating the monitor may choose to assist in this process.

13. **Question:** Events can make an air concentration significantly higher than it would have been in the absence of the event contribution, and elevate the 3-year design value for

ozone or $PM_{2.5}$. Depending on the magnitude of the effect and how the "normal" concentration compares to the NAAQS, the "but for" test may not be satisfied. However, retaining such data in the calculation of a design value for a nonattainment area can elevate the classification status of a nonattainment area (e.g., serious instead of moderate) or make it seem that the area needs more emissions reduction to attain the NAAQS than is actually the case. How will EPA deal with such a situation when reviewing classification status or an attainment demonstration? How, if at all, should AQS be used to flag such data?

Answer: When the available evidence indicates that there would have been an exceedance of a NAAQS even in the absence of the event, the event is not "exceptional" under the EER because the "no exceedance but for" criterion is not satisfied. Yet, this event-related concentration could still impact design values. If the design value is used for an classification of an ozone nonattainment under Subpart 2 of Part D of Title I of the CAA, then it may seem that the area should be classified into a higher category (e.g., severe instead of serious). Similarly, a state incorporating the event-related concentration in a design value used for an attainment demonstration might seem to need more emission reductions to attain the NAAQS than is actually the case.

To illustrate the classification scenario using the 1997 8-hour ozone NAAQS of 0.08 ppm assume that the three annual 4th highest daily maximum 8-hour ozone concentrations for a monitoring site for 2001-2003 were 0.105, 0.105, and 0.115 ppm for each respective year with a resulting 3-year design value of 0.108 ppm which is a violation of the NAAQS. Also, assume that the 5th highest concentration in 2001 below the 0.105 ppm was 0.085. The 0.105 ppm concentration in 2001 was affected by a one-day wildfire, and the state was able to show that the concentration would have been 0.087 ppm without the fire. Because both 0.105 and 0.087 are exceedances, the event on that day does not meet the "but for" test when viewed from an "exceedance" perspective. Moreover, from a "violations" perspective, the 2001 value also would not meet the "but for" test, because the "no event" concentration value of 0.087 for the event day in 2001 would still be the 4th highest concentration in 2001 and would still result in a 3-year design value of 0.102 ppm which is a violation. However, a design value of 0.108 ppm corresponds to a classification of serious, while the no-event design value of 0.102 ppm would correspond to a classification of moderate.

To illustrate the attainment demonstration scenario, assume that the three annual 98th percentile 24-hour $PM_{2.5}$ concentrations for a monitoring site for 2006-2008 are 44, 31, and 37 $\mu g/m^3$ for each respective year, with a resulting 3-year design value of 37 $\mu g/m^3$ which is a violation. Also, assume that the next highest concentration in 2006 below the 44 $\mu g/m^3$ was 40 $\mu g/m^3$. The 44 $\mu g/m^3$ concentration in 2006 was affected by a one-day wildfire, and the state was able to show that the concentration would have been 41 $\mu g/m^3$ without the fire. Because both 44 $\mu g/m^3$ and 41 $\mu g/m^3$ are exceedances, the event on that day does not meet the "but for" test when viewed from an "exceedance" perspective. Moreover, from a "violations" perspective, the 2006 value also would not meet the "but for" test, because the "no event" concentration

value of 41 $\mu g/m^3$ for the event day in 2006 would still be the 98th percentile concentration and would still result in a 3-year design value of 36 $\mu g/m^3$ which is a violation. However, an attainment control strategy based on a design value of 37 $\mu g/m^3$ might be more stringent than needed to attain by the attainment deadline.

States that have measured pollutant concentrations that were affected by an event that do not pass the "but for" determination and that are affecting the 3-year design value in a manner similar to those in the examples should document their analysis of the event as part of their designation/classification recommendations or attainment demonstration SIP submission, as applicable. EPA believes it may be appropriate, on a case-by-case basis, for the classification status or attainment demonstration to reflect the lower concentration that would have occurred without the event, since the strategies in the SIP should not be required to control the event-related emissions contribution to the concentration or to reduce future emissions of other sources to compensate for the air quality effect of the event-related emissions. It may be possible for the state to make and support an explicit adjustment to the concentration value to "back out" the non-controllable influence of the event. States could accomplish this by consulting with their EPA Regional Office and by using techniques similar to those that might be used in a "but for" demonstration under the EER, including the identification of that portion of the event-related emissions that were controllable. These techniques are described in more detail in other questions in this Q&A document (see Questions B6 and E25).

To avoid confusion when EPA reports data to the public or makes retrospective attainment demonstrations, states should not use AQS "request exclusion" flags on such data. EPA Regional Offices will not concur on flags for data that do not meet all requirements of the EER. AQS "information only" flags may be used if this assists the state with tracking data affected by such events.

EPA may develop additional guidance on this topic in the future in the context of modeled attainment demonstrations. States should consult with their EPA Regional Office if they face this situation.

E. General Exceptional Events Rule Applicability and Implementation Issues

14. **Question:** The Preamble to the Exceptional Events Rule states that EPA Headquarters or the EPA Regional Office will make its decision on demonstrations public. See 72 FR at 13574 ("The EPA regional offices will work with the States, Tribes, and local agencies to ensure that proper documentation is submitted to justify data exclusion. EPA will make the response and associated explanation publicly available."). What method does EPA plan to use to make the explanation "publicly available?"

Answer: EPA posts demonstration packages and decisions (consisting of state demonstration submittals, EPA responses, and EPA technical support documents) on EPA Regional Office web sites and/or the Technology Transfer Network web site.[4] In

[4] http://www.epa.gov/ttn/analysis/exevents.htm

certain instances, an EPA concurrence or non-concurrence determination may be a factor in a rulemaking that includes a public comment period. In these cases, the same information that is posted on EPA websites, and any additional supporting correspondence, will also be posted in the relevant rulemaking docket. Further, EPA plans to make the demonstrations and Regional decisions available to interested parties upon request.

15. **Question:** It is possible for events to affect more than one state. Each state must then submit its own exceptional events demonstration package, which may result in redundant work. Could EPA take on multi-state demonstrations?

    Answer: The primary responsibility for developing demonstrations lies with state and local monitoring agencies. States are encouraged to coordinate with each other in compiling demonstration packages and may submit some of the same data, if appropriate. Each NAAQS exceedance, however, will likely have some unique properties (e.g., unique monitoring locations, different surrounding and potentially contributing sources with varying levels of control, different historical concentration patterns, etc.). Individual submittal packages will be necessary to address these unique characteristics.

    For example, if multiple states are affected by a Saharan dust plume, they could collaborate and submit a common demonstration component (e.g., the same or very similar information in multiple submittals) for the "not reasonably controllable or preventable" and "human activity unlikely to occur or natural event" elements. Because the actual event-related exceedance would have been measured by different monitors located in different regions with possibly different contributing factors (e.g., rural monitor affected by both dust from feedlots and Saharan dust and urban monitor affected by both nearby industrial sources and Saharan dust), the "clear causal relationship," "but for," and "historical fluctuations" elements are likely to differ from one state submittal to another.

16. **Question:** Does the EER address scenarios in which temporary activities (e.g., multi-month or multi-year road construction / demolition projects) significantly impact a previously-sited monitor such that the monitor is no longer representative of the area, but rather functions more like a "hot-spot" monitor?

    Answer: Except for $PM_{2.5}$, there is no difference in how monitoring data are treated from "area-wide" monitors (i.e., neighborhood scale) and hot-spot monitors (i.e., microscale). All such data, if meeting applicable CFR regulations, are comparable to the NAAQS. For $PM_{2.5}$ a unique microscale or hot-spot monitor is only comparable to the 24-hour NAAQS and not to the annual $PM_{2.5}$ NAAQS. A state may indicate in its annual monitoring plan (or an update to that plan) that a monitor affected by temporary, localized activities should be considered as a microscale rather than a neighborhood scale monitor. If approved by the Regional Office, this will prevent the data being used to compare with the annual $PM_{2.5}$ NAAQS (see 40 CFR § 58.30). Note also that designating a monitor as "special purpose" does not disqualify its data meeting the applicable 40 CFR

part 50 and 58 requirements from comparison to the NAAQS when EPA makes an attainment determination.

The EER does not specifically address temporary anthropogenic emission sources such as construction projects. However, neither does the EER explicitly place a limit on the duration of a single event. A submitting agency could make a showing that a claimed event (e.g., a multi-year road construction project) is not likely to recur at the location in question. If the remaining exceptional event criteria and demonstration criteria are met, including the requirement that the event (including the emissions from the project) is not reasonably controllable, the activity might qualify as being an exceptional event.

States not wishing to develop exceptional event demonstration packages for the described scenario can request agreement from the EPA Regional Office to relocate a monitor that no longer meets monitoring objectives. This process is, however, time consuming and resource intensive, so states usually "monitor through" the disruption or ask their Regional offices to support a temporary shut-down. When EPA Regional Offices approve temporary shut-downs, states should assign a Null Data Code in AQS for "construction/repairs in area" (AC) to identify and invalidate data associated with periods of local construction.

17. **Question:** Volcanoes on Hawaii are causing 24-hour SO_2 exceedances, which are clearly volcanic exceptional events. Section 319 of the Clean Air Act and CFR require EPA to provide states with a method to flag and petition EPA for exclusion of exceptional events data. When will EPA provide the method for SO_2?

    Answer: AQS has been modified to allow flags on all criteria pollutant data. The specific schedule for exceptional event flagging and documentation submission for data to be used in designations decisions is identified in the final primary SO_2 NAAQS rule (see preamble at 75 FR at 35585-35586 and regulatory text at 75 FR at 35592). The correct flag to use for a volcanic eruption event is "RS."

18. **Question:** Carbon monoxide (CO) flags are in AQS for exceedances caused by fires, but the CO NAAQS does not reference the Exceptional Event Rule. What is EPA's approach for the treatment of CO data affected by exceptional events?

    Answer: CO flagging, including the option for EPA concurrence, has been enabled in AQS. CO flags from structural fires and wildfires that qualify as exceptional events have been allowed in historic EPA guidance. The EER Preamble (72 FR at 13563) explains EPA's position with respect to exceptional event flagging for pollutants for which the statement of the NAAQS in 40 CFR part 50 does not explicitly reference the Exceptional Events Rule: "In the interim, where exceptional events result in exceedances or violations of NAAQS that do not currently provide for special treatment of the data, we intend to use our discretion as outlined under section 107(d)(3) not to redesignate affected areas as nonattainment based on these events." Therefore, states may flag CO data in AQS and EPA may apply the same process and approval criteria as in the Exceptional Events Rule.

On February 11, 2011, EPA proposed to retain the current suite of CO standards without revision (see 76 FR at 8158). Because EPA proposed no revisions to the CO standards, it proposed no related changes to the Exceptional Events rule. If, however, the CO NAAQS are revised, EPA would explicitly address CO flagging schedules and exceptional events in rule language concurrent with re-proposal or promulgation of the CO NAAQS.

19. **Question:** The limited maintenance plan requirements for PM_{10} require a demonstration that the area design value is less than or equal to 98 $\mu g/m^3$. Flagging of values between 98 $\mu g/m^3$ and the NAAQS are therefore relevant for this regulatory decision. Can these values, which are not exceedances and do not contribute to violations, be flagged and receive EPA concurrence?

    Answer: Yes. The May 7, 2009, memorandum from William T. Harnett to Regional Air Division Directors states the following regarding the PM_{10} limited maintenance plan option: "In determining eligibility for the limited maintenance plan option, EPA will treat 24-hour average air quality data between 98 $\mu g/m^3$ and 155 $\mu g/m^3$ in a manner analogous to the treatment of exceedance data under the Exceptional Events Rule, provided the impacted data meet the general definition and criteria for exceptional events (natural event, or exceptional event that is not reasonable controllable or expected to recur)." This memorandum is posted on the EPA website at http://www.epa.gov/ttn/oarpg/t1/memoranda/lmp_final_harnett.pdf

20. **Question:** Exactly which section(s) of the preamble to the final Exceptional Event Rule has been declared a "legal nullity" by the court, and what does that mean?

    Answer: In *NRDC v. EPA*, No. 07-1151 (D.C. Cir. 3/20/09), the DC Circuit Court states that "In one section of the preamble, EPA refers to its 'final rule concerning high wind events', which 'states that ambient particulate concentrations due to dust being raised by unusually high winds will be treated as due to uncontrollable natural events' when certain conditions apply (72 Fed. Reg. 13576). There is no such final rule. The final rule [language in 40 CFR 50 and 40 CFR 51.930] does not mention high wind events or anything about 'ambient particulate matter concentrations.' EPA calls this a drafting error. In light of the error, the high wind events section of the preamble is a legal nullity."

    EPA considers the "high wind events section of the preamble" to which the court referred to be the section titled "*B. High Wind Events*" beginning on 72 FR at 13576. This does not necessarily mean that these passages do not reflect EPA's interpretation of what might be appropriate under the EER. Rather, it means that other parts of the preamble and other EPA guidance should be relied upon instead of statements in these passages of the final rule preamble, which should be treated as not having been published.

21. **Question:** The Exceptional Event rule allows for exclusion of data affected by a prescribed fire if the usual requirements of the rule are satisfied and if the state has adopted and is implementing a Smoke Management Program or if the state has ensured

that the burner employed basic smoke management practices. Are there minimum requirements for a Smoke Management Program? What are "basic smoke management practices?"

Answer: EPA is developing separate guidance to address this issue which will be issued at a later date following an opportunity for stakeholder input.

22. **Question:** Is there a tie between the requirements of 40 CFR 51.930 Mitigation of Exceptional Events and EPA approval for exclusion of data affected by an exceptional event?

Answer: While the granting of data exclusion under the EER does not depend on state actions to meet the requirements of 40 CFR § 51.930, EPA encourages the submittal of a mitigation plan with the demonstration package. The Exceptional Events Rule was promulgated pursuant to Section 319 of the Clean Air Act which contains a provision that each state "must take necessary measures to safeguard public health regardless of the source of the air pollution..." This provision was the basis for the mitigation requirements in 40 CFR §51.930 and the requirement in the EER at 40 CFR §50.14(c)(1)(i) that all states must "notify the public promptly whenever an event occurs or is reasonably anticipated to occur which may result in the exceedance of an applicable air quality standard." The language at 40 CFR §51.930 requires that:

> "(a) A State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the State must:
>
> (1) Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
> (2) Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
> (3) Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events."

Although the language at 40 CFR §51.930 does not require the preparation or submittal of a mitigation plan, it does require that the state develop and implement processes and measures that could easily become the elements of a formal, written plan. For this reason, and because having a mitigation plan in place will help states meet the EER requirements at 40 CFR §50.14(c)(1)(i) related to public notification more systematically, EPA encourages the development and submittal of a mitigation plan with the demonstration package if one has not already been adopted.

23. **Question:** Need a state (or tribe) make an argument or submit evidence about control measures for events that took place in other states or countries, on federally-owned and managed land, or on tribal (or state) lands not subject to state (or tribal) regulation?

    Answer: EPA does not expect a demonstration to address the status of control measures for sources in other countries or other states. Submissions by states do not need to address control measures for Indian country, and submissions by tribes do not need to address control measures for lands under state jurisdiction. EPA believes that controls on sources over which a state or tribe has no jurisdiction would not constitute reasonable controls for such state or tribe to impose. States and tribes should consult with their EPA Regional Office early in the development of an exceptional event demonstration package if they believe that emissions from sources on federally-owned and managed land have been affected by an event in a way that raises issues of reasonable control. Note, however, that demonstrations should not ignore the role of such lands, because their proximity and contribution to a measured concentration can be important to understanding an event overall.

24. **Question:** Need a state (or tribe) make an argument or submit evidence about control measures for air quality impacts from wind-blown dust from desert land in its natural state or about control measures for air quality impacts from wildfires?

    Answer: While EPA's position is generally that impacts from wind-blown dust from undisturbed natural deserts are inherently not reasonable to control, the state would need to assert this and provide appropriate supporting documentation in its demonstration package. The supporting documentation should include a discussion of the historical land use, including prior disturbances, water diversions and other historical practices which may have occurred on the land, even if the land seems or is considered to be "undisturbed" at present. Similarly, emissions from wild fires ignited by natural sources are also generally not reasonable to control. Like the previous example, states should present information that supports the claim that these emissions are "not reasonably controllable or preventable."

25. **Question:** Is there a template or example for preparing a demonstration document?

    Answer: The guidance document, "Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Event Rule," provides this type of advice for demonstrations for high wind dust events. EPA has also developed a presentation entitled, "Presenting Evidence to Justify Data Exclusion as an Exceptional Event: Ideas based on how EPA has recently documented events to support regulatory decisions." This presentation can be downloaded from the following site: http://www.epa.gov/ttn/analysis/docs/IdeasforShowingEEEvidence.ppt. Additionally, EPA is developing a separate guidance document addressing the preparation of demonstrations to support wildfire-related ozone event claims.

26. **Question:** Where can a state find examples of demonstrations from other states that have been approved by EPA?

    Answer: Approved demonstrations are posted at http://www.epa.gov/ttn/analysis/exevents.htm.

27. **Question:** How quickly will EPA review the demonstration document and provide feedback to the state on the approval, or on any suggested improvements?

    Answer: EPA generally intends to conduct its initial review of a submitted exceptional event demonstration package within 120 days of receipt. During this time, EPA will generally determine whether to review the package in the near-term or to defer review. For those packages that are reviewed in the near-term, EPA will also assess completeness. Following this initial review, EPA will generally send a letter to the submitting agency that includes the status of review. For those packages that EPA will review in the near-term, EPA will generally include the following: a completeness determination and/or a request for additional information, a deadline by which the supplemental information should be submitted (if applicable), and an indicator of the timing of EPA's final review. EPA will generally give priority to exceptional event determinations that affect near-term regulatory decisions and may defer review of demonstration packages that are not associated with near-term regulatory decisions. If an agency wants to know whether EPA intends to review an exceptional event in the near-term, it can send a letter indicating its intent to submit a package prior to preparation of the exceptional events package. EPA intends to respond to such a letter within 60 days indicating whether the package is expected to be reviewed in the near-term, thus allowing an agency to prioritize resources for those packages that will be reviewed in the near-term.

    EPA intends to make a decision regarding concurrence with a state's flag within 18 months of receipt of a complete package for those demonstrations that impact a near-term regulatory action, or sooner if necessary to support a regulatory action. EPA intends to communicate with the submitting agency, as needed, during the demonstration review period. EPA will not generally be able to consider state-provided information that is submitted after a concurrence or non-concurrence determination for a submitted demonstration is made unless the information is provided as a timely comment during, for example, a public comment period on a related regulatory action.

    Submitting agencies that believe their demonstration packages are tied to near-term regulatory actions should submit their demonstration packages well in advance of the regulatory deadline. States should also identify the relationship between the exceptional event-related flagged data and the anticipated regulatory action in the cover letter that accompanies their initial submittal package to the reviewing EPA Regional Office.

28. **Question:** Will EPA ever perform and consider additional data analysis itself before deciding whether to approve a state/tribe-submitted demonstration in support of data exclusion?

Answer: In general, EPA will not prepare analyses or additional arguments to be included as components in a submitted demonstration package. Rather, EPA will recommend demonstration package improvements to the submitting agency. However, if a demonstration package is associated with an imminent regulatory action and the public interest will be best served by EPA preparing and/or considering additional analyses, EPA may choose to either assist with or independently prepare supporting analyses that could become part of the submission package or an EPA-prepared technical support document. Analyses prepared by EPA could support either approval or disapproval of a state's request for concurrence on flagged data.

F. Exceptional Event Data Flagging for Air Quality Concentrations that Could Contribute to an Exceedance or Violation of the National Ambient Air Quality Standards

29. **Question:** Each criteria pollutant except PM_{10} now has multiple NAAQS in effect that differ by averaging period, and/or there is an "original" and a lower "revised" NAAQS level each of which has regulatory significance. If a measurement value is approved by EPA for exclusion for one particular NAAQS averaging period and level, is it automatically excluded for all the other NAAQS for that pollutant?

Answer: No. The exclusion of a measured air concentration is to be justified and approved separately for each NAAQS that applies to the pollutant.

When initially flagging data, a state does not need to commit to the specific NAAQS for which it seeks to exclude a measured concentration. EPA's ambient air quality database, AQS, is designed to allow a state to apply a single flag to a measured concentration value, which merely indicates the state's interest in excluding that value with respect to one or more of the applicable NAAQS. Later, in the justification (i.e., the demonstration) for exclusion, the state can indicate the specific NAAQS for which it seeks exclusion and for which the demonstration addresses the Exceptional Events Rule criteria. When EPA makes a decision regarding concurrence with a state's flag, it will generally identify in its approval/ disapproval letter (or other official notice) all of the NAAQS for which EPA has concurred on the flag. EPA will also generally set a flag in AQS indicating concurrence with respect to a specific single NAAQS or a specific combination of NAAQS for that pollutant (e.g., in the case of $PM_{2.5}$, the 24-hour NAAQS only, the annual NAAQS only, or both the 24-hour and the annual average NAAQS). This is done by associating one or more "pollutant standard ID" value with the concurrence.

EPA concurrence flags entered into AQS prior to the March 2010 re-engineering of AQS to accommodate the Exceptional Events Rule did not indicate the specific single NAAQS or the specific combination of NAAQS for which the exclusion was approved. These "legacy" concurrence flags have been converted to the new approach using the following defaulting scheme:

- For ozone, all legacy flags were treated as applying to both the 0.08 ppm 8-hour NAAQS and the 0.12 ppm 1-hour NAAQS. This default was chosen because as of March 2010, designations under the 2008 NAAQS of 0.075 ppm had been suspended pending reconsideration of that NAAQS, and AQS staff were not aware of any concurrences already granted with respect to the 0.075 ppm NAAQS.
- For $PM_{2.5}$, all concurrences on events with dates prior to January 1, 2005 (meaning the date of the concentration, not the date of the EPA concurrence) were presumed to be applicable only to the annual $PM_{2.5}$ NAAQS. This default was chosen because prior to the revision of the 24-hour $PM_{2.5}$ NAAQS in 2006, violations of the 1997 24-hour NAAQS were extremely rare.
- For $PM_{2.5}$, all concurrences on events with dates of January 1, 2005 through March 2010 were presumed to be applicable only to the 24-hour NAAQS because there were no revisions to the annual $PM_{2.5}$ NAAQS during this timeframe, so designations to nonattainment for the annual $PM_{2.5}$ standard were extremely rare. This 24-hour $PM_{2.5}$ NAAQS default was chosen because it was possible for designations under the 2008 24-hour NAAQS to be based on data as early as 2005.
- For PM_{10}, all concurrences were presumed to apply to the 24-hour NAAQS, as the annual PM_{10} NAAQS was revoked in 2006.[5]
- For CO, all concurrences were presumed to apply to both the 1-hour and the 8-hour NAAQS. This default was chosen to ensure that the concurrence applied to whichever NAAQS had been exceeded and logically was the basis for the exclusion request.
- For SO_2, all concurrences were presumed to apply to both the 24-hour and the annual NAAQS. This default was chosen to ensure that the concurrence applied to whichever NAAQS had been exceeded and logically was the basis for the exclusion request. No flags were assumed to apply to the 1-hour NAAQS because the 1-hour SO_2 standard was not promulgated until June of 2010, after the AQS re-engineering.
- For Pb, all concurrences (if any existed) were presumed to apply to the quarterly average NAAQS of 1.5 $\mu g/m^3$. This default was chosen because March 2010 was prior to EPA issuing final designations under the 2008 Pb NAAQS of 0.15$\mu g/m^3$.
- For NO_2, all concurrences were presumed to apply to the annual NAAQS because the 1-hour NO2 standard was not promulgated until February of 2010.

For concurrences on events with dates after the March 2010 re-engineering of AQS, EPA will specify the NAAQS to which the concurrence applies. If this defaulting scheme does

[5] EPA realizes that many of the defaulted EPA concurrences for pre-2006 PM_{10} concentrations that were below the level of the 24-hour PM_{10} NAAQS actually were applicable to the annual PM_{10} NAAQS, but this approach was the most practical way to ensure that all other concurrences originally intended to be applicable to the 24-hour NAAQS were preserved. Because concentrations below the level of the 24-hour NAAQS have no effect on attainment determinations for the 24-hour NAAQS, no error can come from treating such values as having been concurred. Nevertheless, EPA Regional Office may choose to update these concurrence flags as time permits.

not properly represent the actual concurrence action that was taken by the EPA Regional Office, the Regional Office should revise and correct the concurrence flags, if they have not already done so.

Detailed information on the use of events flags in AQS can be found in a tutorial posted at http://www.epa.gov/ttn/airs/airsaqs/manuals/ExceptionalEventTutorial.pdf. Concurrence flags are discussed on page 20 of this tutorial.

30. **Question:** For a NAAQS that is defined for a multi-hour or multi-day averaging time, but for which concentrations are measured, reported, and flagged on the basis of a shorter time period, what comparisons between measurements and the NAAQS level should be done to satisfy the "but for" test?

Answer: One requirement for data exclusion under the Exceptional Events Rule is that there would have been no exceedance or violation of the NAAQS "but for" the event. In AQS, flagging and concurrence are done for each individual reported measurement. When the averaging period for the NAAQS is the same as the measurement duration period, individual measurements can be compared directly to the level of the NAAQS. This is the case for the 1-hour ozone, 1-hour CO, 1-hour SO_2, and 1-hour NO_2 NAAQS.[6] However, a difference exists for the following NAAQS between the time period for reporting concentrations and the averaging period to which the level of a NAAQS applies.

- Ozone, CO, NO_2, and SO_2 are reported to AQS as 1-hour measurements, but all three have NAAQS defined for longer averaging periods (3-hours, 8-hours, 24-hours, and/or annual).
- Pb is reported as 24-hour measurements, but the old and new NAAQS are both for three-month averages (quarterly averages and three-month rolling averages, respectively).
- When using automated/continuous monitoring equipment, $PM_{2.5}$ and PM_{10} are sometimes reported as 1-hour measurements but there are $PM_{2.5}$ and PM_{10} NAAQS with 24-hour averaging periods and a $PM_{2.5}$ NAAQS with an annual averaging period.

[6] States have for many years reported SO_2 concentrations as hourly averages. While some states have also voluntarily reported 5-minute average concentrations also, either for each of the 12 5-minute blocks in an hour or for the maximum 5-minute average concentrations (block or running) during an hour, it is the hourly concentration averages that should be compared to the 1-hour SO_2 NAAQS. Under a change in SO_2 monitoring requirements that accompanied the promulgation of the 1-hour SO_2 NAAQS, states are now required to report the maximum 5-minute block average concentration, as well as the hourly concentration (see 40 CFR § 58.12(g)). States may satisfy the 5-minute reporting requirement by submitting all twelve 5-minute block averages or by reporting only the maximum 5-minute block average concentration. EPA's AQS retains the hourly concentration as submitted; AQS does not use 5-minute data to replace the submitted hourly concentration. While 5-minute concentrations may have a role to play in evaluating whether Exceptional Event criteria are satisfied for a given hour and event, for example to establish a clear causal connection, they are not to be compared to the level of the 1-hour (or any other) NAAQS for SO_2 as part of a "but for" demonstration and should not be flagged for exclusion under the EER.

- When using filter-based monitoring equipment, $PM_{2.5}$ and PM_{10} are sometimes reported as 24-hour measurements but there is a $PM_{2.5}$ NAAQS with an annual averaging period.

The mismatches of time periods make this a question with a complex answer. The following paragraphs, summarized in Table Q30-1, explain the general rationale behind the pollutant and NAAQS-specific entries in Table Q30-2.

To satisfy the "but for" criterion, there must have actually been an exceedance or violation of the NAAQS in a time period overlapping with the event and its effects on air quality, and which would not have occurred "but for" the effects of the event.[7] By definition, an exceedance necessarily involves a comparison between an air concentration, averaged over a time period equal in length to the averaging time of the NAAQS, and the level of the NAAQS. For example, it does not make sense to compare an individual 1-hour ozone concentration to the level of the 8-hour NAAQS as part of a test of whether the "but for" criterion is met, because the outcome of the comparison for a single hour does not indicate whether an exceedance or violation of the 8-hour NAAQS occurred, or whether it would not have occurred "but for" the event. Instead, one should consider whether the event made a "but for" difference in the average concentration over the period that is the same as the averaging period for the NAAQS. That is, states making a "but for" argument should compare the average concentration to the identified NAAQS rather than the individual concentrations that comprise the average. States should, however, identify in their exceptional event submission those cases in which a single measurement or several, but not all, measurements cause the elevated average.

The preamble to the Exceptional Events Rule provides one exception from this formal definitional approach. The preamble states that in the particular case of $PM_{2.5}$, the direct comparison of a single 24-hour average concentration (determined from a single filter-based measurement or by averaging 24 1-hour measurements from a continuous equivalent instrument) to the level of the annual NAAQS (currently 15 $\mu g/m^3$) can be the basis for meeting the "but for" criterion for exceedances or violations of the annual NAAQS. In context, it is clear that based on this comparison, a 24-hour concentration can be excluded from the calculation of the annual $PM_{2.5}$ NAAQS design value, if other rule criteria are also met. It is therefore not necessary to show that the annual average $PM_{2.5}$ concentration was above 15 $\mu g/m^3$ with the event and would have been below 15 $\mu g/m^3$ "but for" the single event at issue. Such a concentration can also be excluded from the calculation of the design value for the 24-hour $PM_{2.5}$ NAAQS, although this is likely to make a difference to meeting the

[7] EPA interprets the Exceptional Event Rule and its preamble to mean "exceedance or violation" each time that "exceedance" or "violation" occurs in the text, consistent with the obvious intent of the Clean Air Act amendment requiring EPA to promulgate the Rule. An "exceedance" occurs each time the concentration in the air for the averaging period applicable to the NAAQS is higher than the level of the NAAQS. Most NAAQS allow some such occurrences in a 1-year or 3-year time period (depending on the NAAQS). A "violation" of the NAAQS occurs when there have been enough high-concentration episodes that the statistical form of the particular NAAQS indicates a failure to meet the NAAQS.

NAAQS only if the actual measured concentration were close to or above 35 $\mu g/m^3$. This special case is reflected in Table Q30-2.

In light of this departure in the preamble from a formal definitional approach in the case of a 24-hour $PM_{2.5}$ measurement and the annual $PM_{2.5}$ NAAQS, Table Q30-2 also provides a parallel special approach for similar comparisons involving Pb, NO_2 and SO_2. EPA believes applying this interpretation for Pb, NO_2, and SO_2 is consistent with the interpretation in the preamble for $PM_{2.5}$ and is consistent with EPA's intent in drafting the Exceptional Events Rule that should be applicable to all pollutants. That is, a 24-hour average concentration of Pb, NO_2, or SO_2 can be compared to the NAAQS level defined for a longer period, for purposes of meeting "but for" with respect to the NAAQS with the longer averaging period. However, EPA does not intend to concur on flags for a 1-hour NO_2 and SO_2 concentration that is below the level of the annual NAAQS, regardless of the outcome of "but for" comparisons based on 24-hour or annual averaging periods.[8] Also, EPA does not intend to concur on flags for a 24-hour Pb measurement below the level of the old (fixed quarterly average) Pb NAAQS or the new (rolling 3-month average) Pb NAAQS.

Table Q30-1. Principles for Correct Approaches for Helping to Show That the "But For" Test Is Met

Note: The principles identified in this table are presented from the more general and/or self-evident to the more specialized and/or derivative.

	Principle	Application to Specific NAAQS	Exceptions
1	A single measurement may be compared directly to the level of the NAAQS if the averaging times are the same.	• 1-hour NAAQS for CO, SO_2, NO_2, and ozone. • 24-hour filter-based $PM_{2.5}$ or PM_{10} measurements vs. 24-hour NAAQS.	

[8] This restriction is intended to parallel the similar restriction for $PM_{2.5}$ stated in the preamble to the Exceptional Event Rule. It likely has no practical effect. It is highly unlikely that even several hourly concentrations below the level of the annual NO_2 NAAQS (53 ppb) could include an event contribution that would, when divided by 8760 (24 hours times 365 days), result in the annual average NO_2 concentration crossing from below to above the level of the annual NAAQS. Similarly, it is highly unlikely that even several hourly concentrations below the level of annual SO_2 NAAQS (30 ppb) could include an event contribution that would, when divided by 24, result in the 24-hour average SO_2 concentration crossing from below to above the level of the 24-hour SO_2 NAAQS (140 ppb).

	Principle	Application to Specific NAAQS	Exceptions
2	When the measurement time is shorter than the averaging time of the NAAQS (e.g., 1-hour O_3 measurements and the 8-hour O_3 NAAQS), states can compare the average of multiple measurements within the averaging period of the NAAQS to the level of the NAAQS (e.g., compare the average of eight 1-hour measurements to the 8-hour NAAQS). If this comparison shows that the average is more than the NAAQS but would have been below the NAAQS in the absence of the event, then the "but for" test will have been met for those individual measurements in the longer averaging period that were affected by the event. States should, however, identify in their exceptional event submission those cases in which a single measurement or several, but not all, measurements cause the elevated average.	• 1-hour ozone measurements vs. 8-hour NAAQS. • 1-hour CO measurements vs. 8-hour NAAQS. • 1-hour SO_2 measurements vs. 3-hour, 24-hour, and annual NAAQS. • 1-hour NO_2 measurements vs. annual average .NAAQS. • 1-hour $PM_{2.5}$ measurements vs. 24-hour and annual average NAAQS. • 1-hour PM_{10} measurements vs. 24-hour average NAAQS. • 24-hour $PM_{2.5}$ measurements vs. annual average NAAQS. • 24-hour Pb measurements vs. quarterly average NAAQS. • 24-hour Pb measurements vs. rolling 3-month average NAAQS.	If a measurement value is below the level of the quarterly, rolling 3-month, or annual average NAAQS, it cannot be excluded, regardless of the outcome of comparing the longer period average to the NAAQS level.
3	When the $PM_{2.5}$ or Pb measurement time is 24 hours, it is also permitted to compare the 24-hour measurement to the annual average $PM_{2.5}$ NAAQS or the quarterly or rolling 3-month Pb NAAQS.	• 24-hour $PM_{2.5}$ filter measurements vs. the annual average NAAQS (expressly permitted in the preamble to the Exceptional Events Rule). • 24-hour Pb filter measurements vs. the quarterly average and rolling 3-month average NAAQS (suggested by this guidance as a consistent with the intent of the $PM_{2.5}$ provision in the preamble).	If a measurement value is below the level of the quarterly, rolling 3-month, or annual average NAAQS, it cannot be excluded.
4	1-hour $PM_{2.5}$ and SO_2 measurements may be averaged to 24-hour periods and then compared to the annual average NAAQS. If the "but for" test is supported by this comparison, the showing supports a "but for" finding for those individual 1-hour measurements in the 24-hour averaging period that were affected by the event.	• 1-hour $PM_{2.5}$ measurements vs. annual average NAAQS (suggested by this guidance to create a level playing field between filter-based and continuous $PM_{2.5}$ measurements). • 1-hour SO_2 measurements vs. annual average NAAQS (where the 30 ppb annual SO_2 NAAQS still applies)	If the average of the 24 1-hour measurements is below the level of the annual average NAAQS, it cannot be excluded.
5	When there is no NAAQS for the 24-hour averaging period, 1-hour measurements may be compared	• 1-hour NO_2 measurements vs. annual average NAAQS (suggested by this guidance to	If a measurement value is below the level of the annual average NAAQS, it cannot

	Principle	Application to Specific NAAQS	Exceptions
	directly to the annual NAAQS.	create a benchmark for judging the excludability of 1-hour NO_2 measurements, other than whether the event affected the annual average enough to make a "but for" difference relative to the annual average NAAQS).	be excluded.
6	Otherwise, single 1-hour measurements may not be compared to the level of the annual average NAAQS.	• Single 1-hour SO_2 measurements may not be compared the annual average NAAQS (because there is a 24-hour NAAQS for SO_2 with a defined averaging methodology). • Single 1-hour $PM_{2.5}$ measurements may not be compared to the annual average NAAQS (because there is a 24-hour NAAQS for $PM_{2.5}$ with a defined averaging methodology).	

Table Q30-2 identifies the comparisons and conclusions that would help satisfy the "but for" test for each pollutant, for each current NAAQS. Note that for completeness Table Q30-2 addresses some situations that may be very unlikely to actually occur – for example, that a single event might cause an exceedance of the annual average NO_2 NAAQS.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
1	Ozone	0.12 ppm 1-hour averaging period 1-hour measurement	If a 1-hour measured concentration was above 0.124 ppm but would have been 0.124 ppm or less in the absence of the event, the 1-hour ozone concentration value meets the "but for" test for purposes of comparison to the 1-hour NAAQS. If other criteria are also met for that hour (e.g., there was a clear causal relationship between the event and that hour's ozone level, among other criteria), then the hour can be flagged and concurred for exclusion.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
2	Ozone	0.08 ppm 8-hour averaging period 1-hour measurement	• If the daily maximum 8-hour average of measured concentrations was above 0.084 ppm but would have been 0.084 ppm or less in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to the 0.08 ppm 8-hour ozone NAAQS. The exclusion of some or all hours of the 8-hour period that was originally the daily maximum 8-hour period may cause another 8-hour period to become the daily maximum. The "but for" comparison can be repeated for this new 8-hour period, which may result in flagging and concurrence for more 1-hour values. If the original daily maximum 8-hour period and the new daily maximum period overlap, it is possible for a specific hourly concentration that was not originally concurred to be concurred as part of the new 8-hour maximum period.
3	Ozone	0.075 ppm 8-hour averaging period 1-hour measurement *(Note: This example may be replaced following EPA's promulgation of the 2011 Reconsidered Ozone NAAQS)*	• If the daily maximum 8-hour average of measured concentrations was above 0.075 ppm but would have been 0.075 ppm or less in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to the 0.075 ppm 8-hour ozone NAAQS. The exclusion of some or all hours of the 8-hour period that was originally the daily maximum 8-hour period may cause another 8-hour period to become the daily maximum. The "but for" comparison can be repeated for this new 8-hour period, which may result in flagging and concurrence for more 1-hour values. If the original daily maximum 8-hour period and the new daily maximum period overlap, it is possible for a specific hourly concentration that was not originally concurred to be concurred as part of the new 8-hour maximum period.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
4	$PM_{2.5}$	35 $\mu g/m^3$ 24-hour averaging period 1-hour measurement	• If the 24-hour average concentration based on 1-hour measurements was above 35.4 $\mu g/m^3$ (after truncating after the first decimal digit, per 40 CFR 50 Appendix N section 3.0(c)) but would have been 35.4 $\mu g/m^3$ or less in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ NAAQS. • Also, if the 24-hour average concentration based on 1-hour measurements was above 15.0 $\mu g/m^3$ (after truncation after the first decimal digit) but would have been 15.0 $\mu g/m^3$ or less in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ NAAQS.
5	$PM_{2.5}$	15.0 $\mu g/m^3$ Annual averaging period 1-hour measurement	• If the annual average $PM_{2.5}$ concentration was above 15.0 $\mu g/m^3$ but would have been equal to or less than 15.0 $\mu g/m^3$ (after rounding to one decimal digit) in the absence of the single event's effect on one or more hours, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 15 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS. • Also, if the 24-hour average concentration based on 1-hour measurements was above 15.0 $\mu g/m^3$ (after rounding to one decimal digit, per 40 CFR 50 Appendix N section 4.3(a)) but would have been equal to or less than 15.0 $\mu g/m^3$ in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 15 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS. However, an hourly value must be part of a 24-hour average concentration that is above 15 $\mu g/m^3$ (after rounding to one decimal digit) to be excluded from an annual NAAQS calculation.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
6	$PM_{2.5}$	35 $\mu g/m^3$ 24-hour averaging period 24-hour measurement	• If the 24-hour average concentration was above 35.4 $\mu g/m^3$ (after truncating after the first decimal digit, per 40 CFR 50 Appendix N section 3.0(b)) but would have been 35.4 $\mu g/m^3$ or less in the absence of the event, the 24-hr concentration value meets the "but for" test for purposes of comparison to 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ NAAQS. • Also, if the 24-hour average concentration was above 15.0 $\mu g/m^3$ (after truncating after the first decimal digit, per 40 CFR 50 Appendix N section 3.0(b)) but would have been 15.0 $\mu g/m^3$ or less in the absence of the event, the 24 average concentration meets the "but for" test for purposes of comparison to 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ NAAQS.
7	$PM_{2.5}$	15 $\mu g/m^3$ Annual averaging period 24-hour measurement	• If the annual average $PM_{2.5}$ concentration was above 15.0 $\mu g/m^3$ (after rounding to one decimal digit per 40 CFR 50 Appendix N section 4.2(a)) but would have been equal to or less than 15.0 $\mu g/m^3$ in the absence of the single event's effect on one or more days, those 24-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 15 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS. • Also, if the 24-hour average concentration from the filter-based sampler was above 15.0 $\mu g/m^3$ (after truncating after the first decimal digit, per 40 CFR 50 Appendix N section 3.0(b)) but would have been equal to or less than 15.0 $\mu g/m^3$ in the absence of the event, the 24-hour value meets the "but for" test for purposes of comparison to 15 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS. Note that a 24-hour concentration that is equal to or less than 15.0 $\mu g/m^3$ (after truncation to one decimal digit) cannot be approved for exclusion, regardless of the outcome of the comparison just described.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
8	PM_{10}	150 $\mu g/m^3$ 24-hour averaging period 1-hour measurement	• If the 24-hour average concentration based on 1-hour measurements was above 150 $\mu g/m^3$ (after rounding to the nearest 10 $\mu g/m^3$, per 40 CFR 50 Appendix K section 1.0(b)) but would have been equal to or less than 150 $\mu g/m^3$ in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to the 150 $\mu g/m^3$ 24-hour PM_{10} NAAQS.
9	PM_{10}	150 $\mu g/m^3$ 24-hour averaging period 24-hour measurement	• If the 24-hour average concentration from the filter-based sampler was above 150 $\mu g/m^3$ (after rounding to the nearest 10 $\mu g/m^3$, per 40 CFR 50 Appendix K section 1.0(b)) but would have been equal to or less than 150 $\mu g/m^3$ in the absence of the event, the 24-hour value meets the "but for" test for purposes of comparison to the 150 $\mu g/m^3$ 24-hour PM_{10} NAAQS.
10	CO	35 ppm 1-hour averaging period 1-hour measurement	• If a 1-hour measured concentration was above 35.0 ppm (after rounding to one decimal digit per 40 CFR 50.8(d)) but would have been 35.0 ppm or less in the absence of the event, the 1-hour CO concentration value meets the "but for" test for purposes of comparison to the 1-hour NAAQS.
11	CO	9 ppm 8-hour averaging period 1-hour measurement	• If an 8-hour average of measured concentrations is one of the two highest non-overlapping 8-hour periods of the year and was above 9.0 ppm (after rounding to one decimal digit per 40 CFR 50.8(d)) but would have been equal to or less than 9.0 ppm in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to the 9 ppm 8-hour CO NAAQS. The exclusion of some or all hours of the 8-hour period that was originally one of the two highest non-overlapping 8-hour periods of the year may cause another 8-hour period to become one of two highest non-overlapping 8-hour periods of the year. The "but for" comparison can be repeated for this new 8-hour period, which may result in flagging and concurrence for more 1-hour values. If the original 8-hour period and the new 8-hour period overlap, it is possible for a specific hourly concentration that was not originally concurred to be concurred as part of the new 8-hour period.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
12	Pb	1.5 $\mu g/m^3$ Quarterly averaging period 24-hour measurement	• If the quarterly mean was above 1.5 $\mu g/m^3$ (after rounding to one decimal digit) but would have been equal to or less than 1.5 $\mu g/m^3$ in the absence of the single event's effect on some day(s), the 24-hour value(s) affected by the single event meets the "but for" test for purposes of comparison to the 1.5 $\mu g/m^3$ quarterly average Pb NAAQS. (Note that given the 1-in-6 sampling schedule for Pb, it will be unusual for a single event to affect multiple sampling days.) • Also, if the 24-hour average concentration from the filter-based sampler was above 1.5 $\mu g/m^3$ (after rounding to one decimal digit) but would have been equal to or less than 1.5 $\mu g/m^3$ in the absence of the event, the 24-hour value meets the "but for" test for purposes of comparison to 1.5 $\mu g/m^3$ quarterly average Pb NAAQS. A 24-hour Pb concentration that is equal to or less than 1.5 $\mu g/m^3$ can never be excluded, regardless of the outcome of the comparison just described.
13	Pb	0.15 $\mu g/m^3$ Rolling 3-month averaging period 24-hour measurement	• If a 3-month mean was above 0.15 $\mu g/m^3$ (after rounding to two decimal digits) but would have been equal to or less than 0.15 $\mu g/m^3$ in the absence of the single event's effect on some day(s), the 24-hour value affected by the single event meets the "but for" test for purposes of comparison to the 0.15 $\mu g/m^3$ quarterly average Pb NAAQS. (Note that given the 1-in-6 sampling schedule for Pb, it will be unusual for a single event to affect multiple sampling days.) • Also, if the 24-hour average concentration from the filter-based sampler was above 0.15 $\mu g/m^3$ (after rounding to two decimal digits per 40 CFR 50 Appendix R section 5(b)) but would have been equal to or less than 0.15 $\mu g/m^3$ in the absence of the event, the 24-hour value meets the "but for" test for purposes of comparison to the 0.15 $\mu g/m^3$ quarterly average Pb NAAQS. A 24-hour Pb concentration that is equal to or less than 0.15 $\mu g/m^3$ can never be excluded, regardless of the outcome of the comparison just described.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
14	NO_2	100 ppb 1-hour averaging period 1-hour measurement	• If a 1-hour measured concentration was above 100 ppb (after truncating to a whole number per 40 CFR 50 Appendix S section 4.2(c)) but would have been equal to or less than 100 ppb in the absence of the event, the 1-hour NO_2 concentration value meets the "but for" test for purposes of comparison to the 1-hour NAAQS.
15	NO_2	53 ppb Annual averaging period 1-hour measurement	• If the annual average of all the measured 1-hour concentrations in a year was above 53 ppb (after rounding to a whole number per 40 CFR 50 Appendix S section 4.1(b)) but would have been 53 ppb or less in the absence of the event, those 1-hour values that were affected by the single event meet the "but for" test for purposes of comparison to the 53 ppb annual average NO_2 NAAQS. • Provided there is an exceedance of the annual standard, if the 1-hour concentration was above 53 ppb (after truncating to a whole number per 40 CFR 50 Appendix S section 4.2(c)) but would have been equal to or less than 53 ppb in the absence of the event meets the "but for" test for purposes of comparison to annual NAAQS. However, a 1-hour NO_2 concentration that is below 53 ppb (after rounding to a whole number) can never be excluded, regardless of the outcome of the comparison just described.
16	SO_2	75 ppb 1-hour averaging period 1-hour measurement	If a 1-hour measured concentration was above 75 ppb (after rounding to a whole number per 40 CFR 50 Appendix T section 4(c)) but would have been equal to or less than 75 ppb in the absence of the event, the 1-hour SO_2 concentration value meets the "but for" test for purposes of comparison to the 1-hour SO_2 NAAQS.
17	SO_2	140 ppb 24-hour averaging period 1-hour measurement	If the 24-hour average concentration based on 1-hour measurements was above 140 ppb (after rounding to the nearest 10 ppb per 40 CFR 50.4(b)) but would have been equal to or less than 140 ppb in the absence of the event, those 1-hour concentration values that were affected by the single event meet the "but for" test for purposes of comparison to 140 ppb 24-hour SO_2 NAAQS.

Table Q30-2. Correct Approaches for Helping to Show That the "But For" Test Is Met

	Pollutant	Specific Case: NAAQS level NAAQS averaging period Measurement period	Correct Approach
18	SO_2	30 ppb Annual averaging period 1-hour measurement	• If the annual average of measured 1-hour concentrations was above 30 ppb (after rounding to a whole number per 40 CFR 50.4(a))) but would have been 30 ppb or less in the absence of the event, those 1-hour values that were affected by the single event meet the "but for" test for purposes of comparison to the 30 ppb annual average SO_2 NAAQS. • Also, if the 24-hour average concentration based on 1-hour measurements was above 140 ppb (after rounding to the nearest 10 ppb per 40 CFR 50.4(b)) but would have been equal to or less than 140 ppb in the absence of the event, those 1-hour concentration values that were affected by the event meet the "but for" test for purposes of comparison to the 30 ppb annual SO_2 NAAQS. If the 30 ppb annual SO_2 NAAQS still applies in the affected area, a 1-hour concentration equal to or below 30 ppb (after rounding to a whole number per 40 CFR 50.4(a)) may never be excluded, regardless of the outcome of the comparison just described.
19	SO_2 (secondary)	500 ppb 3-hour averaging period 1-hour measurement	• If the 3-hour average of measured 1-hour concentrations was above 500 ppb (rounded to the nearest 100 ppb per 40 CFR 50.5(a)) but would have been equal to or less than 500 ppb in the absence of the event, those 1-hour values that were affected by the single event meet the "but for" test for purposes of comparison to the 3-hour average secondary SO_2 NAAQS.

31. **Question:** When is it appropriate for states to flag concentration values that are less than the level of the relevant NAAQS? Under what circumstances will EPA concur on such flags?

Answer: (Please read Q30 before reading this response.)

AQS currently allows a state to flag any measured concentration values it chooses, including values below the level of the relevant NAAQS. EPA does not plan to implement any new technical restrictions through the AQS software. Also, EPA does not consider the Exceptional Events Rule to prohibit states from flagging values below the level of the NAAQS. However, EPA does not intend to review data flags in AQS for concurrence until the state submits its evidence/analysis package demonstrating that

exclusion of the flagged values is consistent with the criteria in the Exceptional Events Rule, including the "but for" analysis at 40 CFR 50.14(c)(3)(iv)(D). State flagged values that are not included in any demonstration package may unnecessarily consume state resources. In addition, EPA's evaluation of flagged data that are addressed in demonstration packages is more time consuming when EPA must differentiate these data from numerous unsubstantiated flags in AQS. Therefore, EPA encourages states to exercise restraint in flagging values less than the level of the NAAQS. Should states wish to flag values for informational purposes, they should use the "I" series flags in AQS.

States may see an advantage in flagging all values they believe were affected by an event, for purposes of being able to later identify historical data that have not been affected so that "normal" concentration patterns can be presented as part of meeting the "in excess of historical fluctuations" prong of the exclusion criteria. AQS does not prevent such flagging, but states should be aware that state flagging by itself does not establish that the concentrations were in fact affected by an event and should be excluded from the "normal" baseline.

Of the flagged cases that appear in both AQS and in demonstration packages, EPA can concur with flags for concentrations that are below the NAAQS only in five very narrow conditions described below. If EPA can determine that a flag on a value less than the level of the NAAQS cannot meet the "but for" test, EPA may choose to nonconcur or leave the default/null value of the AQS concurrence flag (indicating no EPA action) in place.

Except in cases involving PM_{10} limited maintenance plans[9], EPA intends to prioritize events that result in a violation or exceedance of a NAAQS or those that otherwise impact a regulatory decision. As described below and in the response to Question 30, there may be specific instances where individual measurements fall below a NAAQS but still contribute to a violating design value. There may also be instances where a shorter averaging time measurement (e.g., 1-hour O_3 measurement of 100 ppb) is not above the level of that averaging time NAAQS (e.g., 1-hour O_3 NAAQS of 120 ppb), but is above a longer averaging time NAAQS (e.g., 8-hour O_3 NAAQS of 80 ppb) and contributes to a violation of the longer averaging time NAAQS. In such cases, although the individual measurement may not exceed the level of the (short-term) NAAQS, it may be possible for states to present sufficient evidence to satisfy the "but-for" criterion.

First, PM_{10} values between 98 and 154 $\mu g/m^3$ (inclusive) may be flagged, concurred, and excluded for purposes of qualifying an area for reliance on only a limited maintenance plan.[10] Because of the expected exceedance form of the PM_{10} NAAQS, concentrations in

[9] See May 7, 2009 policy memorandum from William T. Harnett to Regional Air Division Directors at http://www.epa.gov/ttn/oarpg/t1/memoranda/lmp_final_harnett.pdf that allows PM_{10} values between 98 and 154 $\mu g/m^3$ (inclusive) to be flagged, concurred, and excluded for purposes of qualifying an area for reliance on only a limited maintenance plan.

[10] See May 7, 2009 policy memorandum from William T. Harnett to Regional Air Division Directors at http://www.epa.gov/ttn/oarpg/t1/memoranda/lmp_final_harnett.pdf.

this range cannot possibly affect whether a site actually meets the NAAQS, so there is no reason for flagging them except when the acceptability of a limited maintenance plan is an issue. The normal AQS flagging and concurrence procedures may be used in this situation.[11]

A second scenario in which EPA can concur with flags for concentrations that are below the NAAQS is indicated at 72 FR at 13570. If (i) an event has affected air quality on multiple consecutive days, (ii) at least one measured concentration during the episode can be found to meet the "but for" test using the relevant comparison specified in Table Q30-2, and (iii) the air quality impact on each day is "exceptional," measurements for the entire period are eligible for data exclusion regardless of how they compare to the level of the NAAQS. In the context of this provision, "exceptional" encompasses all the requirements of the Exceptional Events Rule other than the "but for" test (e.g., clear causal connection, "in excess of normal historical fluctuations, including background," not reasonably controllable or preventable).

Scenarios in which the measured concentration is greater than a NAAQS with a longer averaging time but less than the level of a NAAQS with a shorter averaging time

Third, applying Table Q30-2 may result in qualifying a 24-hour $PM_{2.5}$ measurement that is greater than the 15 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS but not greater than the 35 $\mu g/m^3$ 24-hour $PM_{2.5}$ NAAQS for exclusion for the purposes of the 24-hour $PM_{2.5}$ NAAQS. This is the result if the actual 24-hour concentration was between 15 and 35 $\mu g/m^3$ but would have been below 15 $\mu g/m^3$ but for the effect of the event. It should be noted that an exclusion made under this very specific provision for the 24-hour $PM_{2.5}$ NAAQS will only affect the outcome of an attainment determination for the 24-hour NAAQS if the concentration value in question is one of the few highest daily concentrations during the year, because only then could it have affected the 3-year design value. When a 24-hour value below the level of the 24-hour NAAQS does affect the 3-year design value, the application of the guidance for the fourth situation (below), which is applicable to all four NAAQS pollutants with multi-year design values, would get to the same result as application of this paragraph.

Fourth, assuming that all other Exceptional Events Rule requirements and conditions are met, EPA may concur with flags for ozone, $PM_{2.5}$, 1-hour NO_2, and 1-hour SO_2 that are "less than the level of the NAAQS" if adjusting the flagged concentrations for the estimated contribution from the event would change the 3-year design value from being above the NAAQS to being equal to or below the NAAQS. However, as indicated in Table Q30-2, concentrations below certain values may never be excluded.

[11] The procedure for determining a PM_{10} design value in units of $\mu g/m^3$ is given in section 6.3 of the EPA guidance document "PM_{10} SIP Development Guideline," June 1987, posted at http://www.epa.gov/ttn/oarpg/t1/memoranda/pm10sip_dev_guide.pdf.

Fifth, a 1-hour measurement of a pollutant that is below the level of the 8-hour, 3-hour, 24-hour, or quarterly NAAQS for that pollutant can be excluded if (1) the event affected the 1-hour measurement, and (2) taking into account the event's effect on all the hours in the longer period the effect of the event on the longer averaging period's concentrations satisfies the "but for" criterion. These situations are described in Table Q30-2 (rows 3, 4, 8, 11, 12, 13, 17, and 19). However, as indicated in Table Q30-2, concentrations below certain values may never be excluded.

The following NAAQS-specific discussions provide further explanations regarding some of the situations in which a concentration less than the level of the NAAQS may qualify for exclusion. These discussions are not exhaustive and do not obviate the need to refer to Table Q30-2.

24-hour $PM_{2.5}$

Assume for illustration that the three annual 98th percentile 24-hour $PM_{2.5}$ concentrations for a monitoring site for 2006-2008 are 41, 31, and 37 $\mu g/m^3$ for each respective year with a resulting 3-year design value of 36 $\mu g/m^3$ which is a violation of the 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$. Also, assume that the next highest concentration in 2007 below the 31 $\mu g/m^3$ was only 20 $\mu g/m^3$. The 31 $\mu g/m^3$ concentration in 2007 was affected by a one-day wildfire. The state has been able to show that the concentration would have been 17 $\mu g/m^3$ without the fire. Because neither 28 $\mu g/m^3$ nor 31 $\mu g/m^3$ exceed the NAAQS, the event on that day does not meet the "but for" test when viewed from an "exceedance" perspective. However, the effect of the fire on the 2007 value determines whether the 3-year design value passes the 24-hour NAAQS. Had there been no fire, the 98th percentile concentration in 2007 would have been 20 $\mu g/m^3$ which would result in a 3-year design value of 33 $\mu g/m^3$ (i.e., less than the 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$). Therefore, the 2007 value of 31 $\mu g/m^3$ meets the "but for" test when the focus in on NAAQS violations rather than individual exceedances. Assuming other requirements are met, the 31 $\mu g/m^3$ concentration would be approved by EPA for exclusion from the 2006-2008 design value. Note that in doing a "violations-based" "but for" analysis, one does not simply substitute the "no event" concentration for the original 98th percentile day into the design value calculation. Rather, one must re-select the 98th percentile day, which sometimes will result in a different day's actual measured value being used in the design value calculation.[12]

It is conceivable that the effect of an event on a given day is not enough to satisfy the "but for" test with regard to the "violation" perspective explained in the preceding paragraph for one three-year period, but that it does satisfy it for an earlier or later 3-year period when it is combined with one or two different concentrations to calculate a 3-year design values, since the outcome of the "violations" analysis may change. After EPA has

[12] Note that exclusion of this 24-hour value from design values for the annual average NAAQS is a separate question, the likely answer to which is that the value is not excludable. If the event did not make the 24-hour concentration change from below 15 to above 15 $\mu g/m^3$, the event does not meet the first condition specified in row 7 of Table Q30-2. It is also very improbable that an event affecting a single day would meet the second condition in row 7 of Table Q30-2.

approved the exclusion of a concentration based on a "violations" analysis for one 3-year period, EPA will also exclude that concentration when calculating design values and attainment for the other two 3-year periods that include that same year.

For the 24-hour $PM_{2.5}$ NAAQS, it is possible that multiple days with concentrations below the NAAQS within one year are flagged. Excluding just one of these concentrations may not change the annual 98th percentile concentration enough to cause the 3-year design value to change from "violating" to "complying," but excluding several of them may. The outcome for the design value may also depend in part on whether exclusion is granted for some other concentrations that are above the level of the NAAQS. In such cases, the exclusion decisions should first be made for each of the flagged concentrations that are above the NAAQS. All remaining flagged concentrations (those meeting all other requirements and conditions of the Exceptional Events Rule) should then be considered in progressively larger groups ranked by concentration. That is, if excluding the highest one of the flagged concentrations below the level of the NAAQS would cause a switch in whether the 3-year design value violates the NAAQS then if EPA determines that value is to be excluded then there is no impact to retaining all others and, thus, no need to make determinations for those others. If excluding the two highest such concentrations causes a switch, then there is no impact to determining whether others beyond those two should be retained.

However, the preamble to the Exceptional Events Rule explicitly states that $PM_{2.5}$ concentrations below the level of the annual NAAQS cannot be excluded for purposes of comparisons to the annual NAAQS. (72 FR at 13570, bottom of middle column) Even if the conditions described in the preceding paragraph are met, values below 15 $\mu g/m^3$ cannot be excluded.

Annual $PM_{2.5}$

The preamble to the Exceptional Events Rule explicitly states that $PM_{2.5}$ concentrations below the level of the annual NAAQS cannot be excluded for purposes of comparisons to the annual NAAQS. (72 FR at 13570, bottom of middle column)

Ozone (0.075 ppm 8-hour NAAQS)

(Note that this example may be replaced following EPA's promulgation of the 2011 Reconsidered Ozone NAAQS)

Assume for illustration that the three annual 4th highest daily 8-hour ozone values in 2006-2008 are 0.077, 0.076, and 0.075 ppm respectively. The 0.075 ppm value in 2008 was affected by an exceptional event. The 3-year average would be 0.076 ppm, a NAAQS violation. If the 0.075 ppm value for 2008 were to be excluded and if, as a result, 2008's new 4th highest value was 0.074 ppm or less, the 3-year average (after Appendix P truncation) would be 0.075 ppm, which is not a NAAQS violation. The 0.075 ppm value may be excluded under these circumstances even though it is not itself an exceedance. Furthermore, the exclusion also applies to the use of this value when calculating the 2007-2009 and 2008-2010 design values, regardless of whether such

exclusion causes those design values to switch from violating to complying with the NAAQS.

For ozone, as for 24-hour $PM_{2.5}$, it is possible that a state could flag multiple days within one year with concentrations below the NAAQS. Excluding just one of these concentrations may not change the annual 4th highest concentration enough to cause the 3-year design value to change from "violating" to "complying," but excluding several of them may. Also, the outcome for the design value may depend, in part, on whether exclusion is granted for some other concentrations that are above the level of the NAAQS. In such cases, the exclusion decisions should first be made for each of the flagged concentrations that are above the NAAQS. All remaining flagged concentrations (those meeting all other requirements and conditions of the Exceptional Events Rule) should then be considered in progressively larger groups ranked by concentration. That is, if excluding the highest one of the flagged concentrations below the level of the NAAQS would cause a switch in whether the 3-year design value violates the NAAQS then if EPA determines that value is to be excluded, all others can be retained without impact. If exclusion of the two highest such concentrations causes a switch, then EPA may focus first on whether only those are to be excluded.

PM_{10}

The only current PM_{10} NAAQS is the 24-hour NAAQS based on the expected number of exceedances over a 3-year period. Since a concentration below the level of the NAAQS would not be an exceedance and cannot affect compliance with the NAAQS in any way, a concentration below the level of the NAAQS usually cannot be excluded. However, under an EPA policy memo, for the purpose of EPA approval of a limited maintenance plan PM_{10} values as low as 98 $\mu g/m^3$ can be concurred for exclusion when determining whether an area is eligible for a limited maintenance plan. (See May 7, 2009 memorandum from William T. Harnett to Regional Air Division Directors, http://www.epa.gov/ttn/oarpg/t1/memoranda/lmp_final_harnett.pdf). Because concentrations less than 98 $\mu g/m^3$ would appear to have little regulatory significance, EPA discourages the flagging of such data.

Pb

The current 1.5 $\mu g/m^3$ and 0.15 $\mu g/m^3$ NAAQS for lead are both based on a maximum three-month average concentration. The 1.5 $\mu g/m^3$ standard is based on the highest quarterly average in each year individually, while the 0.15 $\mu g/m^3$ NAAQS is based on the highest rolling 3-month average during a 3-year period. EPA will not concur on the exclusion of a 24-hour concentration value that is below the level of the NAAQS, and we discourage states from flagging such values.

NO_2

EPA will not concur on the exclusion of a 1-hour NO_2 concentration that is below the level of the annual NO_2 NAAQS, and we discourage states from flagging such values.

SO_2

EPA will not concur on the exclusion of a 1-hour SO2 concentration that is below the level of the annual SO_2 NAAQS, and we discourage states from flagging such values.

Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Events Rule

United States Environmental Protection Agency

May 2, 2011

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Acronyms

AAQ	Affects Air Quality
ADEQ	Arizona Department of Environmental Quality
AQS	Air Quality System
BACM	Best Available Control Measures
CAA	Clean Air Act
CCR	Clear Causal Relationship
CFR	Code of Federal Regulation
CLASS	Clean Air Support System
DAQEM	Department of Air Quality and Environmental Management (Clark County, NV)
DRI	Desert Research Institute
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GIS	Geographic Information System
HAURL	Human Activity Unlikely to Recur at a particular Location
HF	Historical Fluctuations
MAG	Maricopa Association of Governments (Arizona)
MODIS	Moderate Resolution Imaging Spectroradiometer
nRCP	not Reasonably Controllable or Preventable
NAAQS	National Ambient Air Quality Standards
NEBF	No Exceedance But For the event
NSR	New Source Review
NWS	National Weather Service
RACM	Reasonably Available Control Measures
PM	Particulate Matter
SCAQMD	South Coast Air Quality Management District (California)
SIL	Significant Impact Level
SJV	San Joaquin Valley
SIP	State Implementation Plan
TOEM	Tapered Element Oscillating Microbalance
UNLV	University of Nevada, Las Vegas
WEG	Wind Erodibility Group
WGA	Western Governors' Association
WRAP	Western Regional Air Partnership

1. Highlights

This document clarifies the Exceptional Events Rule[1] (EER) for high wind dust (i.e., particulate matter) events[2] and provides recommendations for exceptional event demonstrations. High winds can entrain and transport particulate matter (PM) to a monitoring site. These particles can consist of both "inhalable coarse particles" (i.e., larger than 2.5 micrometers (μm) and smaller than 10 μm in diameter, termed PM_{10}) and "fine particles" (i.e., 2.5 μm in diameter and smaller, termed $PM_{2.5}$). This document applies to both PM_{10} and $PM_{2.5}$ high wind dust events.

Purpose of this Document

The purpose of this document is to provide assistance and clarification to agencies implementing the EER for high wind dust events.

To Whom does this Document Apply?

The EER refers to the "State" as the entity that may request EPA to exclude data due to exceptional events (e.g., 40 CFR 50.14(a)). However, the preamble to the EER makes it clear that the EER "applies to all States; to local air quality agencies to whom a State has delegated relevant responsibilities for air quality management, including air quality monitoring and data analysis; and ... to Tribal air quality agencies where appropriate." This document uses the term "State" to be consistent with the EER, but the document similarly applies to all state, local, and Tribal agencies that are responsible for preparation and submission of EER demonstration packages under the EER.

High wind dust events are typically a phenomenon experienced in the western United States where rainfall is seasonal, creating dry and dusty landscapes. Therefore, this document may be of most use to the states from the Great Plains (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas) and west: generally this will include the states that comprise the Western Regional Air Partnership, which is most of EPA Regions 6, 7, 8, 9, and 10. While the EER requirements referenced in this document apply similarly to eastern states, an alternative wind threshold (see Section 3.1.3) appropriate to the eastern landscape and non-arid regions in the west would need to be developed (see Appendix A for a summary of how this type of threshold can be developed).

Guiding Principles for the Development of this Document

1. States should not be held accountable for exceedances due to events that were beyond their control at the time of the event;
2. It is desirable to implement reasonable controls to protect public health;[3] and

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[1] "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR 13560, March 22, 2007.

[2] The term "high wind dust event" is used in this document to refer to the same type of event that was discussed as a "high wind event" in the EER. EPA believes the term "high wind dust event" more clearly describes the referred-to event.

[3] With respect to exceptional events, Section 319 of the Clean Air Act states the following guiding principles (among others);

(i) the principle that protection of public health is the highest priority

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(iv) the principle that each State must take necessary measures to safeguard public health regardless of the source of the air pollution

3. Clear expectations will enable EPA and other air agencies to better manage resources related to the exceptional events process.

For recurring high wind dust events, EPA believes these principles can be achieved using a progressive approach in which states are expected to consider and implement further controls as events continue to recur.

Definition of a High Wind Dust Event

EPA considers that a high wind dust event includes both the high wind and the dust that the wind entrains and transports to a monitoring site; the event is not merely the occurrence of the high wind.

Critical Elements for the Technical Demonstration of High Wind Dust Events

- There are six technical elements that must be met under the EER for EPA to concur on a high wind dust event demonstration. These are:
    1. whether the event was not reasonably controllable or preventable (nRCP),
    2. whether there was a clear causal relationship (CCR),
    3. whether there would have been no exceedance or violation but for the event (NEBF),
    4. whether the event affects air quality (AAQ),
    5. whether the event was caused by human activity unlikely to occur or was a natural event (HAURL / Natural Event), and
    6. whether the event was in excess of normal historical fluctuations (HF).

  Failure to sufficiently address any one will prevent EPA's concurrence under the EER of the request to exclude data.
- In reviewing several high wind dust events flagged by states as exceptional events, EPA has found that the following EER elements have played a significant role in our review of the states' supporting documentation: nRCP, CCR, and NEBF. These three elements, along with HF, may be considered independent elements.
- In reviewing several high wind dust events flagged by states as exceptional events, EPA has found that two elements identified by statute, AAQ and HAURL / Natural Event, are necessarily also satisfied for a high wind event if the other elements are satisfied; therefore, they are not treated as independent and there is generally no separate demonstration that needs to be included to show these elements were satisfied.
- EPA has not set pass/fail statistical criteria for the HF element, but will use a weight of evidence approach to assess each demonstration on a case-by-case basis. The state's role in satisfying this element is to provide analyses and statistics as prescribed by EPA in this document. EPA will use the information provided by the state to determine whether the event was in excess of normal historical fluctuations.[4] Events do not necessarily have to be rare to satisfy this element. EPA expects that failure on this element indicates likely failure for CCR and/or NEBF as well and thus does not expect that non-concurrence will result from failure of this element alone.
- While not listed as a stand-alone element, wind data (e.g., wind speed, direction, and recurrence) will generally play a vital role in informing EPA's decision on elements such

[4] "Normal historical fluctuations" will generally be defined by those days without any exceptional events (e.g, high wind dust events or other types of exceptional events) for the previous years.

as whether the event was not reasonably controllable or preventable and establishing a clear causal relationship.

Not Reasonably Controllable or Preventable

- Exceedances caused in whole or in part by anthropogenic dust sources within the state's control are unlikely to be eligible for treatment as exceptional events under the EER, even under conditions of elevated winds, unless the state shows that the event, including the emissions from the anthropogenic dust sources, was not reasonably controllable or preventable. EPA intends to evaluate whether an event was not reasonably controllable or preventable at the time of the event by taking into account factors including controls in place, wind speed, an area's attainment status, the frequency and severity of exceedances, and the benefits of the controls.
- In addition to considering the factors above, EPA judges the reasonableness of controls based on the technical information that was available to the state at the time the event occurred. In the case of nonattainment areas EPA would generally expect states to already have the technical information needed to reasonably control sources within nonattainment areas. Also, the U.S. Department of Agriculture's Natural Resources Conservation Service develops best management practices (under various program titles), some of which are aimed at preventing loss of soil during high winds, which may also be informative in particular situations.
- The degree of event-specific information and data necessary for demonstrating "not reasonably controllable or preventable" will generally be less for wind speeds above 25 miles per hour (mph), and greater for speeds below that, at least for western states. Empirical evidence shows that a sustained wind speed of 25 mph is typically the minimum wind speed needed to entrain particles from many stable surfaces (i.e., undisturbed/natural surfaces with a crust or disturbed surfaces that have been re-stabilized) in the western U.S. where rainfall is seasonal (see Appendix A), and thus is a useful threshold for setting differential expectations for the detail to be included in a demonstration that dust from a wind event was not reasonably controllable or preventable. With EPA approval, states may establish a different threshold based on local studies.
- The degree of event-specific information and data necessary for demonstrating "not reasonably controllable or preventable" is likely to be lower for non-recurring events.
- EPA and the submitting state can consider the development of a voluntary High Wind Action Plan that would identify mutually agreed upon reasonable controls that a state could implement for subsequent high wind events. Preparation of such a plan and its approval by EPA could promote a common understanding between the state and EPA about whether subsequent high wind events are not reasonably controllable or preventable.

Clear Causal Relationship

Numerous types of analyses may be useful to establish a clear causal relationship, such as wind and concentration patterns or comparisons to concentrations at other monitoring sites and on other days. Examples of the types of analyses that could be used as part of the CCR are provided in Section 3.3.

No Exceedance But For the Event

For areas where the typical concentrations on non-event days are well below the applicable National Ambient Air Quality Standards (NAAQS), the NEBF demonstration may be relatively straightforward. However, demonstrating NEBF becomes increasingly difficult if concentrations on non-event days during the same season exceed the standard and/or if the contribution of non-event pollution sources produce concentrations near the applicable NAAQS.

Disclaimer

The Exceptional Events Rule is the source of the regulatory requirements for exceptional events and exceptional event demonstrations. This document provides guidance and interpretation of the Exceptional Events Rule rather than imposing any new requirements.

2. Overview of Exceptional Events Rule

The EER and preamble outline specific criteria listed below for an event to be considered an "exceptional event" for purposes of exclusion of air quality data from regulatory decisions. These criteria are more nuanced than the dictionary definition of "exceptional" might suggest. In particular, there is no requirement for an "exceptional event" to be exceptional *per se* in the dictionary sense of the word (i.e., forming an exception or rare instance; unusual; infrequent; extraordinary).

2.1 Definition of the "Event" for High Wind Dust Events

In high wind dust events the meteorological phenomenon (i.e., wind) is purely natural but the pollution from the event can arise from a mixture of natural sources (e.g., undisturbed soil) and anthropogenic sources (e.g., soil disturbed by human activity, dust from sand and gravel facilities). EPA classifies high wind dust events as "natural events" in cases where windblown dust is entirely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled such that anthropogenic sources can be considered to have little impact as required under the EER.

EPA considers that a high wind dust event includes both the high wind and the dust that the wind entrains and transports to a monitoring site; the event is not merely the occurrence of the high wind. The "not reasonably controllable or preventable" clause in the statutory definition of an exceptional event applies to all types of events. In the case of a high wind event this clause applies to the high wind event as a whole, and encompasses the reasonable controllability of the emissions entrained by the high wind. The fact that the high wind itself was not preventable does not by itself make the high wind event "not reasonably controllable or preventable."

2.2 Evidence Necessary to Support Exceptional Events Requests

The Exceptional Events Rule was promulgated by EPA in 2007, pursuant to the 2005 amendment[5] of Clean Air Act (CAA) Section 319. The rule added 40 CFR §50.1(j), (k) and (l), §50.14, and §51.930 to the Code of Federal Regulations. These sections contain definitions, criteria for EPA approval, procedural requirements, and requirements for state demonstrations, all of which must be met for EPA to concur under the EER on the exclusion of air quality data from regulatory decisions.

The definition of an exceptional event given in 40 CFR §50.1(j) parallels the statutory definition of Section 319 of the CAA and itself contains certain criteria for approval by EPA:

- The event "affects air quality."
- The event "is not reasonably controllable or preventable."
- The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."[6]

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[5] Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU), section 6013 amending CAA §319, became law August 10, 2005; available at http://thomas.loc.gov/cgi-bin/query/z?c109:H.R.3:

[6] A natural event is further described in 40 CFR 50.1(k) as "an event in which human activity plays little or no direct causal role."

Additional criteria for EPA approval to exclude data affected by a high wind dust event are given (with some repetition of key phrases) in 40 CFR §50.14(a) and (b)(1).[7] Under these provisions the state must:

- "demonstrat[e] to EPA's satisfaction that such event caused a specific air pollution concentration at a particular air quality monitoring location."
- "demonstrate a clear causal relationship between the measured exceedance or violation of such standard and the event …"
- "demonstrat[e] to EPA's satisfaction that an exceptional event caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section [regarding schedules, procedures and submission of demonstrations]."

Under 40 CFR §50.14(c)(3)(iv),[8] the state demonstration to justify exclusion of data must provide evidence that:

A. "The event satisfies the criteria set forth in 40 CFR §50.1(j)" for the definition of an exceptional event (see above);

B. "There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area";

C. "The event is associated with a measured concentration in excess of normal historical fluctuations, including background"; and

D. "There would have been no exceedance or violation but for the event".

The definition of an exceptional event provided in 40 CFR § 50.1(j) explicitly excludes "stagnation of air masses or meteorological inversions, a meteorological event involving high temperatures or lack of precipitation, or pollution relating to source noncompliance."[9] Exceedances due to these events would not be eligible for exclusion under the EER. If there were a significant contribution from sources out of compliance with fugitive dust or other rules, then the PM exceedance would not be excluded as due to an exceptional event.

2.3 Mitigation Requirement

40 CFR §51 Subpart Y includes mitigation requirements at 51.930. While the EER does not require a mitigation plan to be submitted to EPA as part of the demonstration package, it is nonetheless a requirement of this section that "[a] State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." The mitigation requirement is addressed in Section 4 of this document.

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[7] §50.14 (b)(2) and (b)(3) contain criteria relevant only to firework events and prescribed fire events.
[8] Prior to the publishing of the 2010 CFR the citation was §50.14(c)(3)(iii)
[9] For further explanation see "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR at 13577 n.15 (March 22, 2007).

2.4 Process Requirements per EER

In addition to technical demonstration requirements, the EER contains requirements related to the process for a state to request data exclusion under the EER:

- "A State shall notify EPA of its intent to exclude one or more measured exceedances of an applicable ambient air quality standard as being due to an exceptional event by placing a flag in the appropriate field for the data record of concern." 40 CFR § 50.14(c)(2)(i). The placement of the flags and the submittal of an initial event description should be done concurrently with the submission of data to the AQS database (i.e., within 90 days of the end of the quarterly reporting period), 40 CFR § 50.14(c)(2)(i), but must be done "not later than July 1st of the calendar year following the year in which the flagged measurement occurred" 40 CFR § 50.14(c)(2)(iii).
- "A State that has flagged data as being due to an exceptional event and is requesting exclusion of the affected measurement data shall, after notice and opportunity for public comment, submit a demonstration to justify data exclusion to EPA not later than the lesser of, 3 years following the end of the calendar quarter in which the flagged concentration was recorded or, 12 months prior to the date that a regulatory decision must be made by EPA. A State must submit the public comments it received along with its demonstration to EPA." 40 CFR § (50.14(c)(3)(i)).
- With the submission of the demonstration, the State "must document that the public comment process was followed." 40 CFR § (50.14(c)(3)(iv)).

3. Evidence to be Included in a High Wind Dust Event Demonstration Package

As discussed in Section 2.2, the EER identifies technical elements (i.e., criteria or evidence) that need to be addressed for EPA to concur that an exceedance is due to an exceptional event. Table 1 shows the complete list of technical elements to be submitted as part of a demonstration for high wind dust events. All six technical elements need to be met; failure to meet any one will prevent EPA's concurrence under the EER of the request to exclude data.

Table 1. EER Technical Demonstration Elements for High Wind Dust Events

Element	Abbreviation	Section of this Document Containing Additional Explanation
affects air quality	AAQ	3.4
not reasonably controllable or preventable*	nRCP	3.1
caused by human activity unlikely to recur at a particular location OR a natural event	HAURL / Natural Event	3.5
clear causal relationship between the measurement and the event*	CCR	3.3
no exceedance or violation but for the event*	NEBF	3.6
the event is associated with a measured concentration in excess of normal historical fluctuations, including background*	HF	3.2

*Independent Elements

EPA uses a "weight of evidence" approach in reviewing state requests for data exclusion under the EER, but each and every element should still be met. While evidence and narrative that constitutes a strong demonstration for one element can also be part of the demonstration for another element, meeting one element even beyond any room for doubt should not make up for the absence or failure to satisfy another element. In practice there are linkages among the elements. A given element may be impossible to satisfy unless another one is satisfied, or one element's analysis may qualitatively affect the evaluation of another element. Although a strong demonstration on one element should not compensate for a failure of another, the strength of the demonstration for one requirement could influence the persuasiveness of evidence used for another.

In reviewing several high wind dust exceptional event demonstrations, EPA has found that the following EER elements have played a significant role in our review of the states' supporting documentation: nRCP, CCR, and NEBF. EPA's technical review of a high wind dust exceptional event package will therefore focus on these elements. The criterion that the event be in excess of normal historical fluctuations (HF) is an independent element that should be satisfied based on a weight of evidence. While the HF element is considered an independent element, it plays an important role in its contribution to the CCR and NEBF demonstrations.

EPA has generally found that two elements identified by statute, AAQ[10] and HAURL / Natural Event, are necessarily also satisfied for a high wind event if the other elements are satisfied; therefore, they are not treated as independent and there is generally no separate demonstration that needs to be included to show these elements were satisfied. While not listed as a stand-alone element, wind data (e.g., wind speed, direction, and recurrence) will play a vital role in informing EPA's decision on elements such as whether the event was not reasonably controllable or preventable and establishing a clear causal relationship.

Finally, a demonstration package for a high wind dust event should include a conceptual model of how the event occurred. In its simplest form, this could be a narrative description of how the event unfolded and resulted in the exceedance(s). The conceptual model should help tie the various rule criteria together into a cohesive explanation of the event.

Sections 3.1-3.6 of this document describe and clarify each element identified in Table 1. Section 6 provides recommendations on the preparation of demonstration packages for high wind dust events, including examples of analyses and a recommended structure of the document.

In summary, the technical demonstration for a high wind dust exceptional events package should include:

Elements Required by the Exceptional Events Rule

- Not Reasonably Controllable or Preventable *(Independent Element)* - Analyses and descriptions should show that the event was not reasonably controllable or preventable.
- Clear Causal Relationship *(Independent Element)* - Analyses and descriptions should show that there was a clear causal relationship between the ambient concentration measurement under consideration and the event that is claimed to have affected the air quality in the area.
- No Exceedance But For the Event *(Independent Element)* - Analyses and descriptions should show that there would have been no exceedance or violation but for the event.
- Affects Air Quality *(Technical Element)* - statutory technical element that is generally automatically satisfied with no additional analyses once submitter provides historical fluctuations analyses, establishes a clear causal relationship, and provides explicit statement indicating satisfaction of requirement through clear causal and historical fluctuations showings.
- Human Activity Unlikely to Recur at a Particular Location / Natural Event *(Technical Element)* - statutory technical element that is generally automatically satisfied with no

[10] The preamble to the EER clarifies the AAQ criteria in section V.B. (p. 13569) by stating that the following criteria establish that the event affected air quality: "there is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area" and "the event is associated with an unusual measured concentration beyond typical fluctuations including background." On this basis AAQ is satisfied once CCR has been demonstrated and evidence for HF has been provided.

additional analyses once submitter shows the event to be not reasonably controllable or preventable (nRCP), establishes a clear causal relationship, and provides explicit statement indicating satisfaction of requirement through clear causal and not reasonable controllable or preventable showings.

- Historical Fluctuations *(Independent Element)* - Analyses and descriptions should be provided in the format suggested in this document. EPA will use this information in a weight of evidence determination for this criterion.

EPA-Recommended Elements for Demonstration Package

- Wind Data - Data on wind speed, direction, and frequency of recurrence is needed to support all four independent critical elements.

- Conceptual model - Narrative summary at the beginning of a demonstration package describing how the event unfolded to produce elevated PM at the monitor(s) that recorded the exceedance(s) and providing context for the supporting elements.

3.1 Not Reasonably Controllable or Preventable (nRCP)

Exceedances caused by dust sources are not eligible for treatment as exceptional events under the EER, even under conditions of elevated winds, unless the state shows that the event (i.e., emissions of dust due to wind) was not reasonably controllable or preventable. EPA evaluates whether an event was not reasonably controllable or preventable at the time of the event by taking into account controls in place and wind speed, along with other factors.[11] The factors and approach identified in this section are intended to clarify EPA's expectations for high wind dust exceptional event packages and promote consistency in their review. Nonetheless, each package will be considered on a case-by-case basis per the EER. Note that for anthropogenic sources, EPA considers a source that is "reasonably controlled" to be one whose emissions were "not reasonably controllable or preventable"; therefore, these terms are used interchangeably throughout this document for anthropogenic controls.

3.1.1 Reasonable Controls

To meet the definition of an exceptional event, the event must be "not reasonably controllable or preventable" (40 CFR § 50.1(j)). Since EPA considers the event to include both the high winds and the dust entrained by those winds, it is necessary to identify the sources of windblown dust – both natural and anthropogenic – and determine whether their wind-driven emissions were reasonably controllable or preventable. For purposes of evaluating high wind dust exceptional events in the West, EPA will generally use the definitions of natural and anthropogenic windblown dust emissions that have been developed in the *Western Regional Air Partnership (WRAP) Fugitive Dust Handbook.*[12] According to the *WRAP Fugitive Dust Handbook*, all mechanically suspended dust from human activities should be considered anthropogenic

[11]See SJV Attainment Affirmation, 73 FR73 14691, for a prior high wind dust event in which EPA considered controls and wind speed, along with other factors.

[12]*WRAP Fugitive Dust Handbook*, Prepared for Western Governors' Association, Countess Environmental (WGA Contract No. 30204-111), September 7, 2006. Available at http://www.wrapair.org/forums/dejf/fdh/index.html

emissions, while windblown dust from lands not disturbed or altered by human activity should be considered natural emissions. Furthermore, windblown dust from surfaces that have been significantly disturbed or altered by humans should be categorized as anthropogenic emissions. Such surfaces may include: undeveloped lands,[13] construction and mining sites, material storage piles, landfills, vacant lots, agricultural lands, roadways, parking lots, artificially exposed beds of natural lakes and rivers, exposed beds of artificial water bodies, areas subject to off-road vehicle activity, and areas burned by anthropogenic fires. Natural sources may include: naturally-dry river and lake beds; barren lands; sand dunes; exposed rock; sea spray from natural water bodies; non-agricultural grass, range, and forest lands; areas burned by naturally-ignited fires; and glacial silt.

EPA generally considers dust entrained by high wind from undisturbed land (e.g., undisturbed desert) to be not reasonably controllable or preventable, due to the cost of treating large land areas and the likely disturbance to natural ecosystems. EPA also generally considers that wind-generated dust from previously disturbed land that is being allowed to fully return to natural conditions by effective prevention of any new disturbance is also not reasonably controllable or preventable, provided that there are no reasonable active measures that could be taken to control dust during the transition back to natural conditions.[14] While emissions from most other natural sources of wind-blown dust could be similarly not reasonably controllable, EPA will consider those on a case-by-case basis. In areas where events recur, EPA may require increased characterization of the natural sources (e.g., historical surface disturbance, water diversions, vegetation changes, etc.).

While EPA generally does not expect natural sources of dust, e.g., from undisturbed land, to be reasonably controllable or preventable in most cases, EPA does expect reasonable controls on the wind-driven anthropogenic contribution to the concentration measured during the event. Experience in several areas in the western United States has shown that it is practical and reasonable to apply dust-suppression controls to disturbed lands and other anthropogenic dust sources, and that these controls help limit ambient concentrations of PM during high wind events, up to certain wind speeds. For example, many areas in the west have successfully controlled dust with measures such as water or chemical stabilization of disturbed areas such as construction zones, or limiting disturbance activities on windy days. If reasonable controls on wind-driven anthropogenic sources were not in place, then the event would not be considered "not reasonably controllable or preventable" and would not satisfy the nRCP element of the definition of an exceptional event. That is, to meet the EER the state should identify wind-driven contributing anthropogenic sources and show that reasonable controls were in place. For events with wind-driven anthropogenic contributions, it will be important for the state to address how the exceedance occurred despite the implementation of those reasonable controls (e.g., wind speeds high enough to entrain dust from stable surfaces). EPA will evaluate the reasonableness of controls based on the controls that should have been in place given the information the state had when the event occurred.

Typically, measured ambient air concentrations during an event will include some contribution from natural or anthropogenic sources whose emissions are not affected by high wind, for

[13] Undeveloped lands refer to those that are disturbed for purposes of development but not yet developed.
[14] An example of such a measure might be the restoration of all or part of natural surface water flows.

example transportation and industrial point sources: these are considered non-event sources. Non-event sources are not subject to the nRCP requirement of the EER, but a state may apply full-time or event-dependent controls on such sources as part of its attainment/maintenance SIP or as part of meeting the mitigation requirement under 40 CFR §51.930.

3.1.2 Reasonableness of Controls in Place

Under the EER the event must be "not reasonably controllable ***or*** preventable" [emphasis added]; therefore, controls need not prevent the exceedance altogether to be reasonable. The fact that high winds are not preventable does not automatically mean that a high wind dust event is "not reasonably controllable or preventable." If a set of control measures *could reasonably have been in place* for contributing sources at the time of the event, then they *must* have been in place for the event to qualify as an exceptional event under the EER. Among other factors to consider, reasonableness needs to be judged in light of the technical information available to the state at the time the event occurred. In the case of nontattainment areas EPA would generally expect states to already have the technical information needed to reasonably control sources in nonattainment areas, although there could be attainment areas that also have advanced implementation of controls. If EPA has given notice to the state that EPA considers controls on particular uncontrolled sources to be reasonable (e.g., as part of a previous exceptional event review) then EPA will consider the state to have been informed of the need for reasonable controls on those sources for future events. Also, the U.S. Department of Agriculture's Natural Resources Conservation Service develops best management practices (under various program titles), some of which are aimed at preventing loss of soil during high winds, which may also be informative in particular situations. In evaluating reasonableness, EPA will generally consider first and foremost whether the wind speeds were above the minimum threshold to entrain dust from stable surfaces. As described in Section 3.1.3, stable surfaces typically resist dust entrainment from wind speeds below this minimum threshold and above this threshold some reasonable controls could be ineffective. In addition to wind speed, EPA may also consider factors such as those listed in Table 2.

Table 2. Example Factors Considered In Determining the Reasonableness of Controls.

"Reasonableness" Factor	Description of "Reasonableness" Factor
1. Control requirements based on area attainment status	Generally, areas classified as attainment, unclassifiable, or maintenance for a NAAQS would not be expected to have the same level of controls as areas that are non-attainment for the same NAAQS. The reasonableness of the controls depends upon historical concentrations and designation status.
2. Frequency and severity of past exceedances	More stringent controls are reasonable if an area experiences frequent and/or severe exceptional event exceedances due to high winds than if the area has experienced only rare and/or mild isolated exceedances.
3. Controls on primary sources expected to have contributed to the event	Were significant sources of anthropogenic windblown dust controlled during the event?
4. Ease and effectiveness of control	Cost-effective and readily deployable controls may be

Table 2. Example Factors Considered In Determining the Reasonableness of Controls.

"Reasonableness" Factor	Description of "Reasonableness" Factor
implementation	considered more reasonable.
5. Use of specific, reasonably available control measures	Were measures considered "standard practices" and/or those in widespread use for dust control in other areas employed during the event?
6. Jurisdiction	Only sources within the state (or tribal) land need to be considered or demonstrated to have had reasonable controls in place at the time of the event. (However, it may be necessary to include sources outside the local jurisdiction in the conceptual model of the event, and to assess their contribution to the measured concentration, to fully understand the contribution of in-state sources.)
7. Overall benefit of controls to remedy the exceedance	There may be benefits to controlling even small anthropogenic sources. Reducing ambient concentrations may have a public health benefit, or even remove an exceedance.
8. Significant contribution of sources to the exceedance	There is no defined *de minimis* emission rate or ambient contribution that limits which sources should be considered for control, and EPA will review this on a case by case basis. However, as a starting point, we believe it is generally reasonable to consider source categories that may contribute 5 $\mu g/m^3$ or more to an exceedance of the 150 µg 24-hour PM_{10} standard.[15] In some cases (i.e., wind speeds above the threshold to entrain stable surfaces) it may not be necessary to consider sources down to 5 µg, while in other situations it may be appropriate to consider sources below 5 µg. This starting point may be revisited should the PM_{10} NAAQS be revised. *De minimis* levels for $PM_{2.5}$ have not been clearly established.

Although Reasonably Available Control Measures (RACM) and Best Available Control Measures (BACM) are not necessarily required to have been in place at the time of the event, they are measures that have been identified as being or possibly being reasonable.[16] A state needs to demonstrate that the controls that were in place were "reasonable" at the time. The CAA requires BACM for serious PM_{10} non-attainment areas and RACM in moderate PM_{10} non-attainment areas; therefore, EPA may use the local list of BACM or RACM measures (as applicable) as a reference point to review the reasonableness of in-place controls. Having BACM/RACM in place during the time of the event is an important consideration, but does not

[15] 5µg is the "significant impact level" (SIL) used in NSR permitting to decide whether an individual source has a significant contribution to a 24-hr PM_{10} NAAQS violation, based on 40 CFR 51.165(b)(2).

[16] Legally, EPA believes the event-relevant measures that have already been included in the approved SIP as RACM or BACM to be an essential part of the set of controls that need to be in place for an event to be considered "not reasonably controllable or preventable," but they may not be sufficient by themselves particularly if the SIP has not been recently reviewed or revised.

automatically qualify the controls as reasonable. In some cases, a lower level of control could be reasonable, while in other cases it could be reasonable to require controls more stringent than BACM or RACM, particularly in areas with recurring exceedances. Other areas (i.e., attainment, maintenance, or unclassified areas) are not required to have put BACM in place and also may not have implemented RACM. In these cases, EPA may use local RACM measures, where available, along with other RACM measures that may be appropriate for the location and source categories, as the reference point. In areas where events continue to recur, EPA may consider BACM, or greater levels of control, as the appropriate starting point, regardless of attainment status. RACM/BACM lists may be **a reference point, but not the sole means,** by which EPA assesses the reasonableness of controls. If an agency believes that RACM/BACM should not be used by EPA as the starting point to judge the reasonableness of controls, the state should include this justification in the demonstration package. EPA will also generally consider implementation and enforcement of control measures in its determination of whether the event meets the nRCP criterion. Cases where relevant control measures were not being fully implemented or properly enforced, but reasonably could and should have been, will not generally be eligible for data exclusion under the Exceptional Events Rule.

3.1.3 Consideration of Wind Speed

Wind speed is an important consideration when EPA judges whether the requirement for nRCP is met. Typically, undisturbed desert landscapes in the West have a natural crust that protects the surface and tends to prevent wind entrainment of soil. Similarly, many reasonably-controlled anthropogenic sources (e.g., disturbed surfaces) employ techniques that stabilize surfaces to reduce entrainment since disturbed surfaces are a primary source of anthropogenic dust. Numerous studies have been conducted to determine the minimum wind speed that can entrain dust from stable surfaces (i.e., undisturbed/natural surfaces with a crust or disturbed surfaces that have been re-stabilized). The speed varies by location, depending on characteristics of the local landscape (e.g., soil type) and controls (See Appendix A). In the absence of local studies, EPA intends to use 25 mph as the minimum sustained wind speed[17] sufficient to entrain particles from stable surfaces for western states.[18]

Throughout this document 25 mph will be used as the minimum threshold wind speed necessary to entrain particles from stable surfaces, but generally a state can use an alternative wind speed based on local studies subsequent to EPA approval. It is important to note that if a state would like to implement a different threshold, it should be representative of conditions (sustained wind speeds) that are capable of overwhelming the naturally developed stabilization of undisturbed natural sources or anthropogenic sources that are subject to reasonable control for the area in question. If EPA has specific information based on relevant studies to choose an alternative wind speed threshold, EPA will notify the state once a package has been submitted.

If a demonstration can show that the sustained wind speed was 25 mph or higher at or proximately upwind of the location of the exceedance, then a lesser amount of information and data (i.e., a basic controls analysis) could show that the event was not reasonably controllable or

[17] See Section 6.2.2.2 for details on the calculation of sustained wind speed.
[18] The 25 mph threshold is based on studies conducted on natural surfaces.

preventable (nRCP). See Section 3.1.5 for more specific information on the controls analysis for cases at or above 25 mph (3.1.5.1) and below 25 mph (3.1.5.2).

The rationale for allowing states to submit a basic controls analysis when wind speeds are at or above 25 mph is that it is expected that in many cases controls to prevent wind-blown dust become overwhelmed at or above 25 mph, and thus wind-driven emissions could include significant contributions from natural and reasonably-controlled sources under those conditions. If most controls to prevent wind-blown dust become overwhelmed at 25 mph, it could be difficult to identify additional reasonable controls that could be put into place to reduce wind-blown dust. In contrast, if the wind speeds associated with the event are below the threshold levels required to initiate dust emissions from natural or stable (i.e., reasonably-controlled) sources, more detailed information and more extensive data (i.e., a comprehensive controls analysis) are likely to be necessary to satisfy the nRCP requirement. The rationale for requiring a comprehensive controls analysis when wind speeds are below the entrainment threshold is that events with wind speeds below this threshold should entrain very little dust from natural and reasonably-controlled disturbed surfaces and therefore it is expected that wind-driven emissions would include significant contributions from sources that are neither natural nor reasonably-controlled. In these cases it is important to identify the various land areas contributing to the event, evaluate the controls in place on those land areas, and determine whether those controls were reasonable based on those factors identified in Section 3.1.2 (e.g., cost of controls vs. benefit).

3.1.4 Consideration of Recurrence

High wind dust events can recur in the western United States, particularly in the arid regions. Typically, stable surfaces resist entrainment, even under conditions of elevated winds. EPA will generally consider recurrence for high wind dust events[19] as more than one high wind dust event per year, averaged over three years. High wind dust events can recur if: (1) wind speeds that exceed the threshold to entrain dust from stable surfaces (i.e., 25 mph) are common, or (2) surfaces are not stable (i.e., not reasonably controlled). Since recurrence can indicate that surfaces are not reasonably controlled, the controls analysis should be more extensive if events recur, particularly at wind speeds below 25 mph.[20] There are some especially windy areas in the West where sustained wind speeds above 25 mph are not uncommon. In these areas, the protection of public health may be compelling enough to seek more controls that are effective beyond the 25 mph threshold. For this reason, a detailed controls analysis should be conducted when events recur, even if the wind speeds are above 25 mph, although it would not be expected to be as comprehensive as that for recurring events with wind speeds below 25 mph (see Section 3.1.5.2).

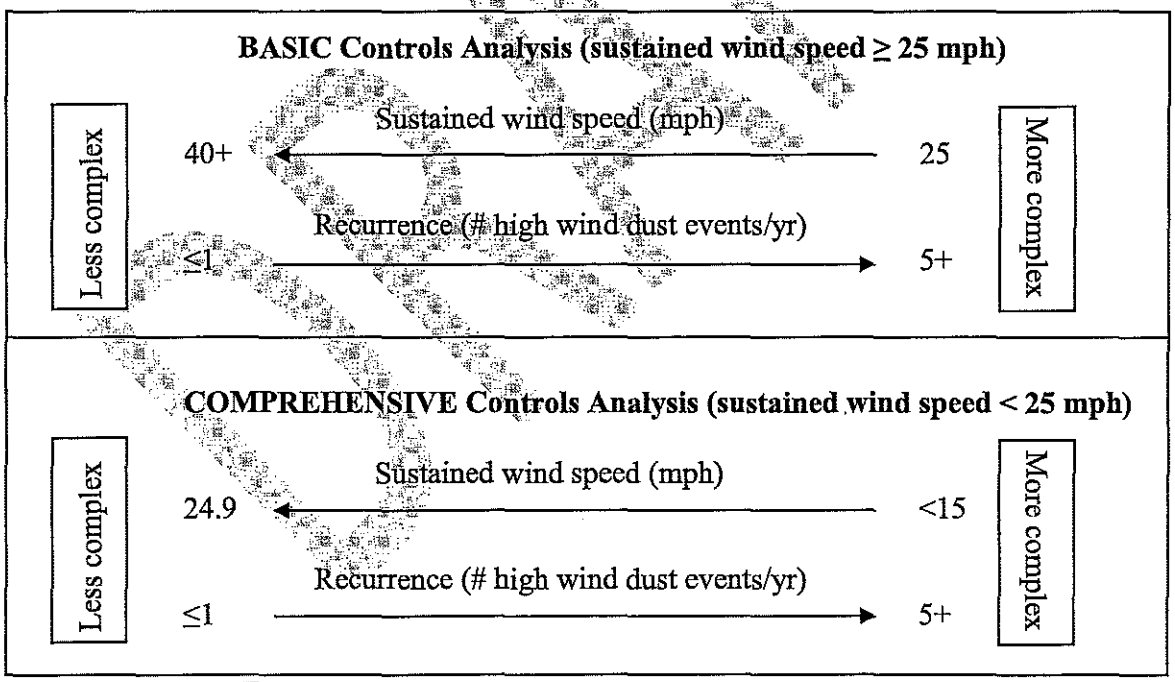
3.1.5 Controls Analysis

EPA expects exceptional event demonstration packages for high wind dust events to include an analysis of controls because the reasonableness of the controls that were in place affects whether

[19] This approach to recurrence is specific to high wind dust events and does not define how recurrence is treated for other types of events such as those caused by human activity unlikely to recur at a particular location.
[20] Recurrence is not discussed here as a criterion to meet the EER but rather as an indicator for the level of analysis needed to meet nRCP.

the event was "not reasonably controllable or preventable" and whether the event can be considered a natural event. The extent of the controls analysis should primarily depend upon the level of the wind speed: a basic controls analysis may be sufficient for cases when sustained wind speed at the source area[21] is greater than or equal to 25 mph, and a comprehensive controls analysis may be necessary when sustained wind speeds are below 25 mph. Generally, a basic controls analysis will identify likely sources in the expected source contribution area, describe the controls in place for anthropogenic sources, and indicate whether the natural sources were reasonably controllable. The comprehensive controls analysis is expected to have back-trajectories indicating specific sources in the upwind area, an inventory of the contribution for the significant sources, and detailed descriptions of controls and their effective implementation and enforcement.[22] This two-pronged approach is intended to streamline preparation and review of high wind dust packages for the more straightforward events and focus additional EPA and state resources on more complex cases. Within each category of basic versus comprehensive controls analysis, the level of complexity should be further informed by the recurrence frequency and how high (more basic) or low (more comprehensive) the wind speed is (Figure 1). On this basis, the nRCP demonstration should start with an analysis of sustained wind speed during the event and an analysis of the recurrence frequency, since this may indicate that only the lower-effort basic controls analysis is needed. See Section 6.2.2.2 for details on how to calculate the sustained wind speed and Section 6.2.2.3 to determine the recurrence frequency.

Figure 1. Complexity of Controls Analysis Based on Wind Speed and Concurrence



[21] Cases where dust was entrained by sustained winds above 25 mph upwind of the monitor and subsequently transported at lower wind speeds to the monitor could still qualify for the basic controls analysis category as long as the State shows that sustained winds were above 25 mph in the expected source area. Cases of long-range transport (e.g., >50 miles) could still qualify for a basic controls analysis but a robust trajectory analysis (and/or satellite plume imagery) would need to be included as part of the nRCP or CCR demonstration.

[22] While the basic and comprehensive categories are intended to generally outline the information that EPA expects to be included in a demonstration, EPA may request case-specific information to inform the nRCP determination, regardless of the category.

The most basic controls analysis will be for those events that have wind speeds well above 25 mph and are non-recurring while the most comprehensive controls analysis will be for events that have wind speeds well below 25 mph and recur (note: these may represent concurrable cases less often). Events with wind speeds at or above 25 mph that recur will need to have a basic controls analysis that includes identification of specific sources in the upwind area, but does not necessarily require trajectories or specific inventories. The purpose of identifying specific sources in the upwind area for recurring cases with wind speeds above 25 mph is to inform both the state and EPA about whether there are sources that might be reasonably controlled to wind speeds above 25 mph. For example, if there were a large construction area in the upwind source area that used gravel to control construction roadways, consideration could be given to whether chemical dust suppressants that stabilize the surface to wind speeds up to 40 mph could be reasonably implemented. In the interest of public health, it is important to consider what additional controls might be reasonable if events recur. Events with wind speeds below 25 mph that are non-recurring will need to have a comprehensive controls analysis because dust from stable surfaces is usually not entrained below wind speeds of 25 mph. Although EPA expects a comprehensive controls analysis for these cases, it will not be expected to be as complex as for the case when wind speeds are below 25 mph *and* recurring. Table 3 summarizes the elements that should be included for both basic and comprehensive controls analyses while Section 6.2.2 provides example analyses that have been included in demonstration submittals.

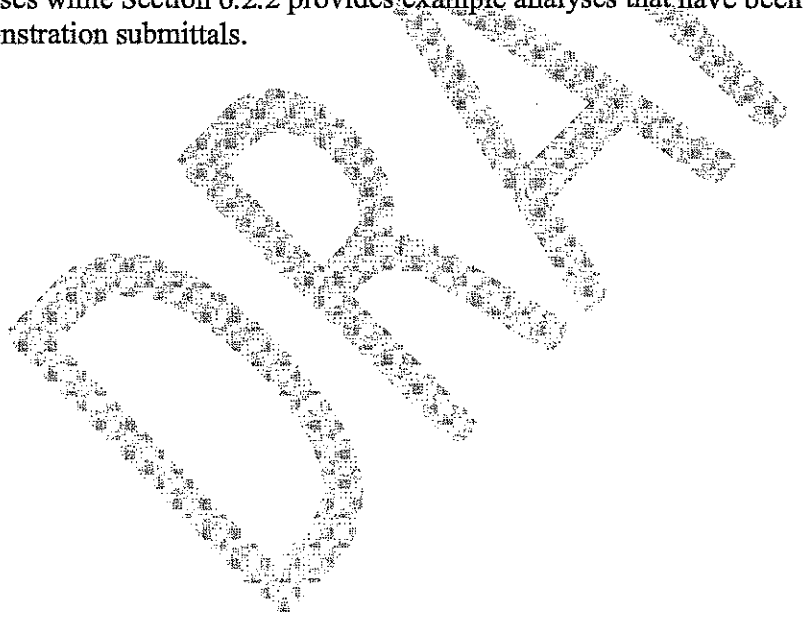


Table 3. Summary of Recommended Controls Analysis Elements for not Reasonably Controllable or Preventable Demonstration

	Basic Controls Analysis (wind speed ≥ 25 mph)		Comprehensive Controls Analysis (wind speed < 25 mph)	
Control Analysis Elements	**Non-recurring**	**Recurring**	**Non-recurring**	**Recurring**
Identification of local/ upwind contributing sources	X	X*	X	X*
Anthropogenic sources – description of controls	X	X*	X	X*
Natural sources – statement regarding reasonableness of controls	X	X*	X	X*
Explanation of how entrainment occurred despite controls	X	X	X	X
Identification and implementation status of controls previously recommended by EPA, if applicable	X	X	X	X
Evidence of effective implementation and enforcement of controls			X	X
Back trajectories of source area			X	X
Source apportionment				X
Source-specific emissions inventories			X	X
Meteorological data associated with measured concentration			X	X

*Indicates that additional detail should be included beyond that for non-recurring cases

3.1.5.1 Basic controls analysis

If the wind speed for the event in question was at or above the 25 mph threshold then a simplified (i.e., basic) controls analysis may be sufficient to show that the event was not reasonably controllable or preventable. Within this category, the complexity of the controls analysis may be informed by the recurrence frequency and wind speed (Figure 1). The most basic controls analysis would include a brief description of local/upwind sources that were suspected to significantly contribute to the event and a description of the controls on the anthropogenic sources in place at the time of the event (e.g., local BACM measures). For the sources identified, the submitter would explain how dust entrainment occurred despite having reasonable controls in place (e.g., controls were overwhelmed by high wind). A basic controls analysis with more complexity (e.g., for recurring events) would specifically identify likely sources in the upwind source area and discuss specific controls. The basic controls analysis, regardless of complexity, would not need to include back-trajectories, specific emissions inventories or detailed reports of controls implementation and enforcement. Finally, if EPA recommended controls improvements as part of a previous high wind dust exceptional event

review then the controls analysis should address the impact of these control improvements. See Section 6.2.2.4 for examples of a basic control analysis.

3.1.5.2 Comprehensive controls analysis

When events occur under conditions with sustained wind speeds below 25 mph, EPA and the state must consider the appropriateness, implementation, and enforcement of in-place controls. For example, exceedances can occur when appropriate measures are in place but not properly enforced. Or, new sources not addressed under the current set of control measures may be contributing to the exceedance. In these cases more comprehensive information on sources and controls will be expected, including: back-trajectories of source area, source apportionment, emissions inventories of specific sources in source area, and evidence of effective implementation and enforcement of controls. As wind speeds decrease from 25 mph and/or recurrence increases, the demonstration would need to be more complex and compelling for EPA to be able to concur. As with the basic controls analysis, if EPA recommended controls improvements as part of a previous high wind dust exceptional event review, then the controls analysis should address how these controls improvements have been addressed. See Section 6.2.2.5 for an example of a comprehensive controls analysis.

3.1.6 Controls for Recurring Events (High Wind Action Plan)

As mentioned above, EPA will judge the reasonableness of controls based on information that was available to the state at the time of the event. For example, if a state were in attainment at the time of the event, it may be reasonable that certain controls on certain sources may not have been in place. Alternatively, in the course of a high wind dust exceptional event demonstration preparation and/or review, the state or EPA may identify previously unknown sources that should be subject to reasonable controls. EPA or the state may determine that additional controls could minimize the likelihood or the health impact of future events. While this would not itself affect the review of the current event, the additional controls could be considered reasonable for future events. EPA and the submitting state can consider the development of a High Wind Action Plan that would identify mutually agreed upon reasonable controls that a state could implement for subsequent high wind events. Preparation of such a plan and its approval by EPA may promote a common understanding between the state and EPA about whether subsequent high wind events are not reasonably controllable or preventable. A High Wind Action Plan could be submitted with the exceptional events demonstration package or as a separate submittal.[23] Establishing a High Wind Action Plan consists of the following steps:

(1) State development and submittal of the High Wind Action Plan after an opportunity for public comment
(2) EPA approval of the High Wind Action Plan
(3) State implementation of the identified and approved control measures
(4) Formal recognition by EPA that the High Wind Action Plan is being implemented

Once the state has begun implementation of the measures approved by EPA and EPA has formally recognized implementation of the High Wind Action Plan, EPA would consider the

[23] If the High Wind Action Plan is submitted separately from the exceptional event demonstration package, an opportunity for public comment should be provided by the State, as the High Wind Action Plan would be part of the basis for EPA's decision on subsequent events.

controls to be reasonable as long as events do not recur. EPA suggests that states use the Annual Monitoring Network Plan process to indicate that high wind dust events have not recurred and that the current High Wind Action Plan remains in effect. It is the state's obligation to notify EPA if events recur so that EPA and the state can discuss possible revisions to the High Wind Action Plan. If events recur, EPA will need to re-approve the High Wind Action Plan regardless of whether it is revised or remains as-is. If EPA indicates that the High Wind Action Plan needs to be revised and the state chooses not to do so, this will be considered in EPA's determination of whether the controls in place were reasonable for subsequent events.

Note that having an approved High Wind Action Plan does not automatically mean that in every case EPA will find all subsequent events to have been not reasonably controllable or preventable. For example, EPA may not be able to make such a finding if it is determined that the controls in place were not effectively implemented or enforced. The benefits of the High Wind Action Plan are that it establishes clear mutual expectations regarding what constitutes reasonable controls for high wind dust events and strengthens protection of human health.[24]

3.2 Historical Fluctuations (HF)

Information on the historical fluctuations of concentration in the area is required to be submitted as part of an exceptional event package and serves as an important basis for the CCR, NEBF, and AAQ criteria (see Table 2). The more that a concentration that is temporally associated with an event stands out from historical concentrations, the more plausible it is that the event was the cause of a substantial portion of the concentration. The objective of this analysis is to give a full and accurate portrayal of the historical context for the claimed event day. EPA expects, at a minimum:

- a time series for concentration and wind data for the event area for the previous 3-5 years, or longer if available, with high wind dust events identified;
- percentile of concentration relative to annual data with and without high wind dust events; and
- percentile of concentration relative to seasonal data with and without high wind dust events.

Because the methods of analyses influence the sensitivity of the historical fluctuation statistics (e.g., percentile calculations are dependent on the number of data points included), EPA provides specific statistics calculation recommendations in Section 6.2.3.

EPA has not set pass/fail statistical criteria for this element but will use a weight of evidence approach to assess each demonstration on a case-by-case basis. The state's role in satisfying this element is to provide analyses and statistics as prescribed by EPA in this document. EPA will use the information provided by the state to determine whether the event was in excess of normal historical fluctuations. "Normal historical fluctuations" will generally be defined by those days without high wind dust events for the previous years. It is not the state's role to show that the

[24] Note that if and when EPA takes a regulatory action that hinges on a decision to exclude data under the Exceptional Events Rule, EPA may be required to consider and appropriately respond to public comments on whether the event was "not reasonably controllable or preventable."

event was above a particular threshold since EPA is not establishing a threshold. EPA acknowledges that natural events, such as high wind dust events, can recur and still be eligible for exclusion under the EER; therefore, events do not necessarily have to be rare to satisfy this element. EPA expects that failure on this element indicates likely failure for CCR and/or NEBF as well and thus does not expect that non-concurrence will result from failure of this element alone.

3.3 Clear Causal Relationship (CCR)

40 CFR §50.14(c)(3)(iv) requires demonstration of a clear causal relationship between the ambient concentration measurement under consideration and the event that is claimed to have affected the air quality in the area. The CCR demonstration must show that elevated concentrations were caused by dust entrained by high wind. The sources of dust implicated by the CCR demonstration should be shown to be not reasonably controllable or preventable as part of the nRCP demonstration. If the CCR implicates new or not reasonably controlled sources, nRCP should be re-evaluated. The CCR demonstration is expected to establish causality between the event and a portion of the ambient concentration, which cannot be demonstrated by simply showing that high wind was coincident with high concentrations. A correlation between high wind and high concentrations is important but does not independently demonstrate that the high concentrations were caused by wind-entrained dust from the sources that were addressed as part of the nRCP demonstration. This section explains in qualitative terms the types of analyses that would support a CCR demonstration. Examples of the quantitative analyses that could be performed are included in Section 6.2.4. Demonstrations for CCR should ultimately support the conceptual model. Table 4 provides examples of the information/analyses that support the CCR demonstration. Demonstrations that support their conceptual model by using the analyses listed below and possibly others are likely to be more convincing than those that employ fewer analyses.

Table 4. Evidence and Analyses Recommended for CCR Demonstration

CCR Evidence	Types of Analyses/Information to Support Evidence
1. Occurrence and geographic extent of the event	Special weather statements, advisories, news reports, nearby visibility readings, measurements from monitoring stations, satellite imagery
2. Transport of emissions related to the event in the direction of the monitor(s) where measurements were recorded	Wind direction data showing that emissions from sources identified as part of the nRCP demonstration were upwind of the monitor(s) in question, satellite imagery
3. Spatial relationship between the event, sources, transport of emissions, and recorded concentrations	Map showing likely source area, wind speeds, wind direction, and PM concentrations for affected area during the time of the event
4. Temporal relationship between the high wind and elevated PM concentrations at the monitor in question	24-hour time series showing PM concentrations at the monitor in question in combination with sustained and maximum wind speed data at area where dust was entrained

CCR Evidence	Types of Analyses/Information to Support Evidence
5. Chemical composition and/or size distribution of measured pollution that links the pollution at the monitor(s) with particular sources or phenomenon	Chemical speciation data from the monitored exceedance(s) and sources; size distribution data
6. Comparison of event-affected day(s) to specific non-event days	Comparison of concentration and wind speed to days preceding and following the event; comparison of concentration data to specific days that are similar to the event day with respect to emissions and meteorology except for the high wind; comparison to high concentration days in the same season (if any) without high wind; comparison to other high wind days without elevated concentrations (if any); comparison of chemical speciation data
7. Comparison of concentration and wind speed during the period of the event to historical (e.g., 3-5 years) data (i.e., analyses from historical fluctuations section)	Time series over entire length of time with potential identification of other claimed events; percentile relative to annual data; percentile relative to seasonal data

A demonstration will be less compelling if there is evidence that is not consistent with the conceptual model of how the event caused the exceedance. For example, a hypothesis that an exceedance was caused by a large-scale wind event is inconsistent with a situation where an isolated monitor exceeds while nearby monitors do not. Comparison of concentrations and conditions at other monitors could thus be very important for the demonstration of a clear causal relationship. Alternatively, eliminating plausible non-event causes supports the claimed causal relationship to the high wind event. Conclusively proving the absence of all possible or plausible other causes is not required or expected. (See Section 6.2.4.8 for an example of eliminating alternative hypotheses.)

3.4 Affects Air Quality (AAQ)

The AAQ element is generally supported by historical fluctuations in concentration data (HF) and demonstrated as part of the clear causal relationship (CCR). Submitting agencies that provide HF analyses that EPA then finds show the HF element is met and that demonstrate the CCR element will generally, by default, have also satisfied the "affects air quality" (AAQ) part of the definition of an exceptional event. To avoid any misperception that a rule requirement has been overlooked, the demonstration should nevertheless explicitly recognize this element, and state that it has been met by having addressed both the HF and the CCR criteria.

3.5 Caused by Human Activity Unlikely to Recur at a Particular Location or a Natural Event (HAURL/Natural Event)

3.5.1 Consideration of High Wind Dust Events as Natural Events

According to both the regulatory and statutory definition, 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 distinction between an event caused by human activity versus a natural event is critical for high wind dust events because only natural events can be likely to recur and still be eligible for data exclusion. Events caused by human activity that are likely to recur do not qualify as exceptional events. A natural event is defined as "an event in which human activity plays little or no direct causal role" (40 CFR §50.1(k)).[25]

An event involving wind-entrained dust solely from undisturbed natural sources is clearly a natural event. However, many high wind dust events affecting the ambient monitoring network include significant contributions from anthropogenic sources of dust, and their treatment under the EER is more complicated. In these cases, a high wind dust event can be considered a natural event, even when a portion of the wind-driven emissions are anthropogenic, as long as those emissions were determined to be not reasonably controllable or preventable. Exceedances that include a significant contribution by anthropogenic sources of windblown dust that were not reasonably controlled will not be considered as due to a natural high wind dust event. In addition, high dust concentrations outside the period of high wind (e.g., dust from rock-crushing or tilling that precedes the period of high wind) cannot be considered as due to a natural event and therefore could not be considered as a high wind dust event. In both of the above cases, it would be assumed that human activity played a large and direct causal role and therefore these exceptional events claims could only be considered under the criterion of "human activity unlikely to recur."[26]

3.5.2 Natural Event Demonstration

Since windblown anthropogenic dust must be reasonably controlled for the event to be considered a natural event under the EER, the state would need to show that the criterion for nRCP is met (see Section 3.1). Further, to satisfy the EER it must also be demonstrated that the windblown dust generated by high wind has a clear causal relationship (CCR) to the event. In

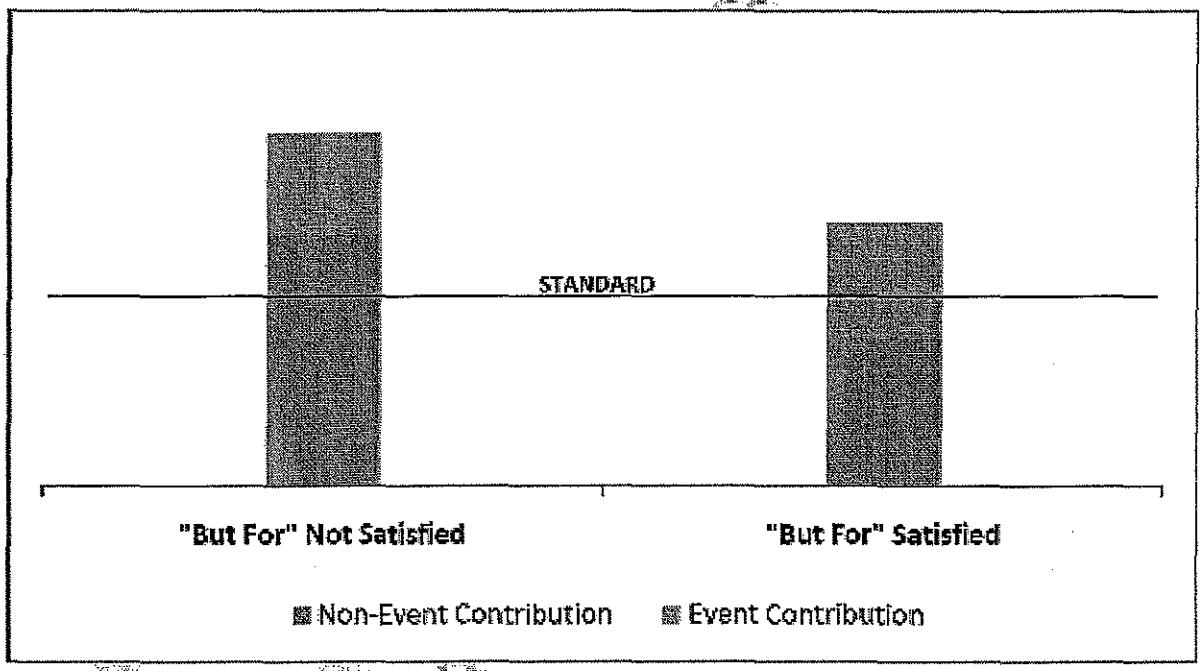
[25] Human activity would be considered to have played little or no *direct* causal role in causing the entrainment of the dust by high wind if contributing anthropogenic sources of the entrained dust are reasonably controlled, regardless of the amount of dust coming from these reasonably controlled anthropogenic sources and thus the event would be considered a natural event. If anthropogenic sources of windblown dust that are reasonably controllable but that did not have those reasonable controls applied at the time of the high wind event have contributed significantly to a measured concentration, the event would not be considered a natural event.

[26] In theory, a high wind dust event for which anthropogenic sources were not reasonably controlled could be considered an anthropogenic event if the event satisfies certain criteria. However, if the event (which includes the dust from both natural and anthropogenic sources) was not "not reasonably controllable or preventable" then the event does not meet the definition of an exceptional event. For this reason, EPA does not believe it is useful to pursue a line of reasoning that would consider a high wind dust event to be an anthropogenic event. If the very unlikelihood of recurrence of similarly high winds means that controls in addition to those that were in place would not have been reasonable, the event can be treated as a natural event and must then meet the criteria laid forth in the EER and explained in this document.

summary, a high wind dust event will generally be considered a natural event if both the nRCP and CCR elements are demonstrated to EPA's satisfaction.

3.6 No Exceedance or Violation But For the Event (NEBF)

40 CFR 50.14(b)(1) directs EPA to exclude data only where a state demonstrates that an event caused a concentration in excess of a NAAQS. This means that there was a concentration in excess of the NAAQS when the event occurred that would have been below the NAAQS if the event had not occurred. §50.14(c)(3)(iv)(D) requires the state to submit evidence that "[t]here would have been no exceedance or violation but for the event." These two statements express the same criterion for EPA approval. The following figure depicts the NEBF concept:



This analysis generally does not need a single or precise approximation of the estimated air quality impact from the event. It would generally be sufficient to develop a reasonably likely range of concentrations contributed by the event itself, and then assert that NEBF is satisfied for all concentrations in that range. EPA is not prescribing the type of analysis that needs to be done to satisfy this regulatory requirement, but the analysis should show that the measured concentration would have been below the applicable NAAQS without the impact of the high wind dust event. For most cases, EPA expects a **quantitative** NEBF analysis. For events where the typical concentrations on non-event days are well below the applicable NAAQS, the NEBF demonstration may be relatively straightforward and a qualitative NEBF demonstration may be acceptable. However, demonstrating NEBF becomes increasingly difficult if concentrations on non-event days during the same season exceed the standard and/or if the contribution of non-event pollution sources produce concentrations near the applicable NAAQS. For example, if days without high winds that neighbor the claimed event day were near the standard (e.g., 150 $\mu g/m^3$), the NEBF analysis would need to be very rigorous to show that the exceedance would

not have happened regardless of the high wind dust event. Examples of how to conduct the NEBF analysis are provided in Section 6.2.7.

The NEBF demonstration builds upon analyses presented as part of the nRCP and CCR elements, although it should be treated as an independent element and will likely include additional analyses. The rigor of the NEBF will be informed by the nRCP and CCR analyses. NEBF also depends upon the CCR demonstration: if there is no CCR then NEBF becomes moot since there is no portion of the exceedance that can clearly be attributed to the event. For these reasons, EPA recommends conducting the NEBF analyses after all other analyses have been completed.

4. Mitigation

Clean Air Act Section 319(b)(3)(A) contains five principles, including the principle that each state "must take necessary measures to safeguard public health." On this basis, Subpart Y of 40 CFR §51 was developed to addresses mitigation requirements for exceptional events and states (40 CFR §51.930):

"(a) A State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the State must:

> (1) Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard;
> (2) Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and
> (3) Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events."

The mitigation requirement does not require the state to prepare and submit a mitigation plan, per se, but the state is required to put in place programs that address the three actions listed above. It should be noted that the regulatory mitigation requirement is separate from the nRCP demonstration criterion. The nRCP criterion states that the demonstration package must include documentation showing that emissions due to high wind from sources were not reasonably controllable or preventable. The mitigation criterion focuses on specific measures and actions to protect public health, rather than on measures that control or prevent emissions. In addition, any controls related to nRCP apply to high wind-generated dust emissions, whereas mitigation control measures can apply to any source of particulate matter. A mitigation plan may also include procedures and responsibilities for public alerts and sheltering advisories. Implementation of effective mitigation measures that reduce dust emissions from wind may become part of the nRCP documentation for future event submittal packages, especially when high wind dust events recur, but this is not necessarily the case.

5. Process Issues for Exceptional Events Including High Wind Dust Events

5.1 Demonstrations Package Submittal and Review

EPA encourages states to engage in regular communication with EPA to prepare complete demonstration packages that meet the requirements stated in this document. EPA will make its decision based on information presented by the state. Discussions and/or cooperation between EPA and the state during the preparation of a state's package do not imply or guarantee EPA approval of that package. EPA cannot concur when information is lacking. It is the responsibility of the state to demonstrate to EPA's satisfaction that the requirements have been met, and EPA reiterates that discussions of potentially sufficient showings in this document are guidance only and may vary for specific cases. Upon initial review of a package, EPA will alert the state if additional information is required and provide a deadline by which the supplemental information should be submitted for EPA's consideration. It will be necessary that the state provide **all** supplemental information requested by EPA prior to EPA's final decision. Determinations on Exceptional Event demonstrations do not constitute final agency action until they are relied upon in a regulatory decision such as a finding of attainment or nonattainment which will be conducted through notice-and-comment rulemaking procedures. EPA does not generally intend to consider additional information after the concurrence decision has been made, except in the context of such a rulemaking procedure.

5.2 Timeframes

EPA recommends the following timeframes for exceptional events processes:

Exceptional Event Demonstration Action	Timing	Timing Specified by EER?
1. State places flags in AQS	Flags and an initial event description should be placed in AQS in accordance with the schedules for submission of data to the AQS database (i.e., within 90 days of the end of the previous quarter) but not later than July 1st of the calendar year following the event in which the flagged measurement occurred. Note that for data certification purposes, it is recommended to flag data prior to submittal of data certification (May 1st).	Yes
2. State submits letter of intent to submit a package *(optional)*	Recommended within 12 months of event. This is an optional step that would alert EPA of a state's intention to submit a package for a flag and prompt EPA to notify the state whether and when EPA plans to act on the claimed exceptional event (EPA may choose not act on exceedance flags which have no bearing on design values, or which are not likely to impact any future regulatory decision). This saves	No

Exceptional Event Demonstration Action	Timing	Timing Specified by EER?
	wasted resources from a state preparing a package that EPA does not intend to review.	
3. EPA responds to notice of intent to inform the state whether EPA will review package or defer. EPA provides timeframe for review if needed for regulatory action.	Anticipated to be within 60 days of receipt of letter of intent to submit a package from state. EPA will generally give priority to exceptional event decisions that affect near-term regulatory decisions and may need to defer review of exceptional event packages that are not associated with near-term or anticipated regulatory decisions.	No
4. State submits exceptional event package to EPA	The EER allows states to submit packages up to 3 years following the end of the calendar quarter in which the event occurred, or 12 months prior to the date that a regulatory decision must be made by EPA.	Yes
5. State submits High Wind Action Plan (optional)	Submit with EE package or recommended within 12 months of EPA concurrence. As discussed in Section 3.1.6 controls will be considered reasonable for events only after control measures identified in the High Wind Action Plan have been implemented and EPA has issued formal recognition of implementation.	No
6. EPA completes initial review of exceptional event package & sends letter to state outlining (1) timing of final review, and (2) preliminary assessment of completeness of package/need for additional information[27]	Anticipated within 120 days of receipt by EPA. Note: If state did not send a notice of intent (step 2), EPA's initial review letter will address whether EPA intends to review the package or will defer (see step 3). EPA will address completeness and timing only for those packages that will be reviewed by EPA in the near term.	No
7. State provides supplemental information requested by EPA, if needed	Requested within timeframe identified by EPA in the initial review letter (step 4). This will typically be 60 days from receipt of the letter from EPA. (Letters will be e-mailed with a hard copy to follow. The date of the e-mail will be considered the date of receipt.)	No
8. EPA final review of EE package	The timing of EPA's final decision will depend on the regulatory impact of the data and will be	No

[27] EPA may request additional information as part of the final review (step 8).

Exceptional Event Demonstration Action	Timing	Timing Specified by EER?
	described in the initial review letter. For EE packages that impact a regulatory decision EPA intends to make a decision regarding concurrence within 18 months of submittal of the complete package, or sooner if required by a regulatory action.	

5.3 Public Comment

If supplemental information submitted to EPA after the state's initial opportunity for public comment is substantial, the state may need to provide an additional opportunity for public comment. EPA will inform the state if public comment is needed for supplemental information; states wishing to submit unsolicited additional information should consult with EPA to determine if public comment is needed. If an additional opportunity for public comment is needed, the state should submit the additional information to EPA within the timeframe outlined in step 7 above and then post the information for public comment. Once the opportunity for public comment has closed, the state should submit the public comments along with the state's responses, if any, to EPA within 10 days of the close of the public comment period. If not submitted as part of the exceptional event demonstration package, the High Wind Action Plan should also have an opportunity for public comment provided.

6. Recommendations for the Preparation of High Wind Dust Exceptional Event Demonstrations

Section 6 provides practical information on the preparation and evaluation of exceptional events demonstrations for high wind dust events. This information is based on the guidance laid out in this document and EPA's experience from demonstrations that EPA has reviewed since the promulgation of the EER. Section 6.1 provides the general framework suggested to prepare a high wind dust event package and Section 6.2 provides details and examples for the technical elements. EPA encourages the submittal of a mitigation plan with the demonstration package although submission of this plan is not a regulatory requirement.

6.1 Framework for Preparing Evidence in Support of a High Wind Dust Exceptional Event

While the technical elements outlined in the EER suggest that each element can be demonstrated independently, many of the elements are linked. EPA suggests the following approach to a demonstration, as depicted in Figure 2.

Step 1. Develop a conceptual model of how the event unfolded and resulted in the exceedance(s).

Step 2. Address not Reasonably Controllable or Preventable (nRCP).

- Calculate sustained wind speed
  - Wind speed will inform whether a basic or comprehensive controls analysis is needed.
- Determine recurrence frequency
  - Recurrence will further inform how complex the controls analysis will need to be.
- Develop controls analysis

Step 3. Present Historical Fluctuations analyses for EPA's assessment of whether the event was in excess of normal historical fluctuations (HF).

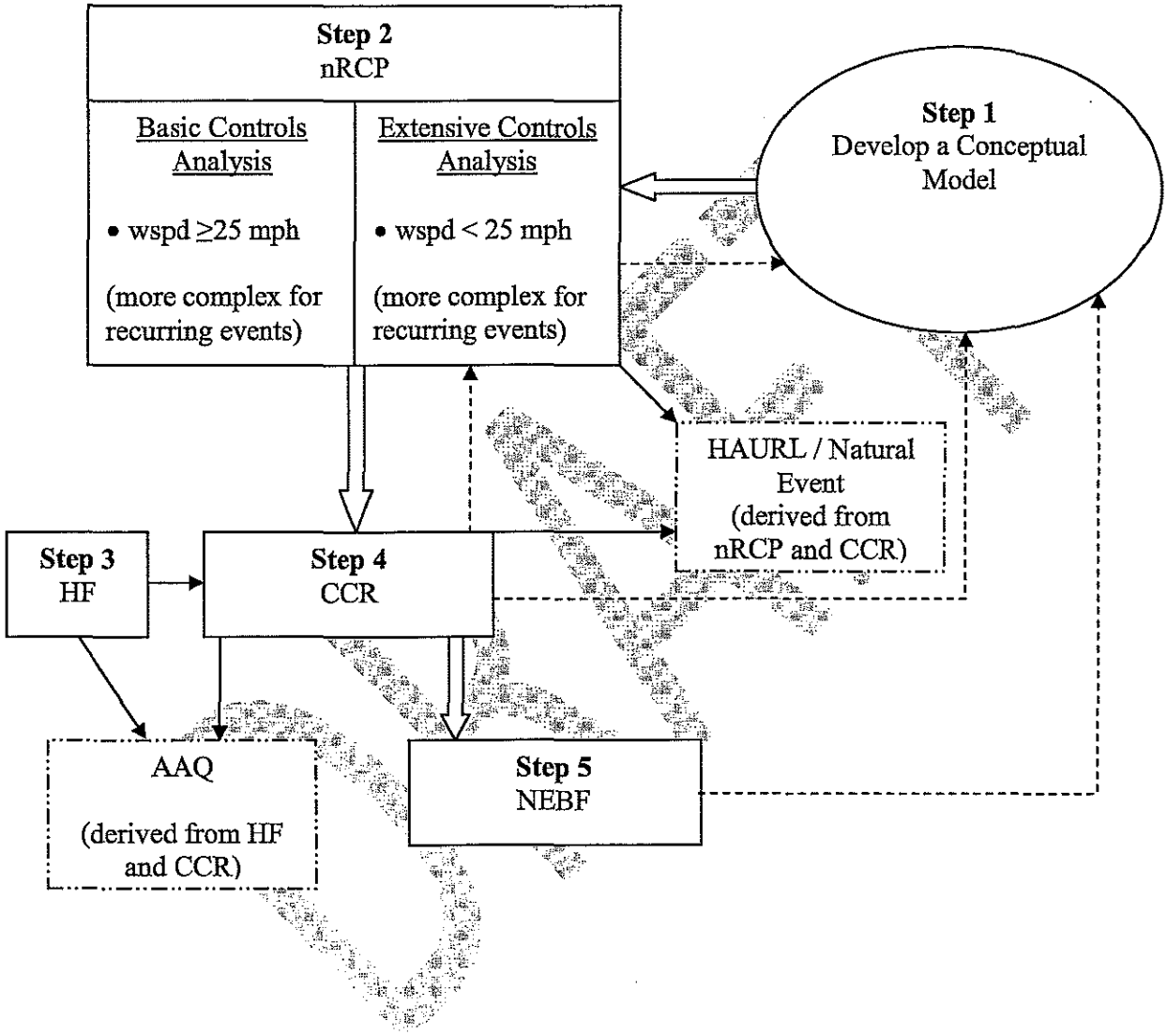
Step 4. Address Clear Causal Relationship (CCR).

- Conduct CCR analyses
  - Consider whether CCR identified sources not addressed in nRCP.
- Once sufficient HF analyses have been completed and CCR has been demonstrated, then Affects Air Quality (AAQ) will generally have also been satisfied. Prepare statement that AAQ has been met by providing HF analyses and demonstrating CCR.
- Once nRCP and CCR have been satisfied, then the element for Human Activity Unlikely to Recur at a particular Location / Natural Event (HAURL / Natural Event) will generally have also been satisfied. Prepare statement that HAURL / Natural Event has been satisfied by demonstrating nRCP and CCR.

Step 5. Address No Exceedance But For the event (NEBF) only after all previous criteria have been satisfied.

After each step it is recommended that the conceptual model be reviewed and revised as needed.

Figure 2. Suggested order for preparing technical elements for demonstration packages for high wind dust events.



6.2 Recommended Methods for the Technical Elements of a High Wind Dust Exceptional Events Package

This section contains recommendations for preparing and demonstrating the technical elements for high wind dust events. These recommendations and examples do not represent the full suite of analyses that could be conducted as part of a high wind dust exceptional events package, but are intended to show the kinds of analyses and descriptions that EPA expects. The examples were taken from EPA Region IX analyses and the following high wind dust exceptional event demonstration packages that were submitted to EPA Region IX.[28]

- Anaheim: South Coast Air Quality Management District (SCAQMD)
- Las Vegas: Clark County Department of Air Quality and Environmental Management (Clark County DAQEM)
- Phoenix: Arizona Department of Environmental Quality (ADEQ)

6.2.1 Step 1: Develop a Conceptual Model

A demonstration package for a high wind dust event should include a conceptual model of how the event occurred. In its simplest form this could be a narrative description of how the event unfolded to result in the exceedance(s). The conceptual model should help tie the various rule criteria together into a cohesive explanation of the event. The following information is suggested to be included in the conceptual model:

- Description of weather phenomena that resulted in high wind
- Description of sources (land areas, industrial sources, other anthropogenic sources, natural sources, types of PM/dust) likely entrained by the high wind
- Explanation of the path by which the dust reached the monitor(s)
- Description of and map showing relevant monitors, topography, and other relevant geographic features that assist in understanding how the event developed and resulted in the exceedance.
- Description of how the event day differs from non-event days
- Description of concentration and wind patterns for the exceeding monitor(s) and for surrounding area

The following is an example of the type of narrative EPA suggests for the conceptual model.[29]

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[28] Full exceptional event demonstration packages are available as follows:
- Anaheim (SCAQMD, event date: October 13, 2008) at http://www.aqmd.gov/pub_edu/notice_exceptional_events_2009.html
- Las Vegas (Clark County DAQEM, event date: February 13, 2008) at http://www.clarkcountynv.gov/Depts/daqem/Pages/ExceptionalEvents.aspx
- Phoenix (ADEQ, event date: April 30, 2008) at http://www.azdeq.gov/environ/air/plan/reear_2008.html

[29] Letter dated November 22, 2010 to Matthew Lakin, Manager Air Quality Analysis Office USEPA Region 9, from Karen Magliano, Chief Air Quality Data Branch California Air Resources Board, transmitting final report dated August 5, 2010 entitled, "Analysis of Exceptional Events Contributing to High PM10 Concentrations in the South Coast Air Basin on October 13, 2008."

Southern California's South Coast Air Basin (Basin) consists of 10,743 square miles and consists of Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino Counties. The population of the Basin is approximately 16 million people, with approximately 11 million gasoline powered vehicles and 300,000 diesel vehicles. The coastal plain contains most of the population of the Basin, which is surrounded by tall mountains, including the San Gabriel Mountains to the north, the San Bernardino Mountains to the northeast, and the San Jacinto Mountains to the east. The coastal range of the Santa Ana Mountains separates the inland part of Orange County from Riverside County. The proximity of the Pacific Ocean to the west has a strong influence on the climate, weather patterns and air quality of the Basin. The mountains also have a significant impact on the wind patterns of the Basin. Offshore winds flow down slope and are warmed and dried by compressional heating, gaining momentum through the passes and canyons. Northeasterly winds, known as Santa Ana winds, typically account for the highest wind events in the Basin, occurring several times each year. Onshore high-wind events also occur with the strongest winds typically occurring in the mountains and deserts.

Violations of the PM_{10} NAAQS were recorded at the South Coast Air Basin Anaheim monitoring station on October 13, 2008, due to high winds. The 24-hour mass concentration at Anaheim was measured with a federal equivalent method (FEM) Tapered Element Oscillating Microbalance (TEOM) continuous monitor, with a midnight-to-midnight 24-hour average concentration of 199 $\mu g/m^3$. This was not a sampling day for the Federal Reference Method (FRM) filter measurements in the Basin. While no other PM_{10} measurements exceeded the federal standard level (150 $\mu g/m^3$), other stations in the Basin had elevated concentrations during the same period.

A strong Santa Ana wind event developed on October 13th, causing very high northerly through easterly winds in the mountains and deserts, especially through and below the wind-favored passes and canyons in the Basin. National Weather Service (NWS) weather stations measured extremely high peak wind gusts throughout the day in areas upwind of the high SCAQMD PM_{10} stations, including: 87 mph by in [*sic*] the Santa Ana Mountains of Orange County (Freemont Canyon RAWS); 87 mph in the San Gabriel Mountains of Los Angeles County (Chilao RAWS); 79 mph in the Malibu Hills of Los Angeles County; 61 mph at Ontario International Airport in San Bernardino County; 55 mph at Corona Airport in Riverside County; 51 mph at Chino Airport in San Bernardino County and 41 mph at the Santa Ana – John Wayne Airport in Orange County.
Due to the widespread winds, sources of the windblown dust were both natural areas, particularly from the mountains and deserts, and BACM-controlled anthropogenic sources. The timing of this event is verified with the high wind observations and reports of reduced visibility and blowing sand and dust, in conjunction with the hourly TEOM and BAM PM_{10} measurement data from nearby monitors in the Basin, when available.

The following maps support the conceptual model:

- Map of the South Coast Air Basin Showing Air Monitoring Stations and Forecast Areas
- Map of South Coast Air Basin with Selected Cities and Topography
- Map of South Coast Air Basin PM_{10} Monitors

6.2.2 Step 2: Address not Reasonably Controllable or Preventable (nRCP).

The nRCP demonstration should identify the sources that were expected to have contributed to the event, both natural and anthropogenic, and indicate how they were not reasonably controllable or preventable. Generally, the nRCP will include identification of natural sources and whether they are reasonably controllable, and identification of anthropogenic sources and their associated controls.

6.2.2.1 Identify source areas and source categories expected to have contributed to the event
EPA recommends that the first step of the nRCP demonstration is to identify the likely source area and source categories expected to have contributed to the event. The source areas and categories can be general, such as, "The area upwind of the monitor includes portions of the Santa Ana Mountains to the NE of the station and extending down into the Basin. Sources of the windblown dust were both natural areas, particularly from the mountains and deserts, and BACM-controlled anthropogenic sources."[30] It is important to identify the geographic references on a map.

6.2.2.2 Calculate sustained wind speed
Sustained wind speed is generally calculated as the wind speed averaged over a period of at least one minute: typical averaging times for a sustained wind speed are one to five minutes.[31] EPA will not consider any average less than one minute to represent a sustained wind speed. Packages should include the maximum sustained wind speed for each hour of the event and also the number of periods above 25 mph (as part of the clear causal relationship a time series with sustained wind speeds during the event should also be included (see Section 6.2.2.4)). The maximum sustained wind speed does not necessarily have to be at the site of the exceedance, but it should represent the source area. If the sustained wind speed provided is not at the exceeding monitor then the CCR demonstration will generally be expected to support this claim. Sustained wind speed data are typically available from sources such as local air monitoring stations and National Weather Service Stations. The demonstration should indicate what the expected entrainment threshold is for the local area and whether the sustained wind speed exceeded this level. If the default entrainment threshold of 25 mph is used then this guidance document should be cited and a statement should be made indicating that this threshold is appropriate for the local area.

6.2.2.3 Determine recurrence frequency
EPA intends to consider the recurrence frequency for high wind dust exceptional events to be the number of events flagged in AQS as high wind dust exceptional events. An event is generally a continuous period of elevated wind linked to the same weather pattern: it is typically multiple hours, but could span one or more successive days. EPA is defining a recurring event for purpose of high wind dust events as more than one expected high wind dust event per year,

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[30] Letter dated November 22, 2010 to Matthew Lakin, Manager Air Quality Analysis Office USEPA Region 9, from Karen Magliano, Chief Air Quality Data Branch California Air Resources Board, transmitting final report dated August 5, 2010 entitled, "Analysis of Exceptional Events Contributing to High PM10 Concentrations in the South Coast Air Basin on October 13, 2008."

[31] National Weather Service defines a "sustained wind" as the wind speed determined by averaging observed values over a two-minute period.

averaged over three years. The use of "expected" events is necessary to account for variable sampling frequencies. EPA will rely on flagged high wind dust events in AQS to indicate the number of high wind dust events in an area. To calculate the recurrence frequency for every-day sampling (i.e., 1-in-1) the state would count the number of events with data flagged in AQS as a high wind dust event over the relevant three-year time period and divide the number of flagged days by three years. For 1-in-3 day sampling the state would count the number of events with data flagged in AQS as a high wind dust event over the relevant three-year period, multiply by three to get the equivalent of 1-in-1 day sampling, and then divide by three years. For both 1-in-1 and 1-in-3 day sampling schedules, if the three-year average recurrence frequency exceeds one then high wind dust exceptional events within that period will be treated as recurring. In the case of 1-in-6 day sampling a different approach is necessary since even one high wind dust event would result in an expected recurrence frequency greater than one and it is illogical to call one exceedance recurring. In this case, one flagged high wind dust event will be considered non-recurring. If there is more than one flagged high wind dust event in three years then events during that period will be treated as recurring.

6.2.2.4 Prepare basic controls analysis

If the sustained wind speed calculated in Section 6.2.2.2 is at or above 25 mph (or an alternative entrainment threshold approved by EPA) then generally the state can provide a basic controls analysis to show that the event was not reasonably controllable or preventable (see Section 3.1.5.1). The level of detail in the basic controls analysis will be informed by the recurrence frequency and level of wind speed above 25 mph (Figure 1). Generally, a basic controls analysis will identify likely sources in the expected source contribution area, describe the controls in place for anthropogenic sources, and indicate whether the natural sources were reasonably controllable and why. The basic controls analysis, regardless of complexity, generally does not need to include back-trajectories, specific emissions inventories, or detailed reports of controls implementation and enforcement.

Cases where dust was entrained by sustained winds above 25 mph upwind of the monitor and subsequently transported at lower wind speeds to the monitor could still qualify for the basic controls analysis category as long as the state shows that sustained winds were above 25 mph in the expected source area. Cases of long-range transport (e.g., >50 miles) could still qualify for a basic controls analysis, but a robust trajectory analysis and/or satellite imagery should be included as part of the CCR demonstration.

Basic controls analysis for non-recurring cases

The basic controls analysis for non-recurring cases should discuss in general terms the controls on the sources identified in Section 6.2.2.1 and explain why the sources were not reasonably controllable or preventable. As discussed in Section 3.1.5, there is a range of complexity within the basic controls analysis category. As sustained winds (both level and duration) increase, the controls analysis can be more basic. The most basic controls analysis would include a brief description of local/upwind sources that were suspected to significantly contribute to the event and a description of the controls on the anthropogenic sources in place at the time of the event (e.g., local BACM measures) and why they are reasonable. For the sources identified, the submitter should explain how dust entrainment occurred despite having reasonable controls in place (e.g., controls were overwhelmed by high wind).

An example of a basic controls analysis for the anthropogenic sources in a non-attainment area is:[32]

> This requirement is met by demonstrating that despite reasonable and appropriate measures in place, the October 13, 2008 wind event caused the NAAQS violation. During this event, there were no other unusual PM_{10}-producing activities occurring in the Basin and anthropogenic emissions were approximately constant before, during and after the event. SCAQMD has implemented regulatory measures to control emissions from fugitive dust sources and open burning in the South Coast Air Basin. Implementation of Best Available Control Measures (BACM) in the Basin has been carried out through SCAQMD Rule 403 (Fugitive Dust), as well as source-specific rules. With its approvals of the South Coast PM_{10} Attainment Plans in the State Implementation Plan (SIP), EPA has concluded that this control strategy represents BACM and Most Stringent Measures (MSM) for each significant source category, and that the implementation schedule was as expeditious as practicable.
>
> - SCAQMD Rule 403 establishes best available fugitive dust control measures to reduce fugitive dust emissions associated with agricultural operations, construction/demolition activities (including grading, excavation, loading, crushing, cutting, planning, shaping or ground breaking), earth-moving activities, track-out of bulk material onto public paved roadways, and open storage piles or disturbed surface areas.
> - SCAQMD Rule 1156, Further Reductions of Particulate Emissions from Cement Manufacturing Facilities, is a source-specific rule that applies to all operations, including material handling, storage and transport at cement manufacturing facilities. It restricts visible emissions from facility operations, open piles, roadways and unpaved areas and requires enclosed systems for loading, unloading and transfer of materials. Other operations must employ wind fencing and wet suppression systems or be enclosed with permitted control equipment.
> - SCAQMD Rule 1157, PM_{10} Emissions Reductions from Aggregate and Related Operations, is a source-specific rule applicable to all permanent and temporary aggregate and related operations that produce sand, gravel, crushed stone or quarried rocks. Like Rule 1156, this rule restricts the discharge of fugitive dust emissions into the atmosphere through plume opacity tests and limiting visible plume travel to within 100 feet of the operation. This rule requires: prompt removal of material spillage; stabilization of piles with dust suppressants; the control of loading, unloading, transferring, conveyors, and crushing or screening activities with dust suppressants or other control methods; stabilization of unpaved roads, parking and staging areas; sweeping of paved roads; and the use of track-out control systems.
> - SCAQMD Rule 1158, Storage, Handling, and Transport of Coke, Coal and Sulfur, is a source-specific rule that applies to any facility that produces, stores, handles, transports or uses these materials. This rule restricts visible emissions

[32] Letter dated November 22, 2010 to Matthew Lakin, Manager Air Quality Analysis Office USEPA Region 9, from Karen Magliano, Chief Air Quality Data Branch California Air Resources Board, transmitting final report dated August 5, 2010 entitled, "Analysis of Exceptional Events Contributing to High PM10 Concentrations in the South Coast Air Basin on October 13, 2008."

and requires that piles be maintained in enclosed storage and that unloading operations be conducted in enclosed structures with water spray systems or venting to permitted air pollution control equipment. It also has specific requirements to control emissions from roadways, other facility areas, and conveyors and the loading of materials.

- SCAQMD Rule 1186, PM_{10} Emissions from Paved and Unpaved Roads and Livestock Operations, requires rapid removal of paved road dust accumulations and establishes a treatment schedule for unpaved roads, street sweeper procurement standards, and design standards for new road construction. SCAQMD Rule 1186.1, Less-Polluting Sweepers, requires procurement of alternative-fueled equipment when governmental agencies replace street sweepers.
- SCAQMD Rule 444, Open Burning, ensures that open burning is conducted in a manner that minimizes emissions and impacts, and that smoke is managed to protect public health and safety. This rule requires authorization for agricultural and prescribed fire, limited to days that are predicted to be meteorologically conducive to smoke dispersion and that will not contribute to air quality that is unhealthy for sensitive groups or worse. It also restricts residential and waste burning.
- SCAQMD Rule 445, Wood Burning Devices, reduces pollution from wood-burning fireplaces and other devices through requirements for new construction, curtailment of wintertime wood burning in specified areas when poor air quality is forecast and restriction of the sale of unseasoned firewood. The SCAQMD Healthy Hearths program provides public education on how to reduce air pollution from wood burning and encourages the conversion to natural gas burning fireplaces through an incentive program.

October 13, 2008 was designated an agricultural and prescribed wildland "no-burn" day, in accordance with SCAQMD rule 444. The $PM_{2.5}$ 24-hour averages at all stations in the Basin, including Anaheim, were well below the 24-hour $PM_{2.5}$ NAAQS and the PM_{10} was estimated to be composed of 87% PM-Coarse particles ($PM_{10-2.5}$) and only 13 percent $PM_{2.5}$. This shows that mostly crustal material comprised the PM_{10} mass and not transported or locally generated urban pollution or combustion sources.

A survey of the SCAQMD complaint records and inspection reports for Anaheim and all other areas of the Basin indicated no evidence of unusual particulate emissions on October 13, 2008 other than related to the strong winds. The complaints are summarized in Table 2-7 from the SCAQMD Clean Air Support System (CLASS) database for complaints and compliance actions. Due to the windy conditions, SCAQMD compliance staff responded to 17 complaints related to windblown dust on October 13. Most were in Riverside and San Bernardino County, but two were in Orange County with no further compliance action taken. No Notices of Violation or Notices to Comply were issued in the Basin for fugitive dust on this day. Several complaints were directly related to the strong winds and windblown dust that overwhelmed the strict fugitive dust controls that are enforced in the Basin. The control methods were generally effective throughout the Basin, but were apparently overwhelmed in several instances by the strong, gusty winds, causing windblown dust and sand to be entrained in the atmosphere.

While the above example provided a basic controls analysis for anthropogenic sources in a non-attainment area, an area attaining the NAAQS can similarly present the current rules, if any, and how the identified rules are reasonable given the attainment status.

In addition to identifying controls on anthropogenic sources, it is important that a submitting agency indicate whether the natural sources could have been reasonably controlled. For example, the following statement could fulfill this need: "Wind speeds were high enough to entrain dust from natural areas including undisturbed mountain and desert areas upwind of the monitor. Dust from these sources was not reasonably controllable due to the cost of applying controls over such a large land area and because of the detrimental effect on the natural ecosystem that could result."

Basic controls analysis for recurring cases

When sustained wind speeds are at or above 25 mph and there is more than one high wind dust event in the year, a controls analysis can be basic but will need more information than the most basic case. This kind of controls analysis will need to include identification of specific sources in the upwind area and a discussion of specific controls on those sources; this does not require trajectories or specific inventories. The purpose of identifying specific sources in the upwind area for recurring cases with wind speeds above 25 mph is to inform both the state and EPA about whether reasonable control of sources includes increasing controls that would be effective above 25 mph.

An example of a basic controls analysis for the anthropogenic sources in a non-attainment area for recurring cases will be incorporated in this document as one becomes available.

Similar to the basic controls analysis for non-recurring cases, it is important that a submitting agency indicate whether the natural sources could have been reasonably controlled. As with the anthropogenic sources for recurring events, it is important to specifically identify natural sources that are expected to be contributing to the event(s) so that the state and EPA can consider whether controls such as wind breaks near the natural sources might be reasonable. For example, the following type of assessment and statement could fulfill this need:

> Wind speeds were high enough to entrain dust from natural areas upwind of the monitor, in particular at the Mojave Tortoise Natural Preserve which is five miles upwind of the monitor. Wind breaks and other control measures are prohibited in this area because it interferes with the natural landscape movement required by the endangered Mojave Desert Tortoise. Dust from this source was not reasonably controllable due to the cost of applying controls over such a large land area and because of the detrimental effect on the natural ecosystem and health of the desert tortoise that could result.

Finally, if EPA recommended controls improvements as part of a previous high wind dust exceptional event review then the controls analysis should address how these controls improvements have been addressed.

6.2.2.5 Prepare comprehensive controls analysis

If the sustained wind speed calculated in Section 6.2.2.2 is below 25 mph (or alternative entrainment threshold approved by EPA) then the state will generally be expected to provide comprehensive controls analysis (see Section 3.1.5.2). The comprehensive controls analysis is

expected to have back-trajectories indicating specific sources in the upwind area, an inventory of the contribution for the significant sources, and detailed descriptions of controls and their effective implementation and enforcement. The further below 25 mph the wind speeds are at the source area and/or the higher the recurrence frequency, the more complex and compelling the demonstration will generally need to be for EPA to be able to concur. Note that some of the information generated as part of a comprehensive controls analysis will also contribute to the CCR and should be referred to in that portion of the demonstration package.

All controls analyses when wind speeds are below 25 mph, regardless of complexity, should generally address whether control improvements were recommended by EPA as part of a previous high wind dust exceptional event review. If controls improvement had been previously recommended then the controls analysis should address how these controls improvements have been implemented.

Comprehensive controls analysis for non-recurring cases

States will generally need to prepare a comprehensive controls analysis for non-recurring events with wind speeds below 25 mph. Because dust from stable surfaces is usually not entrained below the 25 mph, this analysis should consider whether all contributing sources are reasonably controlled. The comprehensive controls analysis for non-recurring cases should include: back-trajectories indicating specific sources in the upwind area, an inventory of the contribution for the significant sources, and detailed descriptions of controls and their effective implementation and enforcement. Although EPA expects a comprehensive controls analysis for these cases, EPA does not expect analyses for non-recurring cases to be as complex as analyses for recurring cases with wind speeds are below 25 mph.

An example of a comprehensive controls analysis for non-recurring cases will be incorporated in this document as one becomes available.

Detailed descriptions of enforcement efforts, any notice of violations, and evidence of proper implementation of controls should be included.

Finally, in addition to identifying controls on anthropogenic sources, it is important that a submitting agency indicate whether the natural sources could have been reasonably controlled. For example, the following statement could fulfill this need:

> Wind speeds were high enough to entrain dust from natural areas including undisturbed mountain and desert areas upwind of the monitor. Dust from these sources was not reasonably controllable due to the cost of applying controls over such a large land area and because of the detrimental effect on the natural ecosystem that could result.

Comprehensive controls analysis for recurring cases

Recurring cases with wind speeds below 25 mph will require the most comprehensive analyses to show that the wind-entrained emissions were not reasonably controllable or preventable. The demonstration is likely to be increasingly difficult as sustained wind speeds decrease from 25 mph (see Section 3.1.5.2 and Figure 1). Many of these cases may not, in fact, represent concurrable cases. Those cases that could be concurrable will require considerable analyses to show that specific sources upwind of the exceeding monitor had reasonable controls that were properly implemented and enforced. Specifically, the comprehensive controls analysis for recurring cases should include: back-trajectories indicating specific sources in the upwind area, an inventory of the contribution for the significant sources, and detailed descriptions of controls and their effective implementation and enforcement.

For comprehensive controls analysis for recurring events, EPA will place significantly more weight on the meteorological data associated with the measured high particulate matter concentration. A state may be required to provide a source contribution analysis, similar to the analysis presented below, for multiple hours of the day, as a single back trajectory does not account for wind direction fluctuations during the event and may not accurately capture all the sources that may be contributing to the exceedance. Also, when moderate winds are responsible for high levels of measured particulate matter, considerably more attention should also be placed on the hours of the day preceding the event to adequately assess the sources contributing to the exceedance that may have influenced particulate matter concentrations before the arrival of the claimed event.

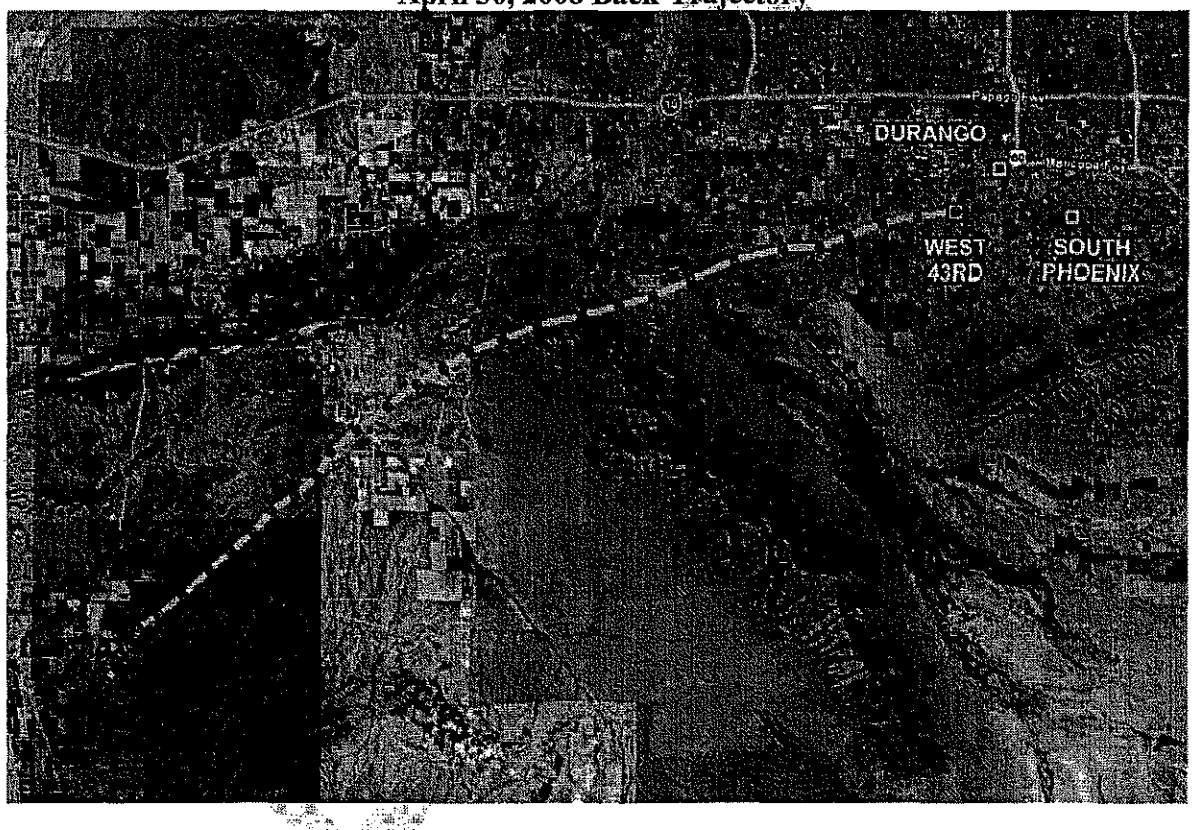
Following is an example of a methodology of a back-trajectories and inventory[33] for a comprehensive controls analysis for recurring cases:

> Back-trajectories were plotted in 5-minute links based on 5-minute average wind speed and wind direction data recorded at the West 43rd Avenue station. The back-trajectory plot for April 30, 2008 is shown in the following figure. These back-trajectories revealed that winds accompanying peak PM_{10} concentrations typically blew from the west-southwest to the West 43rd Avenue station, crossing a mosaic of agricultural, residential, industrial, and riverbed lands. GIS files were used to determine the zoned uses of all lands within ½ mile of each back-trajectory track over which wind parcels travelled during the two hours prior to delivering the peak PM_{10} concentration to the West 43rd Avenue monitor. Lands under active construction on each exceedance day were identified from earthmoving permit records. Parcel areas were aggregated within seven general categories for which limited emission factor data were available: vacant, agriculture, construction, open/restricted access, riverbed, sand and gravel/landfill, and other lands. The uses of these land categories are generally defined as follows:
>
> Vacant – represents undeveloped land to which public access is not restricted;
> Agriculture – represents lands under agricultural cultivation;

[33] Assessment of Qualification for Treatment under the Federal Exceptional Events Rule: High Particulate (PM10) Concentration Event in the Phoenix Area on April 30, 2008. Technical report prepared by the Arizona Department of Environmental Quality, Air Quality Division. August 16, 2010.

Construction – represents lands being developed for long term use that will include ground coverage elements such as pavement, structures, or landscaping that will prevent the generation of windblown dust;
Passive/restricted open space – represents undeveloped or partially developed lands to which public vehicular access is restricted (these lands include public parks, national forests, military posts, and Indian reservations);
Riverbed – represents riverbed channels of the Salt and Gila River branches;
Landfill/sand and gravel – represents lands being used for mineral extraction or waste deposit;
Other – represents developed lands that are protected from windblown dust generation by elements such as paving, structures, and landscaping.

April 30, 2008 Back-Trajectory



PM_{10} emissions were calculated for each back-trajectory hour using emission factors derived from the Nickling and Gillies data, 5-minute wind speed averages recorded at the West 43rd Avenue monitoring station, and the land use acreage along each back-trajectory computed by MAG staff. The emission factor equations were used to compute PM_{10} emissions for each 5-minute portion of each back-trajectory hour. For each 5-minute period, the measured average wind speed was compared to the threshold friction velocity calculated at a 10-meter height to determine whether the threshold wind speed necessary to the generation of windblown PM_{10} on each land use, undisturbed and disturbed, had been exceeded. If the threshold velocity was exceeded, the appropriate Nickling and Gillies emission factor equation was used to compute PM_{10} emissions in units of gm/cm2-

sec. Emissions for each 5-minute period within each hour and within each land use category were converted to units of lb/acre-hr and then summed to produce hourly average PM_{10} emission rates per land use category. The emission rates for the other land use categories and the 2nd hour were calculated using a similar methodology. The land use category emission rates were then multiplied by the acreages within each appropriate land use category to derive PM_{10} emissions for each back-trajectory hour by land use category. The PM_{10} emissions for each of the back-trajectory hours on each exceedance day were summed together to calculate total emissions over each exceedance day back-trajectory by land use category. These land use category emissions were then grouped by anthropogenic and nonanthropogenic categories to assess the relative contribution of nonanthropogenic sources to exceedances recorded at the West 43rd Avenue monitoring station during 2008. A summary of the results of these calculations for the April 30, 2008 exceedance day is presented in the following table.

Table 11
Anthropogenic and Nonanthropogenic Windblown PM_{10} Emissions From West 43rd Avenue Monitor Back-Trajectory Lands on April 30, 2008

Land Use Category	PM_{10} Emissions (lb)		% of Anthropogenic
	Anthropogenic	Nonanthropogenic	
Vacant/Undisturbed	-	0	
Vacant/Disturbed	1,501	-	20.7%
Agriculture/Undisturbed	0	-	0.0%
Agriculture/Disturbed	0	-	0.0%
Construction/Undisturbed	0	-	0.0%
Construction/Disturbed	277	-	3.8%
Passive-Restricted/Undisturbed	-	0	
Passive-Restricted/Disturbed	0	-	0.0%
Riverbed/Undisturbed	-	8,234	
Riverbed/Disturbed	2,408	-	33.3%
Sand & Gravel/Undisturbed	0	-	0.0%
Sand & Gravel/Disturbed	3,053	-	42.2%
Other		-	
Total	7,240	8,234	
% of Grand Total	46.8%	53.2%	

[EPA Addendum: After this detailed source attribution estimate is established for all contributing source areas, the State should then identify all the reasonable control measures associated with each source category. This analysis should include a detailed explanation as to why each of those control measures are reasonable for the area and should also include statements that there were no other control measures that were reasonably available.]

The analysis should include information on whether these required reasonable controls were appropriately implemented and enforced during the time of the event. The state should include all available enforcement, rule effectiveness, and compliance information for the days preceding, during, and following the claimed event day. EPA will consider the number of inspections and notices of violations in upwind areas as evidence that all reasonable controls were, in fact, implemented and functioning appropriately. EPA will also consider the overall compliance rates for specific source categories in determining whether reasonable controls were in place.

Finally, it is important that a submitting agency indicate whether the natural sources could have been reasonably controlled. As with the anthropogenic sources for recurring events, it is important to specifically identify natural sources that are expected to be contributing to the event(s) so that the state and EPA can consider whether controls such as wind breaks near the natural sources might be reasonable. For example, the following type of assessment and statement could fulfill this need:

> Wind speeds were high enough to entrain dust from natural areas upwind of the monitor, in particular at the Mojave Tortoise Natural Preserve which is five miles upwind of the monitor. Wind breaks and other control measures are prohibited in this area because it interferes with the natural landscape movement required by the endangered Mojave Desert Tortoise. Dust from this source was not reasonably controllable due to the cost of applying controls over such a large land area and because of the detrimental effect on the natural ecosystem and health of the desert tortoise that could result.

6.2.2.6 Prepare High Wind Action Plan (optional)

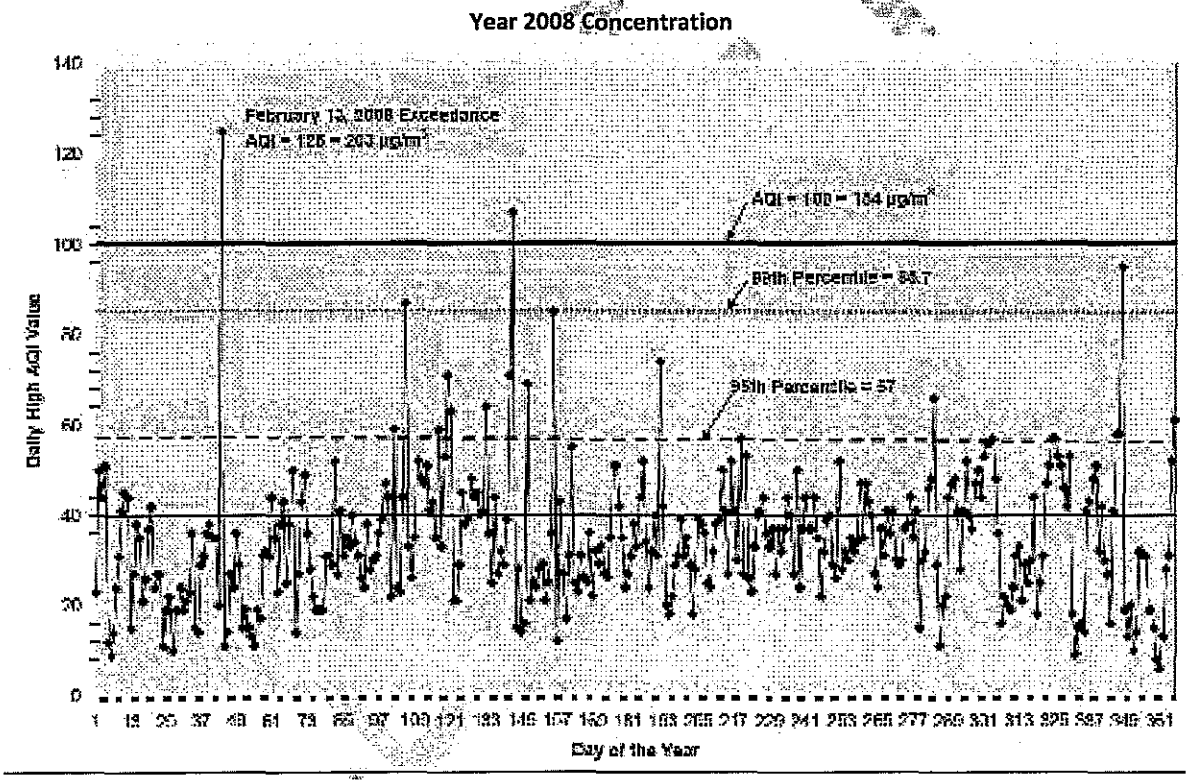
If a state discovers (an) uncontrolled source(s) of dust during the course of the event demonstration, the state may choose to submit a High Wind Action Plan, either separately or along with the demonstration package, so the newly discovered source(s) can be considered reasonably controlled if a subsequent event occurs. Alternatively, EPA may identify a source previously unidentified by the state that EPA considers to be reasonably controllable. In this case, a state could submit a High Wind Action Plan following the submission of the demonstration package. A High Wind Action Plan is developed to address sources that could reasonably be controlled to minimize the occurrence of future events. As such, the following information would be included:

- Source(s) targeted for controls
- Description of controls
- Oversight/enforcement plan for event days
- Implementation timeline
- Documentation of effective implementation and enforcement

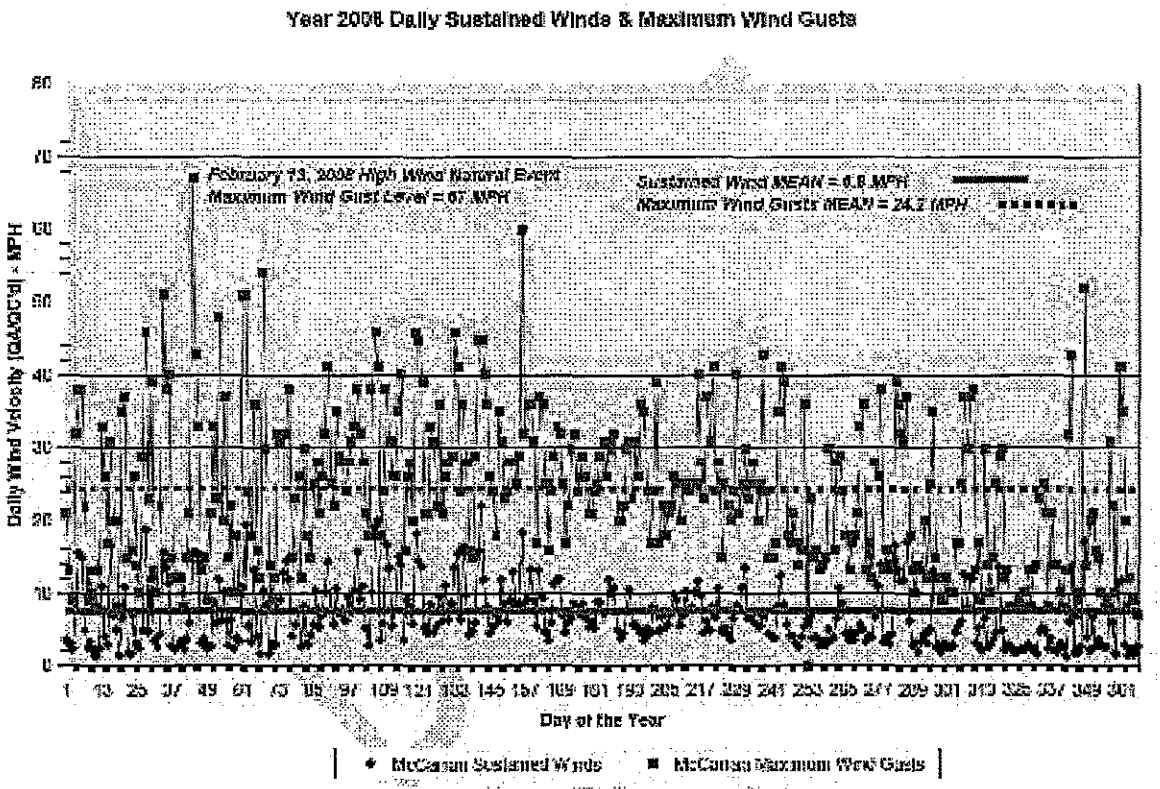
6.2.3 Step 3: Present Historical Fluctuations (HF) Analyses

As described in Section 3.2, historical fluctuations (HF) analyses will inform EPA's determination of whether the event was in excess of normal historical fluctuations and will also inform CCR, NEBF, and AAQ. Specific analyses expected to provide the historical context for the event include:

1. A time series for concentration and wind data for the event area for the previous 3-5 years, or longer if available, with high wind dust events identified: Concentration data should be 24-hour concentrations for each day and wind data should be maximum sustained (1-5 minute average) wind for each day. It would also be appropriate to display wind gusts (1-3 second averages), if available. Depending on the quantity of data, it may be appropriate to present monthly maximums (note that it is not appropriate to present monthly-averaged daily data or any other average of the daily data as this masks other high values). It is appropriate to identify information such as: seasonal or monthly 24-hour means, other event days, and relevant standards. The following figures[34] show the type of information EPA is seeking, except that in these cases the time series includes only one year rather than the longer timeframe expected by EPA and other high wind dust events were not specifically identified. Additionally, EPA would prefer concentration statistics rather than AQI statistics. Finally, wind statistics should show a maximum for each day or month rather than averaged data.



[34]Exceptional Event Documentation for February 13, 2008, PM10 High-Wind Exceedance Event. Technical report prepared by the Clark County (Nevada) Department of Air Quality & Environmental Management. February 8, 2011.



2. Percentile of concentration relative to annual data with and without all high wind dust events: The percentile of the 24-hour average PM concentration should be provided for the event day relative to all measurement days over the previous 3-5 years. EPA expects a minimum of 300 data points to be included in this calculation. If the sampling schedule is 1-in-6 day sampling then this percentile should include five years of data (60 sample days/year for five years provides 300 data points). Higher frequency sampling can utilize fewer years of data but not fewer than three years. If three years is not available, consult with EPA.

3. Percentile of concentration relative to seasonal data with and without all high wind dust events: The percentile of the 24-hour average PM concentration should be provided for the event day relative to all measurement days for the season (or appropriate alternative 3-month period) of the event over the previous 3-5 years. It is appropriate to use the same time horizon as used for the percentile calculated relative to annual data.

6.2.4 Step 4: Address Clear Causal Relationship (CCR)

As described in Section 3.3, the following types of evidence can support the CCR demonstration:

- Occurrence and geographic extent of the event
- Transport of emissions related to the event in the direction of the monitor(s) where measurements were recorded

- Spatial relationship between the event, sources, transport of emissions, and recorded concentrations
- Temporal relationship between the high wind and elevated PM concentrations at the monitor in question
- Chemical composition and/or size distribution of measured pollution that links the pollution at the monitor(s) with particular sources or phenomena
- Comparison of event-affected day(s) to specific non-event days
- Comparison of concentration and wind speed during the period of the event to historical data (i.e., historical fluctuations analyses)

Each of these types of evidence is treated in detail below. Note that information generated in this portion of the demonstration submittal may result in revisions to the conceptual model and controls analysis. As the flow diagram (Figure 2) suggests, preparation of a high wind dust exceptional event package is not necessarily a step-wise process.

6.2.4.1 Occurrence and geographic extent of the event

The following information can be provided to help establish the occurrence and geographic extent of the event: special weather statements, advisories, news reports; nearby visibility readings; measurements from monitoring stations; MODIS and other satellite maps; and description of weather conditions that created the high wind.

- Special weather statements, advisories, news reports:
  The following information was provided by SCAQMD for an exceptional event showing for Anaheim *(Note that Appendices from the SCAQMD demonstration submittal are referenced in the excerpt below, but they are not provided as part of this document or the example).*

> The National Weather Service had predicted this first strong Santa Ana event of the season well in advance and Governor Schwarzenegger issued a press release on October 10 to prepare the state for Santa Ana winds and the associated wildfire potential (see Appendix A.7).
>
> The Appendix to this document (Sections A.2 through A.6) contains the forecast discussions, short-term forecasts (nowcasts), fire weather forecasts, warnings and significant wind reports, as available from the NWS Los Angeles/Oxnard and San Diego Forecast Offices, whose areas of responsibility cover the Basin and much of southern California. These show that the strong Santa Ana wind event was well predicted in advance, warning the public of potentially damaging winds and windblown dust and sand, along with reduced visibilities.
>
> NWS advisories and warnings for high winds (Appendix, Section A.5) were already in place on October 12, extending through Tuesday, October 14, or longer. A Wind Advisory is issued by NWS when sustained winds of 30 to 39 mph are expected for 1 hour or longer. A High Wind Warning is issued when sustained winds of 40 mph or more are expected for 1 hour or longer, or for wind gusts of 58 mph or more with no time limit. NWS Oxnard issued High Wind Warnings on October 12, extending through the period for the Los Angeles and Ventura County Mountains and Wind Advisories for the Santa Monica Mountains, the Ventura County coastal and interior valleys, the Santa Clarita Valley, the Los Angeles County San Fernando Valley, and the Ventura and Los Angeles County coasts, including

Downtown Los Angeles. NWS San Diego issued High Wind Warnings for the San Bernardino and Riverside County valleys (Inland Empire) and the Santa Ana mountains and foothills and Wind Advisories for the San Bernardino County mountains, Orange County coastal areas, the Riverside County mountains, the San Diego County mountains, and the San Diego County valleys, In short, High Wind Advisories and Warnings were in place for most of the South Coast Air Basin and much of southern California to warn the public of this high wind event. Northeasterly winds with sustained speeds in the 35 to 45 mph range were predicted throughout the region, along with damaging gusts to 70 mph, especially in the mountains and below passes and canyons in the Inland Empire. Hazardous driving conditions were predicted, especially through and below canyons and passes, as well as blowing dust and sand with reduced visibility, broken tree limbs and downed power lines.

The AQMD Meteorology Section predicted high winds for October 13 in the Coachella Valley for AQMD Rule 403.1, which requires specific actions in this area when wind gusts exceed 25 mph. While there are no other AQMD rule requirements to forecast winds in the Basin, the daily forecast discussion by AQMD issued on October 12 for Monday, October 13 predicted the strong winds. A smoke advisory was already in effect in the morning of October 12 and the strong winds were prominent in the forecast discussion, as follows:

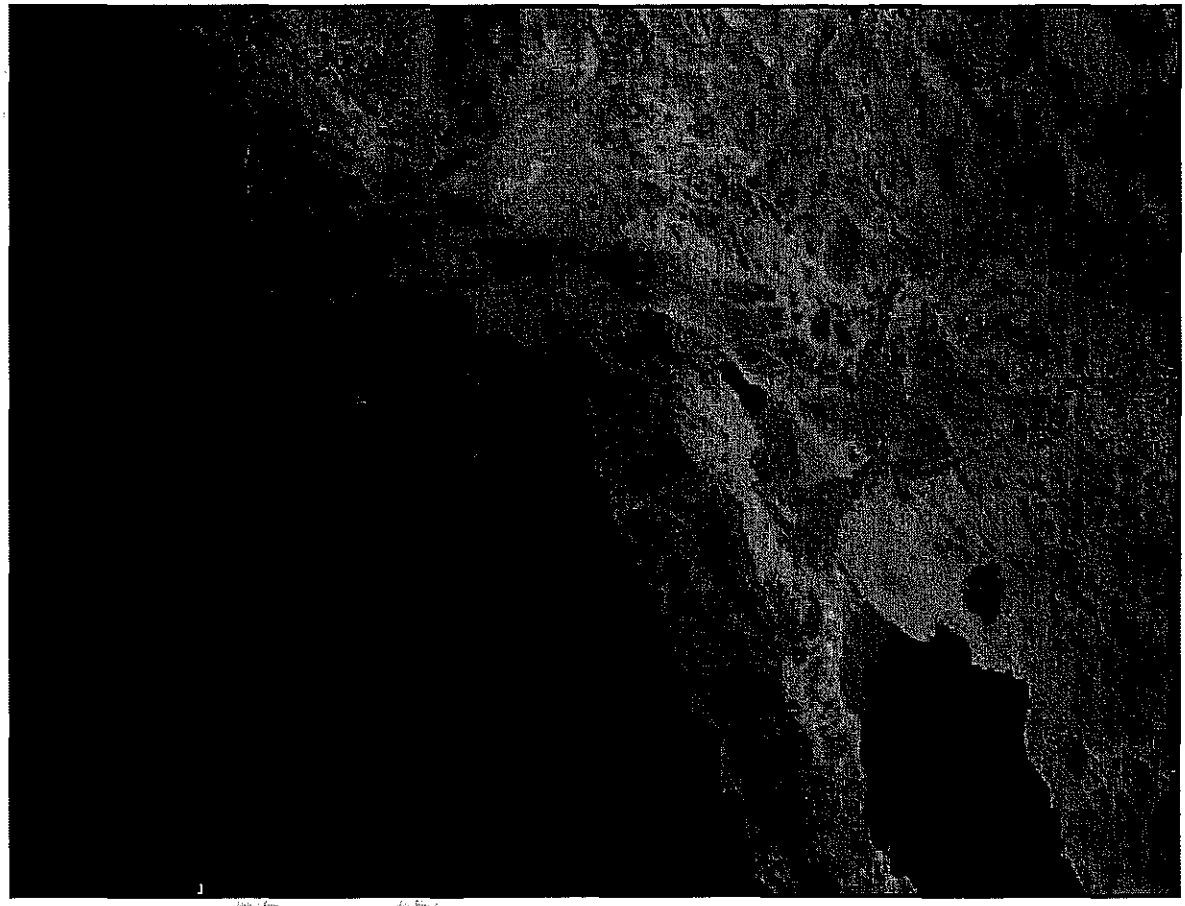
- *SMOKE ADVISORY for Sunday. Concentrations of fine particulates may reach Unhealthy for Sensitive Groups or higher in areas of Los Angeles County directly impacted by smoke from a wildfire in the Angeles National Forest north of Pacoima.*

- *Monday will be mostly clear, windy and warmer as the offshore Santa Ana winds strengthen. Gusty winds through and below canyons and passes will cause elevated particulate concentrations due to windblown dust and possibly continued wildfire activity.*

PM10 predictions were increased throughout the Basin for October 13 and agricultural and prescribed burning was prohibited with a No-Burn declaration for the entire Basin. AQMD issued a Smoke and Windblown Dust Advisory in the morning of October 13, reproduced in the Appendix, Section A-10, that warned of the likelihood of strong Santa Ana winds causing high PM10 concentrations in several areas of the Basin, including Central Orange County (Forecast Area 17, including Anaheim), as follows:
In addition, strong Santa Ana winds will likely cause PM10 concentrations to reach Unhealthy for Sensitive Groups concentrations or higher in areas throughout the Basin downwind of the winds areas. This includes any areas where windblown dust is visible, especially through and below passes and canyons, until the winds subside. Wind prone areas are likely to include: the San Bernardino Valley (Areas 32, 33, 34, 35), Riverside County Valleys (Areas 22, 23, 24, 25, 26), Orange County (Areas 16, 17, 18, 19, 20) and the Los Angeles County northern and southern coastal areas (Areas 2 and 4).

- Nearby visibility readings:
  Visibility readings were supplied by SCAQMD and visibility pictures were submitted by ADEQ for nearby airports.

- MODIS satellite maps:
  SCAQMD provided the following maps showing the spatial distribution of blowing dust.



- Description of weather conditions that created the high wind:
  SCAQMD provided the following description of weather conditions around the time of the event

> An upper level trough of low pressure moved through California, between October 9 and 11. The low pressure system did not create much rain in California during this period, but temperatures were cool throughout the state. By Sunday, October 12, the backside of the trough was over California, providing upper level support for a developing strong Santa Ana wind event. The strong pressure gradients that developed between the high and low pressure aloft created strong winds. The National Weather Service (NWS) 500 millibar (MB) analyses every 12 hours between 0400 PST on October 12 and 0400 PST on October 14 are shown in the Appendix, Section A.11. The winds over California at

the 500 MB pressure level started out northwesterly in the morning of October 12 with speeds to 81 mph (70 knots), then became more northerly by the morning of Monday, October 13 with speeds to 57 mph (50 knots). The strong northerly flows aloft, coupled with strong northeasterly surface pressure gradients, enhanced the offshore flows at the surface.

The passage of the low pressure trough aloft brought the first strong cold front of the season at the surface. Section A.12 in the Appendix shows the NWS sea-level pressure analyses, every three hours between 1600 PST on October 12 and 0100 PST on October 14. By 1600 PST October 12, the surface low and cold front was over the northeastern border of New Mexico and high pressure was building over northern Nevada, increasing the northerly gradients. By 0100 PST on October 13, the high pressure over Nevada had increased to 1033 MB, strengthening the gradient flows across California. By 0700 PST, the area of high pressure had expanded and peaked at 1037 MB. The strength of the high pressure remained nearly the same through the rest of the day, while the broad area of high pressure slowly moved to the east, causing the winds to shift from northerly to northeasterly, then easterly throughout the day. The strong pressure gradients caused strong winds, especially in southern California as the flow of cold air from the area of high pressure further enhanced the winds as it flowed across the mountains. Some gusty winds had already been observed on October 12, but they increased considerably in the early morning of October 13.

This is the classic Santa Ana wind pattern that brings strong winds to southern California. High pressure builds over the Great Basin desert region of the western United States in the cold air behind the front with lower pressure off the southern California coast. This pressure gradient creates strong north through northeasterly winds, enhanced by thermal gradients due to denser cold air over the Great Basin. The relatively cool air from the Great Basin deserts flows over the southern California mountains, gaining momentum on the lee side. The downslope flow causes compressional warming and drying of the air in the South Coast Air Basin. This combination of strong wind, high temperatures and low relative humidities make these Santa Ana conditions highly conducive to wildfires in southern California.

The AQMD Meteorology Section routinely analyzes sea-level pressure gradients in southern California to assess winds and air pollution potential. The Summation Pressure Gradient (SPG) is a good indicator of the strength of the flow and whether it is onshore (positive) or offshore (negative), where

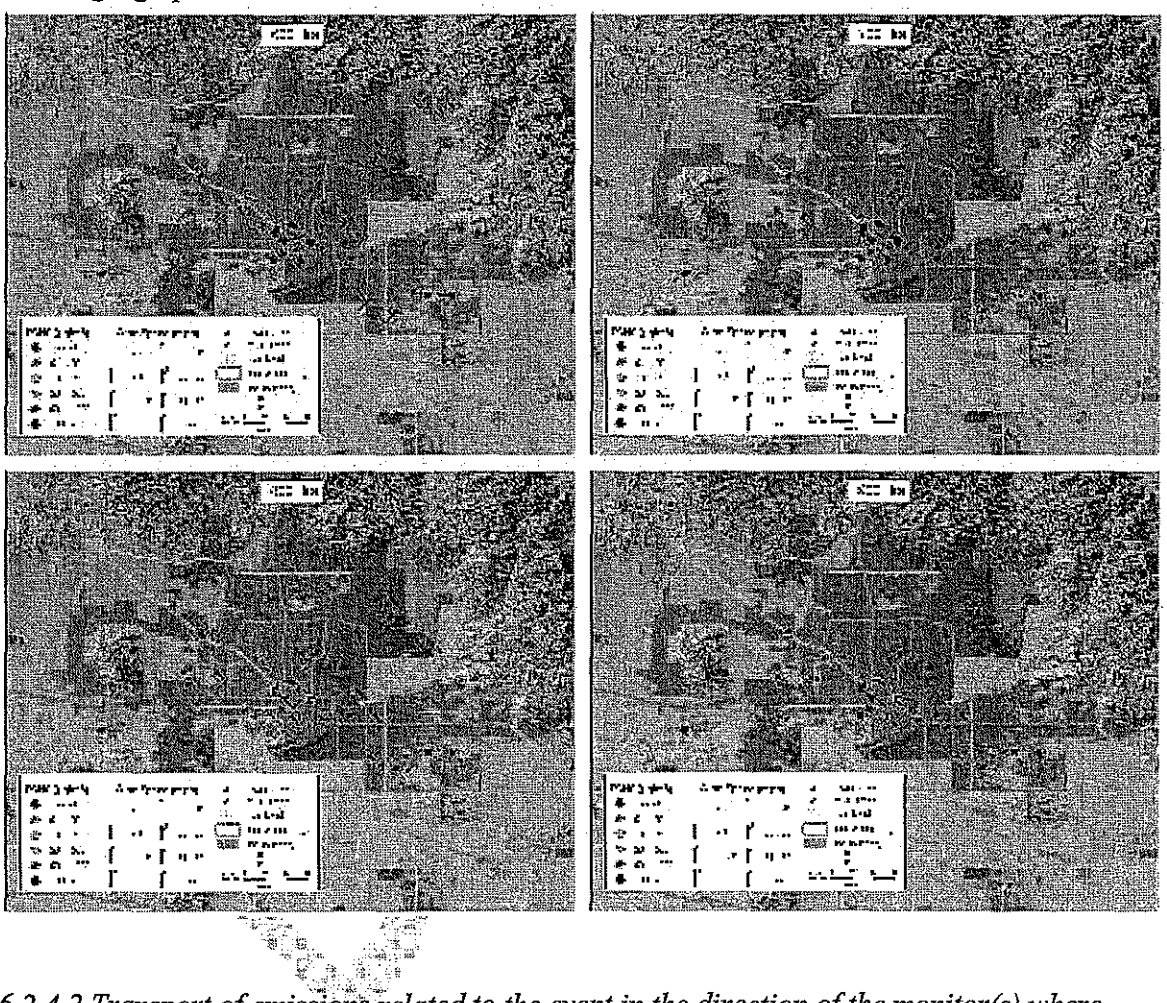
$$SPG = (SAN\text{-}LAS)^{35} + (LGB\text{-}DAG)^{36} + (RIV\text{-}DAG)^{37}$$

In the morning of October 12, the 0700 PST SPG was –5.5 MB, indicating moderate offshore flow. At the same time in the morning of October 13, the SPG strengthened to

[35] Sea Level Pressure difference between San Diego and Las Vegas
[36] Sea Level Pressure difference between Long Beach and Daggett
[37] Sea Level Pressure difference between Riverside and Daggett

−14.7 MB, indicating a stronger offshore gradient. The gradient was enhanced by the upper level pattern and thermal gradient as described above, to create a strong wind event, especially for several hours through the morning of October 13.

- Measurements from monitoring stations:
  The following figures show the kind of analyses based on measurements from air monitoring and meteorological stations that could be used to show the occurrence and geographic extent of the event.[38]



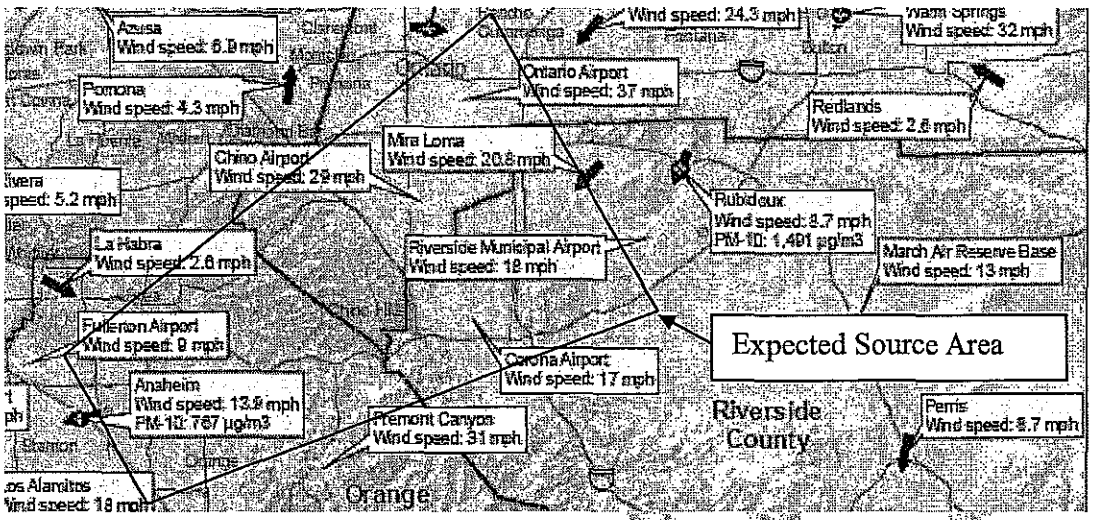
6.2.4.2 Transport of emissions related to the event in the direction of the monitor(s) where measurements were recorded

The type of information that would support this kind of evidence is wind direction data showing that emissions from sources identified as part of the nRCP demonstration were upwind of the monitor(s) in question.

- **Example 1**: map showing local sources and wind direction[39] – note that the topography gives an indication of sources in this map. Ideally, the likely significant sources such as

[38] EPA Region IX
[39] EPA Region IX

agriculture fields, desert areas, mountains, and industrial sources would be identified (see next example).

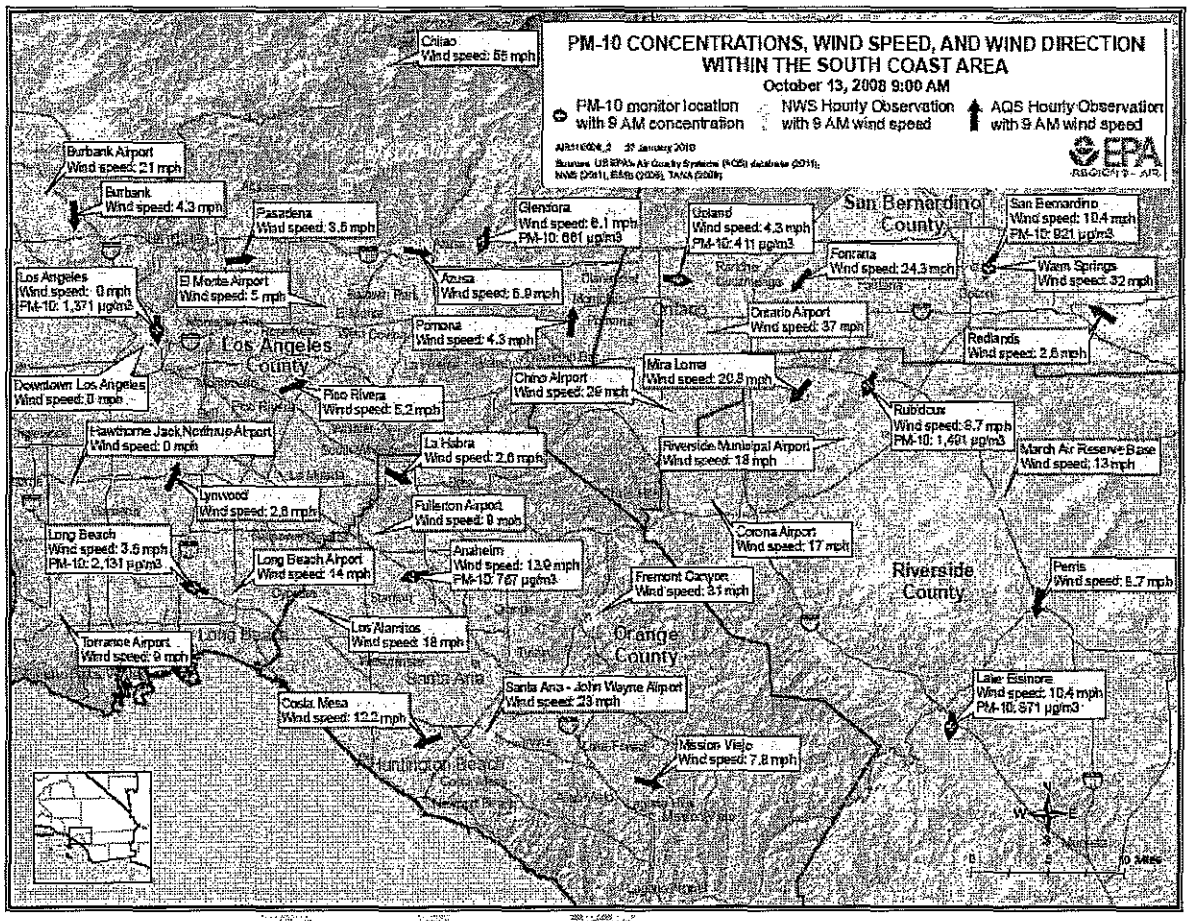


- **Example 2**: trajectories focused on area in question
  Even if extensive comprehensive controls analysis is not needed, a back-trajectory analysis as shown in Section 6.2.2.5 would be appropriate as part of the CCR demonstration. Note that HYSPLIT trajectories that cover hundreds of miles are of limited use if the sources of dust are local.
- **Example 3**: wind roses
  A wind rose for periods of the event day showing wind speed and direction at or near the concentration monitor, coupled with a description of the area suggested by the wind rose, could provide evidence of where the dust was transported from. This approach may not suffice for situations where the sources of dust are not proximate to the monitor.

6.2.4.3 Spatial relationship between the event, sources, transport of emissions, and recorded concentrations

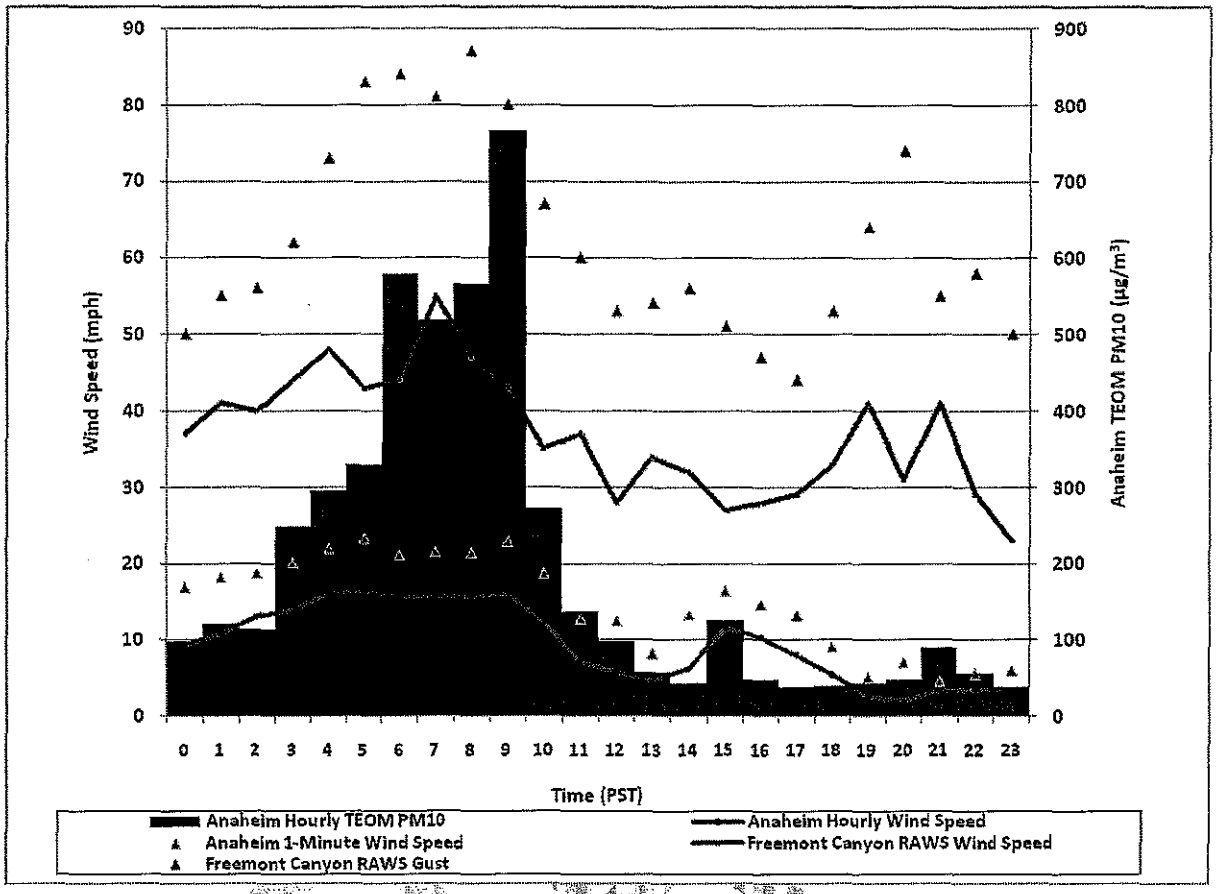
The type of information that would support this evidence could be a map showing likely source area, wind speeds, wind direction, and particulate matter concentrations for the affected area during the time of the event: see the example figure below.[40]

[40] EPA Region IX



6.2.4.4 Temporal relationship between the high wind and elevated PM concentrations at the monitor in question

Evidence for establishing the temporal relationship can include 24-hour time series showing PM concentrations at the monitor in question in combination with sustained and maximum wind speed data at the area where dust was entrained. As shown below, it is most informative to include the sustained wind speed data for the area of dust entrainment and the concentration data on the same figure.



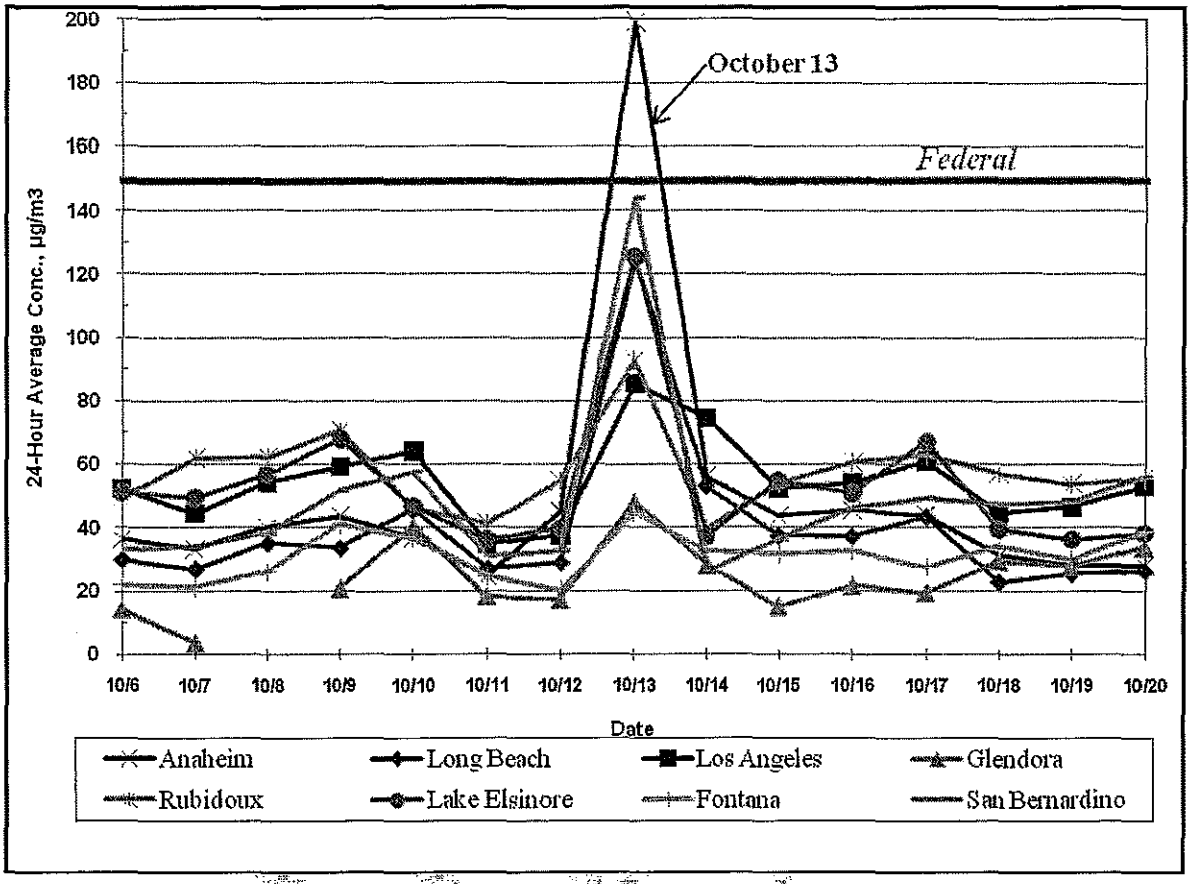
6.2.4.5 Similarity of chemical composition of measured pollution with that expected from sources identified as upwind
Information such as chemical speciation data from the monitored exceedance(s) and sources, or size distribution data, could be part of this type of evidence. These data are not always available but should be included wherever possible. An example of this type of analysis will be incorporated in this document as one becomes available.

6.2.4.6 Comparison of event-affected day(s) to specific non-event days:
The following types of analyses could be part of this piece of evidence:

- comparison of concentrations and wind speed in the area to days preceding and following the event
- comparison of concentration data to specific days that are similar to the event day with respect to emissions and meteorology except for the high wind
- comparison of chemical composition

The following figure is an example of a comparison of concentrations and wind speed in the area to days preceding and following the event.[41]

[41]Letter dated November 22, 2010 to Matthew Lakin, Manager Air Quality Analysis Office USEPA Region 9, from Karen Magliano, Chief Air Quality Data Branch California Air Resources Board, transmitting final report dated



6.2.4.7 Comparison of concentration and wind speed during the period of the event to historical (e.g., 3 to 5 years) data: See Section 6.2.3 for discussion and example.

6.2.4.8 Alternative Hypotheses

Eliminating other possible non-event causes supports the claimed causal relationship to the high wind event, although conclusively proving the absence of all possible or plausible other causes is not required or expected. For example, SCAQMD provided the following:

> Three wildfires were reported in southern California on October 13, fanned by the strong, dry Santa Ana winds, two in the San Gabriel Mountains north of the San Fernando Valley and one at Camp Pendleton in the north coastal part of San Diego County. Only one of these, the Marek Fire, was active during the early morning hours when the hourly PM_{10} concentrations spiked at Anaheim. Also, the northeasterly wind flows throughout the period, make it unlikely the smoke or ash from the fires contributed significantly to the PM_{10} measured at Anaheim. Crustal material from windblown dust was the primary component of the measured PM_{10}, as confirmed by comparing with the $PM_{2.5}$ measured on this day. Prescribed, agricultural or residential burning did not appear to have added any significant amount of PM_{10} to the concentrations measured in the Basin; these

August 5, 2010 entitled "Analysis of Exceptional Events Contributing to High PM10 Concentrations in the South Coast Air Basin on October 13, 2008."

activities were not permitted on this day. The $PM_{2.5}$ portion of PM_{10}, which would indicate combustion sources, was very small throughout the Basin. PM_{10} was emitted from some BACM-controlled sources (mainly agricultural and construction activities) as BACM controls were locally overwhelmed by the high winds. Natural particulate sources areas also contributed to the measured PM_{10}, particularly the upwind mountain and desert areas.

6.2.5 Address Affects Air Quality (AAQ)

Once sufficient HF analyses have been provided and CCR has been demonstrated the event will generally have been considered to have affected air quality at the exceeding monitor, and thus the AAQ element will have been met. Prepare statement that AAQ has been met by providing HF analyses and demonstrating CCR.

6.2.6 Address Human Activity Unlikely to Recur at a Particular Location / Natural Event (HAURL / Natural Event)

Once both CCR and nRCP have been demonstrated, the event will generally be considered a natural event, thus fulfilling the HAURL / Natural Event element. Prepare statement that HAURL / Natural Event has been met by demonstrating nRCP and CCR.

6.2.7 Step 5: Address No Exceedance But For the Event (NEBF)

The NEBF demonstration generally builds on information gathered to support other elements of an exceptional event demonstration. Further, if the exceptional events demonstration fails on a different element then the NEBF analysis becomes moot since there is no portion of the concentration than can be attributed to an exceptional event. For these reasons, EPA suggests that states complete the NEBF demonstration last after addressing all other EER elements.

6.2.7.1 Qualitative NEBF

If non-event pollution levels are typically significantly below the NAAQS during the season of the event then a qualitative NEBF may be adequate. The following is provided as an example[42]:

Activities that generate anthropogenic PM_{10} were approximately constant in the Basin immediately preceding, during and after the event. Activity levels in the Basin were typical for the time of year and PM_{10} emissions control programs were being implemented, not only for fugitive dust-generating activities, but also for agricultural burning in the Basin. Furthermore, due to the forecasts for high winds on October 13, the SCAQMD compliance teams were ready to act quickly to fugitive dust complaints to minimize emissions and to enforce mitigation methods like watering and soil stabilization.

[42]Letter dated November 22, 2010 to Matthew Lakin, Manager Air Quality Analysis Office USEPA Region 9, from Karen Magliano, Chief Air Quality Data Branch California Air Resources Board, transmitting final report dated August 5, 2010 entitled "Analysis of Exceptional Events Contributing to High PM10 Concentrations in the South Coast Air Basin on October 13, 2008."

Vehicular traffic, cooking and residential fires do not directly cause PM_{10} 24-hour NAAQS violations in the Basin. Activity levels in the Basin were typical for the time of year and PM_{10} emissions control programs were being implemented, for fugitive dust-generating activities, as well as open burning. With the unsettled conditions on October 13, such emissions would not contribute significantly to the PM_{10} measured. There were reasonable and appropriate measures in place to control PM_{10} in the Basin on October 13, 2008, including SCAQMD Rules 403, 444, 445, 1156, 1157, 1158 and 1186.

Examining the make-up of the PM_{10} in the Basin on this day using $PM_{2.5}$ data, the coarse particles ($PM_{10-2.5}$), which are associated with windblown dust, represent well over 75% of the total PM_{10} mass collected in the Basin. The three wildfires that were burning in the Basin, one of which started on October 12 and two other after the high hourly PM_{10} concentrations started, were not the primary cause of the high PM_{10}. $PM_{2.5}$ remained relatively low throughout the Basin on this day with no exceedance of the 24-hour NAAQS. While there were no PM_{10} filters collected on this day for laboratory analyses for soluble potassium, an indicator of wood smoke, the predominance of coarse particles, the timing of the fires and the lack of supporting wind directions to bring smoke to Anaheim provide support the conclusion that while there could have been a minor contribution from the wildfires, it was relatively small portion of the PM_{10} measured.

Based on the data provided in this report, SCAQMD concludes that there would not have been exceedances of the PM_{10} NAAQS in the Basin on October 13, 2008 if high winds were not present. Even if the extreme 99.5 percentile concentration for the Basin, 139.5 $\mu g/m^3$, were used as the background concentration to compare to the measured PM_{10} concentrations, the particulate contribution from the high wind event clearly caused these exceedances. The causal connection of the measured PM_{10} and the strong winds in the Basin, and throughout southern California, along with the high contribution of fugitive dust to the PM_{10} mass indicate that but for the high wind event this NAAQS violation would not have occurred.

6.2.7.2 Quantitative NEBF

A quantitative NEBF will generally be expected if concentrations on days without events during the same season exceed the standard or nearly exceed the standard and/or if the contribution of non-event pollution produces concentrations near the applicable NAAQS. An example of a quantitative NEBF analysis will be incorporated in this document as one becomes available.

Appendix A. Summary of Studies on Windblown Dust Emissions

Windblown dust is a controllable and preventable form of PM_{10} pollution when wind speeds are below the threshold to entrain dust from reasonably controlled sources. To ensure effective implementation of the EER, it is useful to determine the wind speeds at which windblown dust no longer becomes controllable. To clarify the related definitions in the EER and its preamble, EPA generally plans to apply a 25 mph sustained wind speed threshold for arid areas. Areas with local data supporting alternate minimum wind speeds to entrain dust from stable surfaces are encouraged to submit this information to EPA for review and approval. In EPA's weight of evidence analysis of high wind dust events, sustained wind speeds above 25 mph will be assumed to have the potential ability to raise dust emissions from some stable surfaces in arid, semi-arid, or seasonally dry regions. Wind speeds below this threshold will be assumed to entrain dust emissions primarily from disturbed anthropogenic sources that have not been reasonably controlled. The following summary of pertinent information provides technical justification for the proposed threshold wind speed.

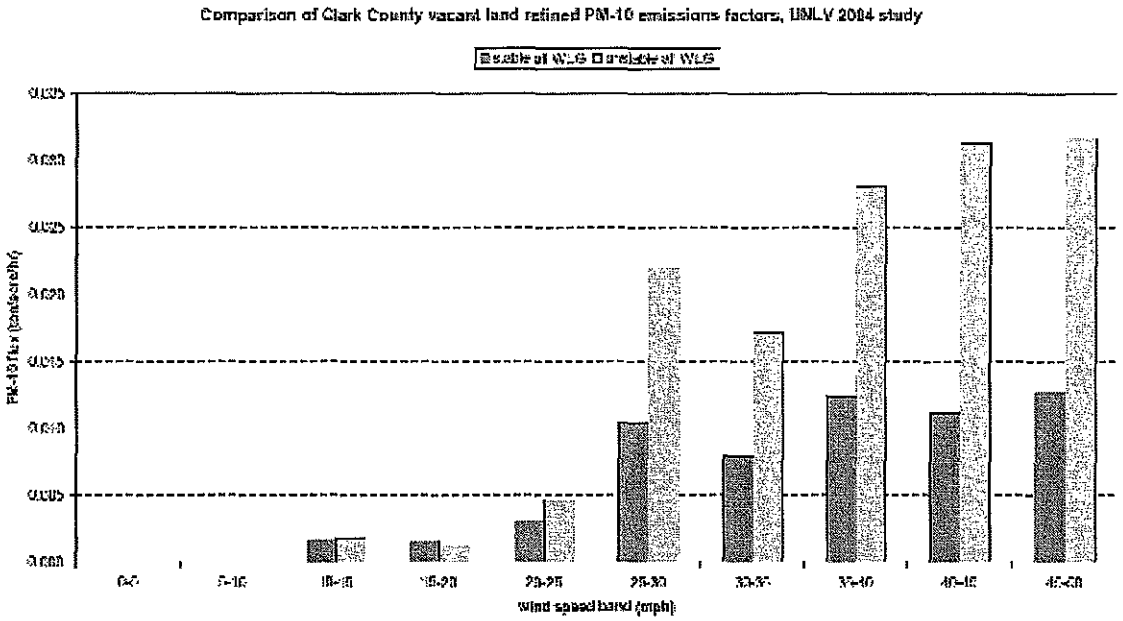
The Clark County Department of Air Quality and Environmental Management (DAQEM) contracted with the Department of Civil and Environmental Engineering, University of Nevada, Las Vegas (UNLV) to conduct field studies to generate refined wind-blown PM_{10} emissions factors for stable natural, disturbed surfaces that had been re-stabilized, and unstabilized, disturbed surfaces. The latest study was performed in 2004 using a portable wind tunnel at 31 locations in the Las Vegas valley that represented nine different soil groups.[43] All of the test sites were determined to be stable through the same methods as outlined in DAQEM's fugitive dust rules for open areas and vacant lots and thus provide a consistent measure of "stable" conditions.[44] These same test sites were then intentionally destabilized and subsequently retested using the same wind tunnel approach that had been used on the previously stabilized surfaces. A summary of the 2004 field study results can be seen in Figure ES-1. The 2004 data show that non-linear increases in PM_{10} flux generally begin to occur at sustained 10 meter velocities exceeding 25 mph. These data formed the basis for EPA's selection of a 25 mph threshold for natural events.[45] Note that the Clark County study found small amounts of entrainment below 25 mph. The small PM_{10} fluxes observed at lower winds speeds could be attributed to aerodynamic entrainment, which occurs primarily when fine particles are lifted directly off the ground and remain elevated. While it is expected that small amounts of aerodynamic entrainment could occur when wind speeds are below 25 mph, these are not expected to result in exceedances in most western areas, particularly the desert areas such as in Clark County.

[43] Sites were characterized in terms of Wind Erodibility Groups (WEGs).

[44] Clark County Department of Air Quality and Environmental Management Air Quality Regulations, Section 90 – Fugitive Dust from Open Areas and Vacant lots, Subsection 90.4. Test Methods, revised 12/17/2002.

[45] Refined PM_{10} Aeolian Emission Factors for Native Desert and Disturbed Vacant Land Areas. Final Report, June 30, 2006.

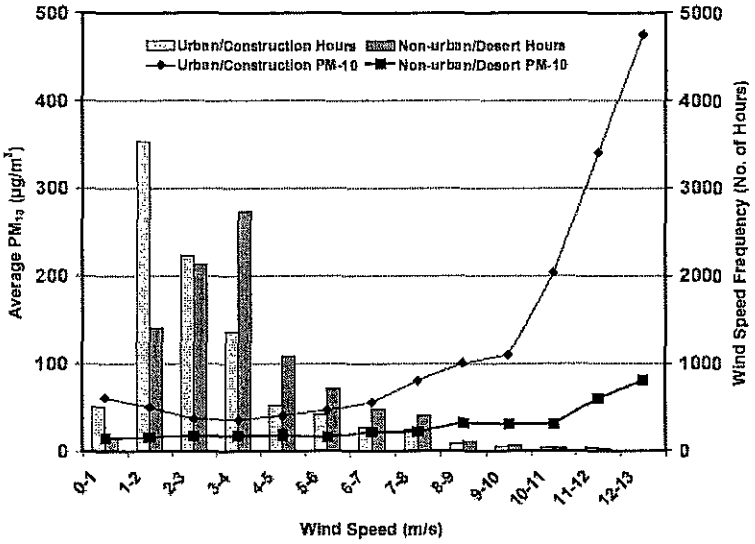
Figure F.5 1 Summary of wind blown geometric mean PM 10 Emissions factors, averaged over all wind erodibility groups. UNLV 2004 wind tunnel field study. Error bars omitted to clarify differences between wind speed bands.



Studies conducted by the Desert Research Institute (DRI) in Clark County, NV have concluded that windblown desert dust contributes to approximately 20% of measured PM_{10} in urban areas and that only desert soils that have been disturbed by anthropogenic activities are large emitters under common high wind conditions.[46] These studies also conclude that windblown PM_{10} from urban/disturbed surfaces are not seen until 10 meter hourly average wind speeds are greater than 7 m/s (16 mph), while nonurban desert show a significant increase in PM_{10} emissions only when hourly average wind speeds are greater than 11 m/s (25 mph). See Figure 3-1 for a graphical representation of these data. The authors note that these results refute the argument that most urban dust derives from natural surfaces.

[46] Watson, J.G. and Chow, J.C. 2000. Reconciling Urban Fugitive Dust Emissions Inventory and Ambient Source Contribution Estimates: Summary of Current Knowledge and Needed Research. *DRI Document No. 6110.4F.*

Figure 3-1. Average PM_{10} classifed by wind speed from hourly beta attenuation monitor (BAM) measurements at an Urban/Construction site and a Non-Urban/Desert site near Las Vegas, NV during 1995 (Chow and Watson, 1997b; Chow et al., 1999). Wind speeds were measured at 10 m above ground level.



These results are also consistent with results obtained from wind tunnel studies performed throughout the state of Arizona.[47] These studies suggest that windblown dust emissions from scrub desert and dune flat areas occur when wind speeds are greater than 11.3 m/s (25 mph) and 18.31 (41 mph), respectively. The same study revealed that surfaces that had been disturbed by anthropogenic activities began to produce emissions when wind speeds ranged from 5.11 m/s (11 mph) to 8.11 m/s (18 mph). The effect of surface disturbance on threshold wind speeds was further examined for a number of natural desert soils by a number of researchers.[48] The main conclusion was that disturbance of soils profoundly lowers the threshold friction velocity of desert soils.

[47] Nickling, W.G. and Gillies, J.A. 1989. Emission of Fine Grained Particulates From Desert Soils. In *Paleoclimatology and Paleometeorology: Maodern and Past Patterns of Global Atmospheric Transport.* Leinen, M. and Sarnthein, M., (Eds.) Kluwer Academic Publishers. 133-165.

[48] Gillette, D.A. 1980. Threshold Velocities for Input of Soil Particles into the Air by Desert Soils. *Journal of Geophysical Research.* 85: 5621-5630; Gillette, D.A. 1982. Threshold Friction Velocities and Rupture Moduli for Crusted Desert Soils for the Input of Soil Particles into the Air. *Journal of Geophysical Research.* 87: 9003-9015; Belnap, J. 2007. Wind Erodibility of Soils at Fort Irwin, California (Mojave Desert), USA, Before and After Trampling Disturbance: Implications for Land Management. *Earth Surface Processes and Landforms.* 32: 74-84; Belnap, J. 1998. Vulnerability of Desert Biological Soil Crusts to Wind Erosion: The Influences of Crust Development, Soil Texture, and Disturbance. *Journal of Arid Environments.* 39: 133-142.

Appendix B. Checklist for High Wind Exceptional Events Demonstration Submission

Completeness Checklist for High Wind Dust Exceptional Events.

Instructions: This checklist is to be submitted with the exceptional events package for EPA review.

Note that completion of this checklist does not indicate that the event in question is concurrable nor does this reflect the entire universe of information that EPA may require to satisfy the demonstration requirements. This checklist represents the minimum information that must be included in a package and serves to identify packages that are incomplete rather than show that a package is complete. In some cases (e.g., very high wind speeds) not all parameters under each criterion will need to be included. EPA will not review incomplete packages; failure to submit a complete package prior to regulatory decision will result in non-concurred events.

Site Name/AQS ID: _____

Pollutant: _____

Date(s): _____

Procedural Criteria		EPA Use
Did an exceedance of the NAAQS occur?	[Y/N]	
Were data flagged by July 1st of following year?	[Y/N]	
Was there a 30-day public comment period? Is documentation for the comment period included?	[Y/N] [Y/N]	
If public comments were received, are the public comments and responses included?	[Y/N]	
Was the package submitted within 3 years of the end of the quarter in which the event occurred and 12 months prior to the date that any regulatory decision must be made by EPA? [Note: In all cases, EPA encourages submittal within 12 months of when the event occurred.]	[Y/N]	

Evidence	Information Included	Page(s)	EPA Use
Conceptual Model			
-description of weather phenomena resulting in high wind	[Y/N]	[page #]	
-description of what sources were likely entrained by the high wind	[Y/N]	[page #]	
-explanation of the path by which the dust reached the monitor(s)	[Y/N]	[page #]	
-map showing relevant monitors, topography, other relevant geographic features	[Y/N]	[page #]	
-description of how the event day differs from non-event days	[Y/N]	[page #]	
-description of concentration and wind patterns for the exceeding monitor(s) and surrounding area	[Y/N]	[page #]	
Wind Statistics			
-max sustained wind (5 min avg)	[X mph]	[page #]	
-max gust (1 min avg)	[X mph]	[page #]	
-wind trajectories done?	[Y/N]	[page #]	
-were wind speeds compared to historical data? (i.e., recurrence frequency analysis)	[Y/N]	[page #]	
-other:	[list other wind analyses]	[page #]	
nRCP			
-wind speed at which stabilized surfaces are entrained (default = 25mph)	[25 mph]	[page #]	
-sources contributing to event identified, including anthropogenic vs. natural?	[Y/N]	[page #]	
-controls identified for anthropogenic sources? (note: level of control analysis depends on wind speed)	[Y/N]	[page #]	
-are natural sources not reasonably controllable?	[Y/N]	[page #]	
-was a High Wind Action Plan included?	[Y/N]	[page #]	
HF			
-were time-series analyses for concentration and wind data included?	[Y/N]	[page #]	
-annual comparison to historical data (wind and concentrations)	[%ile]	[page #]	
-seasonal comparison to historical data (wind and concentrations)	[%ile]	[page #]	

CCR (=> AAQ & HAURL / Natural Event)			
-were spatial analyses included, establishing a spatial relationship between the event, sources, transport of emissions, and recorded concentrations?	[Y/N]	[page #]	
-were temporal analyses included, establishing a temporal relationship between the high wind and elevated PM concentrations at the monitor?	[Y/N]	[page #]	
-comparison of event-affected day(s) to specific non-event days?	[Y/N]	[page #]	
-was the dust shown to be from the sources discussed in the nRCP section?	[Y/N]	[page #]	
-were alternative hypotheses discussed?	[Y/N]	[page #]	
-was a causal (not just correlational) relationship established?	[Y/N]	[page #]	
NEBF			
-was a but-for analysis included?	[Y/N]	[page #]	