



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

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San Francisco, CA 94105-3901

CTS 311071
ADEQ
AIR QUALITY DIVISION

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OFFICE OF THE
REGIONAL ADMINISTRATOR

Mr. Eric Massey
Director, Air Division
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, Arizona 85007

Dear Mr. Massey:

This letter responds to Arizona Department of Environmental Quality's (ADEQ) February 13, 2013 submittal regarding 37 exceedances of the 24-hour PM₁₀ standard that occurred at several monitoring stations within the Phoenix PM₁₀ nonattainment area on the following days: September 11 and 12, 2011, June 16, June 27, July 11, August 11, August 14, and September 6, 2012.

ADEQ's submittal included documentation that these exceedances were caused by high wind exceptional events. EPA has reviewed the documentation provided by ADEQ to demonstrate that the exceedances on these days meet the criteria for an exceptional event in the Exceptional Events Rule (EER). EPA concurs based on the weight of the evidence that the exceedances were caused by high wind exceptional events and finds that ADEQ has successfully made the demonstrations referred to in 40 CFR §50.14 to EPA's satisfaction. In addition, ADEQ has met the schedule and procedural requirements in section 50.14(c) with respect to the same data. A more detailed assessment of ADEQ's demonstration is enclosed. My staff has or shortly will enter "concurrency flags" for these data into EPA's AQS data system.

Based on these determinations, EPA will exclude these data from the following types of calculations and activities:

- EPA's Air Quality Data system (AQS) will not count these days as exceedances when generating user reports, or include them in design values estimates, unless the AQS user specifically indicates that they should be included.
- EPA will accept the exclusion of these data for the purposes of selecting appropriate background concentrations for New Source Review air quality analyses.¹
- EPA will accept the exclusion of these data for the purposes of selecting appropriate background concentrations for transportation conformity hot spot analyses.²
- The data will continue to be publicly available, but EPA's publications and public information statements on the status of air quality in the affected area will not reflect these data in any summary statistic of potential regulatory application, unless such inclusion is specifically noted.³

¹ If we are the permitting authority, we will propose permits on this basis. If we are commenting on another permitting authority's proposed action, our comments will be consistent with the determinations in this letter.

² Applicable only to PM₁₀ and PM_{2.5}.

³ These data may be included in statistics intended to describe trends in actual air quality in the area.

In addition, EPA will rely on calculated values that exclude these data in proposed regulatory actions, such as a proposed designation, classification, attainment demonstration, or finding as to whether the Phoenix PM₁₀ nonattainment area has met the PM₁₀ NAAQS. These regulatory actions require EPA to provide an opportunity for public comment prior to taking a final Agency action. If EPA is pursuing one of these actions for the Phoenix PM₁₀ nonattainment area, EPA will open a new comment period during which EPA may receive comments on the exceptional event submission you have made and the determinations conveyed in this letter. If so, we must consider and respond to those comments before taking final regulatory action. Accordingly, the determinations conveyed in this letter do not constitute final EPA action regarding any matter on which EPA is required to provide an opportunity for public comment. In particular, this point applies to determinations regarding the attainment status or classification of the area. Final actions will take place only after EPA completes notice and comment rulemaking on those determinations. As an additional clarification, the determinations conveyed in this letter are applicable only to determinations incorporating the submitted data relative to the PM₁₀ NAAQS.

If you have any questions or wish to discuss this matter further, please contact Deborah Jordan, Director of the Air Division at (415) 947-8715.

Sincerely,

for Allen Strauss 1 July 2013
Jared Blumenfeld

Enclosure

cc: Ms. Theresa Rigney, ADEQ

EXCEPTIONAL EVENTS RULE REQUIREMENTS

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

Under 40 CFR §50.14(c)(3)(iv), the air agency 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;
 - 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."¹
- 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."

Not Reasonably Controllable or Preventable (nRCP)

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.² For *natural* sources of dust, a high wind dust event can generally be considered to be not reasonably controllable or preventable if winds are high enough to cause emissions from natural undisturbed areas. For *anthropogenic* sources of dust, a high wind dust event is also eligible to be considered to be not reasonably controllable or preventable if:

1. The anthropogenic sources of dust have reasonable controls in place,
2. The reasonable controls have been effectively implemented and enforced, and
3. The wind speed was high enough to overwhelm the reasonable controls.

Historical Fluctuations (HF)

EPA evaluates whether a measured exceedance is in excess of historical fluctuation by taking into account the level of the exceedance in relation to historical data, which is typically 3 to 5 years.

¹A 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."

²See e.g., Affirmation of Attainment of PM-10 NAAQS for the San Joaquin Valley Nonattainment Area, 73 FR 14691 (March 19, 2008).

Clear Causal Relationship (CCR)

EPA considers a variety of evidence when evaluating whether 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. Demonstrations typically include documentation showing that the event in fact occurred and that emissions related to the event were transported in the direction of the monitor(s) where elevated concentrations measurements were recorded; the size of the area affected by the transported emissions; the relationship in time between the event, transport of emissions, and recorded concentrations; and, as appropriate, pollutant species-specific information supporting a causal relationship between the event and the measured concentration.

Affects Air Quality (AAQ)

EPA will generally consider events to have affected air quality if the CCR and HF requirements have been adequately demonstrated.

Natural Event

EPA will generally consider a high wind dust event to be a natural event in cases where windblown dust is entirely from natural sources or where contributing anthropogenic sources of windblown dust are reasonably controlled.³ This generally involves adequately demonstrating both the nRCP and CCR requirements.

No Exceedance or Violation But For the Event (NEBF)

Generally, for high wind dust events, the NEBF demonstration is similar to and informed by the demonstration of the nRCP and CCR requirements, and is expected to show that the measured concentration would have been below the applicable NAAQS without the effect of the event.

OVERVIEW OF EVENTS

On February 13, 2013, Arizona Department of Environmental Quality (ADEQ) submitted seven exceptional events demonstrations for 37 exceedances of the 24-hour PM₁₀ standard that occurred at several monitoring stations within the Phoenix PM₁₀ nonattainment area on the following days: September 11 & 12, 2011, June 16, June 27, July 11, August 11, August 14, and September 6, 2012. Table 1 summarized these exceedances.

³EPA will generally consider human activity to have played little or no *direct* role in causing emissions of the dust generated by high wind for purposes of the regulatory definition of "natural event" if contributing anthropogenic sources of the dust are reasonably controlled, regardless of the amount of dust coming from these reasonably controlled anthropogenic sources, and thus the event could be considered a natural event. In such cases, EPA believes that it would generally be a reasonable interpretation of its regulations to find that the anthropogenic source had "little" direct causal role. 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. See preamble to the EER at 72 FR 13566, f.n.11.

Generally, ADEQ explains that the exceedances measured on September 11 & 12, 2011, June 16, June 27, July 11, August 11, August 14, and September 6, 2012, were associated with “monsoonal thunderstorm activity” and “thunderstorm-driven high winds.” ADEQ provided a comprehensive description and discussion of each of these events in the respective demonstrations. ADEQ's narrative is summarized in the following sections.

Table 1: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
September 11, 2011	JLG Supersite	04-013-9997-3	185
	JLG Supersite	04-013-9997-4	178
	North Phoenix	04-013-1004-1	184
	North Phoenix	04-013-1004-2	183
	West Phoenix	04-013-0019-1	168
September 12, 2011	Durango Complex	04-013-9812-1	229
	West 43 rd	04-013-4009-1	161
	West Phoenix	04-013-0019-1	200
June 16, 2012	Buckeye	04-013-4011-1	202
	Durango Complex	04-013-9812-1	186
	Dysart	04-013-4010-1	167
	Higley	04-013-4006-1	194
	South Phoenix	04-013-4003-1	165
	West 43 rd	04-013-4009-1	211
	West Phoenix	04-013-0019-1	189
June 27, 2012	Central Phoenix	04-013-3002-4	340
	Durango Complex	04-013-9812-1	221
	Glendale	04-013-2001-1	337
	Greenwood	04-013-3010-1	323
	Higley	04-013-4006-1	224
	JLG Supersite	04-013-9997-3	344
	JLG Supersite	04-013-9997-4	329
	North Phoenix	04-013-1004-1	178
	South Phoenix	04-013-4003-1	342
	Tempe	04-013-4005-1	169
	West 43 rd	04-013-4009-1	221
	West Chandler	04-013-4004-1	220
	Zuni Hills	04-013-4016-1	285
July 11, 2012	Durango Complex	04-013-9812-1	217
	Greenwood	04-013-3010-1	212
	South Phoenix	04-013-4003-1	285
	West 43 rd	04-013-4009-1	172
August 11, 2012	Higley	04-013-4006-1	159
	West Chandler	04-013-4004-1	219
August 14, 2012	Durango Complex	04-013-9812-1	179
	West 43 rd	04-013-4009-1	254
September 6, 2012	West Chandler	04-013-4004-1	164

Event Days: September 11 & 12, 2011

Table 2: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
September 11, 2011	JLG Supersite	04-013-9997-3	185
	JLG Supersite	04-013-9997-4	178
	North Phoenix	04-013-1004-1	184
	North Phoenix	04-013-1004-2	183
	West Phoenix	04-013-0019-1	168
September 12, 2011	Durango Complex	04-013-9812-1	229
	West 43 rd	04-013-4009-1	161
	West Phoenix	04-013-0019-1	200

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, "BACM-approved control measures on significant anthropogenic sources were in place and enforced during the events, and pro-active tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing/prior approved required controls are adequate for meeting the requirements of an exceptional event and should be considered 'reasonable' for these purposes."

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 20 mph on September 11, 2011, and above 25 mph on September 12, 2011. For example, maximum sustained wind speeds of 20 mph with gusts of 25 mph were measured at Phoenix Sky Harbor Airport on September 11, 2011, and maximum sustained wind speeds of 25 mph with gusts of 32 mph, 25 mph with gusts of 36, and 26 mph with gusts of 33 mph were measured at Phoenix Sky Harbor, Casa Grande Municipal Airport, and Williams Gateway Airport on September 12, 2011, respectively. Also, while not included in the demonstration, it is important to note that the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center Storm events database included reports of strong thunderstorm winds in upwind areas of the exceeding monitoring stations in the area north of the city of Maricopa in Pinal County that were observed to be in excess of 46 mph. Also, 50 mph winds were observed in conjunction with a NOAA report of a dust storm in the greater Phoenix Area on September 11, 2011.

ADEQ further explained that "despite the deployment of comprehensive control measures and sophisticated response programs and one localized, low-impact violation of the dust control rules, high wind conditions associated with thunderstorms and thunderstorm outflows brought high concentrations of PM₁₀ emissions into, and also overwhelmed controls within, the Phoenix PM₁₀ nonattainment area. Strong thunderstorm outflows with sustained winds ranging from 20-30 mph, and even greater speeds nearest the source regions... were enough to overwhelm all available efforts to limit PM₁₀ concentrations from the events. The fact that these were natural events involving strong thunderstorm outflow winds that transported PM₁₀ emissions into the Phoenix PM₁₀ nonattainment area, with a majority of the PM₁₀ emissions recorded by Maricopa County area monitors coming from sources to the south and southeast of the nonattainment area, provides strong evidence that the events and exceedances

of September 11 & 12, 2011, recorded within the Phoenix PM₁₀ nonattainment area, were not reasonably controllable or preventable.”

Section V of ADEQ’s documentation included a complex Geographic Information System (GIS) analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located south and southeast of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations throughout the area, and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 3: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section IV: p. 20-26, Section V: p. 27-42, App. E	Sufficient	Yes
September 12, 2011	Section IV: p. 20-26, Section V: p. 43-63, App. E	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “events that occurred on September 11 & 12, 2011, resulted in one of the top ten highest 24-hour average PM₁₀ concentrations seen in the last five years.” ADEQ’s analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on September 11 & 12, 2011, were in excess of normal historical fluctuations.

Table 4: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section III: p. 16-19, App. A	Sufficient	Yes
September 12, 2011	Section III: p. 16-19, App. A	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ’s demonstration included a comprehensive conceptual model of the events, including a general overview of the geographic setting of the monitors and climate information. The conceptual model also included a very detailed discussion of the events that occurred on September 11 & 12, 2011, and a time series graph for the four day period from September 10, 2011, to September 13, 2011, that included hourly PM₁₀ concentrations for monitors in the Phoenix PM₁₀ nonattainment area.

Section V of the demonstration included time-lapse video evidence, satellite imagery, metrological data from various National Weather Service (NWS) stations within the Phoenix PM₁₀ nonattainment area and Pinal County, time series graphs for the events that included hourly PM₁₀ concentrations from monitors

within the Phoenix PM₁₀ nonattainment area, visibility and sustained with speed from Phoenix Sky Harbor Airport. ADEQ also included an additional times series graphs for the September 11 & 12, 2011, events that included 5-minute PM₁₀ concentrations from various PM₁₀ monitors within the Phoenix PM₁₀ nonattainment area compared to 5-minute wind speed from the Central Phoenix monitoring station, and PM₁₀ concentrations from monitors located in Pinal County compared to wind speed and visibility at Casa Grande Municipal Airport, respectively. Finally, ADEQ included a detailed and extensive GIS analysis that included PM₁₀ concentrations, sustained wind speeds, wind gusts, wind direction, base velocity radar, and visibility to track the transport of PM₁₀ throughout the region. Accompanying the analysis, ADEQ provided a discussion for every map that described the conditions at that time. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. The time-lapse videos of the event can be found at the following locations:

- September 11, 2011: http://www.phoenixvis.net/videos/mpeg4/SOMT_09112011.mp4
- September 12, 2011: http://www.phoenixvis.net/videos/mpeg4/SOMT_09122011.mp4

While not included in the demonstration, it is important to note that NOAA's National Climatic Data Center Storm events database included dust storm observations on September 11, 2011, at 6:15 PM (greater Phoenix area). The timing of these dust storm reports for this event is consistent with the issuance of a NWS Dust Storm Warning for the period of 6:00 PM to 7:00 PM, NWS Significant Weather Advisory for the period of 5:19 PM to 7:00 PM, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of blowing dust (BLDU), haze (HZ), and dust (DU). Also, as previously mentioned in the nRCP section of this document, the wind speeds associated with this event reached the 20 mph range at meteorological stations in the area, but the NOAA's National Climatic Data Center Storm events database included observations of strong thunderstorm winds in excess of 46 mph just north of the City of Maricopa in Pinal County at 5:30 PM. These observations are consistent with the base velocity radar data included in the GIS analysis in Figure 5-4 in ADEQ's demonstration, as well as the location of the collapsing thunderstorm and the area of formation of the outflow boundary as described by ADEQ in Section V on p. 27 and p. 32 and of the September 11, 2012, event demonstration. The timing of the September 12, 2011, event is consistent with the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of thunderstorms (TS) and blowing dust.

ADEQ stated that the evidence presented has "demonstrated a clear causal relationship between the emissions generated by uncontrollable natural events and the exceedances measured at the monitors." ADEQ further stated that "the satellite images, time series graphs, and meteorological data tables provided in this section for September 11 & 12, 2011, show the temporal progression of the dust events from the development of the thunderstorms, to the increase in wind speeds, and to the rise in PM₁₀ concentrations. The GIS maps for September 11th also showed how soon after the main outflow boundary passed through the Phoenix area, that stagnation allowed PM₁₀ concentrations to remain high at a few sites. The GIS maps for September 12th showed how strong winds and high PM₁₀ concentrations in Pinal County traveled northward into Maricopa County, leading to a subsequent increase in wind speeds and PM₁₀ concentrations at the Phoenix area PM₁₀ monitors. The combination of the PM₁₀ concentrations and wind data from Maricopa County on September 11th, and from Maricopa and Pinal Counties on September 12th, supports the conclusion that the events were primarily caused by windblown dust from emission sources outside of Maricopa County and the transport of PM₁₀ into the Phoenix PM₁₀ nonattainment area."

The analysis in Sections II and V, specifically, the PM₁₀ time series graph, winds speed and direction measurements, the complex GIS maps, time-lapse video evidence, NOAA dust storm and thunderstorm wind observations, NWS advisories, and NWS station reports of reduced visibility, blowing dust, haze, and dust, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedances measured at monitors identified in Table 2 of this document.

Table 5: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section II: p. 4-15, Section V: p. 27-42, App. D, App. E	Sufficient	Yes
September 12, 2011	Section II: p. 4-15, Section V: p. 43-63, App. D, App. E	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event[s] in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 6: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section VII: p. 66	Sufficient	Yes
September 12, 2011	Section VII: p. 66	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “events shown to cause these exceedances were emissions of PM₁₀ driven by high winds caused by thunderstorm activity and related outflow boundaries on September 11 & 12, 2011” and that “the events therefore qualify as a natural events.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 7: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section VII: p. 66-67	Sufficient	Yes
September 12, 2011	Section VII: p. 66-67	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the body of evidence presented in this submittal provides no alternative that could tie the exceedances to any other causal source but transported and re-entrained PM₁₀ generated from thunderstorm outflows, confirming that there would have been no exceedances but for the presence of these uncontrollable natural events.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 8: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 11, 2011	Section VI: p. 65	Sufficient	Yes
September 12, 2011	Section VI: p. 65	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 9 outlines EPA’s evaluation of these requirements.

Table 9: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p.1 App. B	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p. 1-2	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ⁴	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p. 2 App. D ⁵	Yes

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 2 on September 11 & 12, 2011. EPA has determined that the flagged exceedances at these locations on these days meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the events provide sufficient evidence to conclude that the events were not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the events and the measured exceedances, there would have been no exceedances but for the events, and the measured exceedances were in excess of normal historical fluctuations.

⁴ See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

⁵ A copy of the affidavit was not included in App. D, as stated in Section I of the final demonstration; but was submitted to EPA as part of the February 13, 2013 submission.

Event Day: June 16, 2012

Table 10: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
June 16, 2012	Buckeye	04-013-4011-1	202
	Durango Complex	04-013-9812-1	186
	Dysart	04-013-4010-1	167
	Higley	04-013-4006-1	194
	South Phoenix	04-013-4003-1	165
	West 43 rd	04-013-4009-1	211
	West Phoenix	04-013-0019-1	189

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, “BACM-approved control measures on significant anthropogenic sources were in place and enforced during the events, and pro-active tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing/prior approved required controls are adequate for meeting the requirements of an exceptional event and should be considered ‘reasonable’ for these purposes.”

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 25 mph in multiple locations throughout the Phoenix PM₁₀ nonattainment area and Pinal County. For example, maximum sustained wind speeds of 29 mph with gusts of 39 mph, and 32 mph with gusts of 46 mph, and 30 mph with gusts of 37 were measured at Williams Gateway Airport, Casa Grande Municipal Airport, and Falcon Field Airport, respectively.

ADEQ further explained that “despite the deployment of comprehensive control measures and sophisticated response programs and a few localized, low-impact violations of the dust control rules, high wind conditions associated with thunderstorms and thunderstorm outflows brought high concentrations of PM₁₀ emissions into, and also overwhelmed controls within, the Phoenix PM₁₀ nonattainment area. Strong thunderstorm outflows with sustained winds ranging from 20-30 mph, and even greater speeds nearest the source regions, described in Section V, were enough to overwhelm all available efforts to limit PM₁₀ concentrations from the event. The fact that these were natural events involving strong thunderstorm outflow winds that transported PM₁₀ emissions into Maricopa County, with a majority of the PM₁₀ emissions recorded by Maricopa County area monitors coming from sources outside of the Phoenix PM₁₀ nonattainment area, provides strong evidence that the events and exceedances of June 16, 2012, recorded within the Phoenix PM₁₀ nonattainment area, were not reasonably controllable or preventable.”

Section V of ADEQ’s documentation included further analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located to the south and southeast of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for

the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations throughout the area and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 11: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section IV: p.18-24, Section V: p. 25-34, App. E	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “event that occurred on June 16, 2012, resulted in one of the top 12 highest 24-hour average PM₁₀ concentrations seen in the last five-plus years.” ADEQ's analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on June 16, 2012, were in excess of normal historical fluctuations.

Table 12: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section III: p. 14-17, App. A	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ's demonstration included a comprehensive conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a very detailed discussion of the event that occurred on June 16, 2012, and a time series graph for the event that included hourly PM₁₀ concentrations for monitors in the Phoenix PM₁₀ nonattainment area.

Section V of the demonstration included satellite imagery, time-lapse video evidence, a time series graph for the event that contained hourly PM₁₀ concentrations from monitors in the Phoenix PM₁₀ nonattainment area, visibility and sustained wind speed from Phoenix Sky Harbor International Airport, and sustained wind speed from Williams Gateway Airport. The CCR analysis also included a time series graph that contained PM₁₀ concentrations from monitors in Pinal County, visibility, and sustained wind speed from Casa Grande Municipal Airport, and the raw data tables for numerous NWS stations in Maricopa and Pinal Counties. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. Time-lapse video of the event was included and can be found at the following location:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_06162012.mp4

While not included in the demonstration, it is important to note that NOAA's National Climatic Data Center Storm events database included dust storm observations on June 16, 2012, at 4:30 PM (central deserts) and 5:09 PM (greater Phoenix area). The timing of these dust storm reports for this event is

consistent with the issuance of a NWS Significant Weather Advisory for the period of 4:24 PM to 6:00 PM, NWS Dust Storm Warning for the period of 4:30 PM to 7:00 PM, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced-visibility, and NWS station reports of blowing dust (BLDU), haze (HZ), and dust storms (DS).

ADEQ stated that the evidence presented shows a clear causal relationship “between the emissions generated by uncontrollable natural events and the exceedances measured at the monitors.” ADEQ further stated that “the satellite images, time series graphs, and meteorological data tables provided in this section show the temporal progression of the dust events from the development of the thunderstorms, to the increase in wind speeds, and to the rise in PM₁₀ concentrations. The combination of the PM₁₀ and wind data from Maricopa and Pinal counties shows the transport of particulate matter from the south through Pinal County and into the Phoenix PM₁₀ nonattainment area. This information supports the conclusion that the events were primarily caused by windblown dust from emission sources outside of Maricopa County and the transport of PM₁₀ into the Phoenix PM₁₀ nonattainment area.”

The analysis in Sections II and V, specifically, the PM₁₀ time series graph, winds speed and direction measurements, time-lapse video evidence, NOAA dust storm observations, NWS advisories, and NWS station reports of reduced visibility, blowing dust, haze, and dust storms, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedances measured at the monitors identified in Table 10 of this document.

Table 13: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section V: p. 25-34, App. D, App. E	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations, “we can reasonably conclude that the event in question affected air quality.” ADEQ's summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 14: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section VII: p. 36	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “events shown to cause these exceedances were emissions of PM₁₀ driven by high winds caused by thunderstorm activity and related outflow boundary on June 16, 2012” and that “the events therefore qualify as natural events.” ADEQ's summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 15: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section VII: p. 36	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the body of evidence presented in this submittal provides no alternative that could tie the exceedances of June 16, 2012, to any other causal source but transported and re-entrained PM₁₀ generated from thunderstorm outflows, confirming that there would have been no exceedances but for the presence of these uncontrollable natural events.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 16: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 16, 2012	Section VI: p.35	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 17 outlines EPA’s evaluation of these requirements.

Table 17: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p.1, App. B	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p.1-2	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ⁶	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p.2, App. C ⁷	Yes

⁶See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

⁷A copy of the affidavit was not included in App. C, as stated in Section I of the final demonstration, but was submitted to EPA as part of the February 13, 2013 submission.

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 10 on June 16, 2012. EPA has determined that the flagged exceedances at these locations on this day meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the event provides sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedances, there would have been no exceedances but for the event, and the measured exceedances were in excess of normal historical fluctuations.

Event Day: June 27, 2012

Table 18: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
June 27, 2012	Central Phoenix	04-013-3002-4	340
	Durango Complex	04-013-9812-1	221
	Glendale	04-013-2001-1	337
	Greenwood	04-013-3010-1	323
	Higley	04-013-4006-1	224
	JLG Supersite	04-013-9997-3	344
	JLG Supersite	04-013-9997-4	329
	North Phoenix	04-013-1004-1	178
	South Phoenix	04-013-4003-1	342
	Tempe	04-013-4005-1	169
	West 43 rd	04-013-4009-1	221
	West Chandler	04-013-4004-1	220
	Zuni Hills	04-013-4016-1	285

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, “BACM-approved control measures on significant anthropogenic sources were in place and enforced during the events, and pro-active tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing/prior approved required controls are adequate for meeting the requirements of an exceptional event and should be considered ‘reasonable’ for these purposes.”

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 25 mph in multiple locations throughout the Phoenix PM₁₀ nonattainment area and Pinal County. For example, maximum sustained wind speeds of 38 mph with gusts of 45 mph, 34 mph with gusts of 47 mph, 31 mph with gusts of 39 mph, and 31 mph with gusts of 44 mph were measured at Chandler Municipal Airport, Williams Gateway Airport, Casa Grande Municipal Airport, and Phoenix Sky Harbor, respectively.

Section V of ADEQ’s documentation included further analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located to the southeast of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀

concentrations throughout the area and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 19: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section IV: p. 18-25, Section V: p. 26-35, App. E	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that the “event that occurred on June 27, 2012, resulted in one of the top 10 highest 24-hour average PM₁₀ concentrations seen in the last five-plus years.” ADEQ's analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on July 18, 2011, were in excess of normal historical fluctuations.

Table 20: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section III: p. 14-17, App. A	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ’s demonstration included a comprehensive conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a very detailed discussion of the event that occurred on June 27, 2012, and a time series graph for the event that included hourly PM₁₀ concentrations for monitors in the Phoenix PM₁₀ nonattainment area.

Section V of the demonstration included satellite imagery, time-lapse video evidence, a time series graph for the event that contained hourly PM₁₀ concentrations from monitors in the Phoenix PM₁₀ nonattainment area, visibility and sustained wind speed from Phoenix Sky Harbor International Airport, and sustained wind speed from Williams Gateway Airport. The CCR analysis also included a time series graph that contained PM₁₀ concentrations from monitors in Pinal County, visibility, and sustained wind speed from Casa Grande Municipal Airport, and the raw data tables for numerous NWS stations in Maricopa and Pinal Counties. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. Time-lapse video of the event was included and can be found at the following location:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_06272012.mp4
- Superstition Mountains: http://www.phoenixvis.net/videos/mpeg4/SUPM_06272012.mp4

While not included in the demonstration, it is important to note that NOAA’s National Climatic Data Center Storm events database included dust storm observations on June 17, 2012, at 6:00 PM (central deserts) and 6:40 PM (greater Phoenix area). The timing of these dust storm reports for this event is consistent with the issuance of a NWS Blowing Dust Advisory for the period of 5:30 PM to 6:00 PM, NWS Severe Thunderstorm Warning for the period of 6:09 PM to 7:30 PM, NWS Significant Weather Advisory for the period of 6:58 PM to 8:15 PM, NWS Dust Storm Warning for the period of 6:02 PM to 9:00 PM, NWS preliminary local storm reports of dust storms, the observed increased PM₁₀

concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of blowing dust, haze, dust, and dust storms (DS).

ADEQ stated that the evidence presented shows a clear causal relationship “between the emissions generated by uncontrollable natural events and the exceedances measured at the monitors.” ADEQ further stated that “the satellite images, time series graphs, and meteorological data tables provided in this section show the temporal progression of the dust events from the development of the thunderstorms, to the increase in wind speeds, and to the rise in PM₁₀ concentrations. The combination of the PM₁₀ and wind data from Maricopa and Pinal counties shows the transport of particulate matter from the south through Pinal County and into the Phoenix PM₁₀ nonattainment area. This information supports the conclusion that the PM₁₀ exceedances observed on June 27, 2012, were the result of emissions entrained into the atmosphere by strong thunderstorm outflow boundary winds from source areas to the southeast, outside of the Phoenix PM₁₀ nonattainment area, and transported into the Phoenix PM₁₀ nonattainment area.”

The analysis in Sections II and V, specifically, the PM₁₀ time series graph, winds speed and direction measurements, time-lapse video evidence, NOAA dust storm observations, NWS local storm reports, NWS advisories, and NWS station reports of reduced visibility, blowing dust, haze, dust, and dust storms, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedances measured at monitors identified in Table 18 of this document.

Table 21: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section V: p. 26-35, App. D, App. E	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 22: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section VII: p. 37	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “the events shown to cause these exceedances were emissions of PM₁₀ driven by high winds caused by thunderstorm activity and related outflow boundary on June 27, 2012” and that “the events therefore qualify as natural events.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 23: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section VII: p. 37	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the body of evidence presented in this submittal provides no alternative that could tie the exceedances of June 27, 2012, to any other causal source but transported and re-entrained PM₁₀ generated from thunderstorm outflows, confirming that there would have been no exceedances but for the presence of these uncontrollable natural events.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 24: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 27, 2012	Section VI: p. 36	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 25 outlines EPA’s evaluation of these requirements.

Table 25: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p. 1 App. B	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p 1-2	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ⁸	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p. 2 App. C	Yes

⁸See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 18 on June 27, 2012. EPA has determined that the flagged exceedances at these locations on this day meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the event provides sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedances, there would have been no exceedances but for the event, and the measured exceedances were in excess of normal historical fluctuations.

Event Day: July 11, 2012

Table 26: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
July 11, 2012	Durango Complex	04-013-9812-1	217
	Greenwood	04-013-3010-1	212
	South Phoenix	04-013-4003-1	285
	West 43 rd	04-013-4009-1	172

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, “BACM on significant anthropogenic sources were in place and enforced during the events, and pro-active tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing/prior approved required controls are adequate for meeting the requirements of an exceptional event and should be considered ‘reasonable’ for these purposes.”

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 20 mph in multiple locations nearby and upwind of the exceeding monitoring stations throughout the Phoenix PM₁₀ nonattainment area and above 25 mph in Pinal County. For example, maximum sustained wind speeds of 23 mph with gusts of 33 mph, and 25 mph with gusts of 33 mph were measured at Phoenix Sky Harbor Airport and Casa Grande Municipal Airport, respectively.

ADEQ further explained that “despite the deployment of comprehensive control measures and sophisticated response programs, high-wind conditions associated with thunderstorms and thunderstorm outflows brought high concentrations of PM₁₀ emissions into, and also overwhelmed controls within, the Phoenix PM₁₀ Nonattainment Area. Widespread thunderstorm outflows with sustained winds in excess of 20 mph with gusts over 30 mph were enough to overwhelm all available efforts to limit PM₁₀ concentrations during the event. The fact that these were natural events involving strong thunderstorm outflow winds that transported PM₁₀ emissions into and across the Phoenix area, with a majority of the PM₁₀ emissions recorded by Phoenix area monitors coming from sources outside of the Phoenix PM₁₀ Nonattainment Area, provides strong evidence that the exceedances of July 11, 2012, recorded within the Phoenix PM₁₀ Nonattainment Area were not reasonably controllable or preventable.”

While ADEQ states that the majority of the PM₁₀ emissions were generated outside of the Phoenix PM₁₀ Nonattainment Area, ADEQ’s documentation included information on the event that indicates that monitors in the Phoenix PM₁₀ nonattainment area may have been affected by PM₁₀ transport primarily from within the nonattainment area, specifically, the areas in the southeastern portion of the nonattainment area. Information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations throughout the area and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 27: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section V: p 1-7, Section III: p. 1-7, App. A	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “the PM₁₀ concentrations measured...on July 11, 2012, were among the highest 24-hr averages...measured over the five-year period.” ADEQ's analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on July 11, 2012, were in excess of normal historical fluctuations.

Table 28: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section IV: p. 1-2, App. C	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ's demonstration included a conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a discussion of the event that occurred on July 11, 2012, and general map of the region of the thunderstorm development in relation to the Phoenix PM₁₀ nonattainment area.

Section III, Appendix A, and Appendix B of the demonstration included satellite imagery visibility photos, time-lapse video evidence, a map of the Phoenix area that displays wind speed and direction at the peak hour of PM₁₀ concentrations during the event, a map with radar base velocity data that identifies thunderstorm outflow boundaries, a time series of hourly PM₁₀ concentrations from PM₁₀ monitors in Pinal County, a time series graph that shows hourly PM₁₀ concentrations from monitors in the Phoenix PM₁₀ nonattainment area and visibility from Phoenix Sky Harbor Airport, and the raw data tables for numerous NWS stations in Maricopa and Pinal Counties. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. ADEQ also provided a discussion for every map that described the conditions at that time. Time-lapse videos of the event can be found at the following location:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_07112012.mp4

The timing of the event is consistent with the issuance of a NWS Blowing Dust Advisory for the period of 8:30 PM to 12:00 AM, NWS Significant Weather Advisory for the period of 10:35 PM to 11:15 PM, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of thunderstorms, haze, and dust.

ADEQ stated that the evidence presented shows a clear causal relationship “between the windblown dust and the PM₁₀ exceedances measured at four Phoenix-area monitors on July 11, 2012. The radar and wind data shown in this section illustrate the spatial and temporal extent of the dust storm as it moved through the Phoenix area. In addition, the time-series plots of air quality and meteorological data found in this section and in Appendix A show that the sharp increase in PM₁₀ concentrations coincided with the strong wind speeds and wind gusts.”

The analysis in Sections II, III, Appendix A, and Appendix B, specifically, the PM₁₀ time series graphs, winds speed and direction measurements, maps, time-lapse video evidence, NWS advisories, and NWS station reports of reduced visibility, thunderstorms, haze, and dust, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedance measured at the monitors identified in Table 26 of this document.

Table 29: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section II: p. 1-9 Section IV: p. 1-2, App. C, B, & D	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 30: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section VII: p. 1	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “PM₁₀ exceedances on July 11, 2012, were shown to be caused by PM₁₀ transported into the Phoenix area by thunderstorm outflow” and that “the event therefore qualifies as a natural event.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 31: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section VII: p. 1	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

Table 32: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
July 11, 2012	Section VI: p. 1	Sufficient	Yes

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the weight of evidence presented in this submittal provides no alternative that could tie the exceedance of July 11, 2012, to any causal source other than PM₁₀ transported by thunderstorm outflow, confirming that there would have been no exceedance but for the presence of this uncontrollable natural event.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 33 outlines EPA’s evaluation of these requirements.

Table 33: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I, p. 1 App. D	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I, p. 1	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ⁹	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I, p. 1-2 App. E ¹⁰	Yes

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 26 on July 11, 2012. EPA has determined that the flagged exceedances at these locations on this day meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. Specifically, EPA has determined that the event was not reasonably controllable and preventable due to high wind conditions that overwhelmed reasonable controls within the Phoenix PM₁₀ nonattainment area. Information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the event provide sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedances, there would have been no exceedance but for the event, and the measured exceedances were in excess of normal historical fluctuations.

⁹See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

¹⁰A copy of the affidavit was not included in App. E, as stated in Section I of the final demonstration, but was submitted to EPA as part of the February 13, 2013 submission.

Event Day: August 11, 2012

Table 34: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. (µg/m ³)
August 11, 2012	Higley	04-013-4006-1	159
	West Chandler	04-013-4004-1	219

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, “BACM on significant anthropogenic sources were in place and enforced during the events, and proactive tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing prior-approved required controls are adequate for meeting the requirements of an exceptional event and should be considered ‘reasonable’ for these purposes.”

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 25 mph in multiple locations throughout the Phoenix PM₁₀ nonattainment area and Pinal County. For example, maximum sustained wind speeds of 32 mph with gusts of 41 mph, and 25 mph with gusts of 36 mph were measured at Chandler Municipal Airport, and Casa Grande Municipal Airport, respectively.

ADEQ further explained that “despite the deployment of comprehensive control measures and sophisticated response programs, high wind conditions associated with the thunderstorm outflow transported high concentrations of PM₁₀ into, and also overwhelmed controls within, the Phoenix PM₁₀ nonattainment area. Widespread sustained winds in excess of 20 mph with gusts over 30 mph were strong enough to overwhelm available efforts to limit PM₁₀ concentrations during the event. The fact that these were natural events involving strong winds that transported PM₁₀ emissions into and across Maricopa County, with a majority of the PM₁₀ emissions recorded by Maricopa County area monitors coming from sources outside of the Phoenix PM₁₀ nonattainment area, provides strong evidence that the exceedances of August 11, 2012, recorded within the Phoenix PM₁₀ nonattainment area were not reasonably controllable or preventable.”

Section III of ADEQ’s documentation included a complex GIS analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located to the south of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations throughout the area, and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 35: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section V: p. 1-8, Section III: p. 1-10, App. A	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “the PM₁₀ concentrations measured...on August 11, 2012, resulted in some of the highest 24-hr averages...measured over the five-year period.” ADEQ’s analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on August 11, 2012, were in excess of normal historical fluctuations.

Table 36: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section IV: p. 1-2, App. C	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ’s demonstration included a conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a discussion of the event that occurred on August 11, 2012, and general map of the region of the thunderstorm development in relation to the Phoenix PM₁₀ nonattainment area.

Section III and Appendix A of the demonstration included satellite imagery visibility photos, time-lapse video evidence, the raw data tables for numerous NWS stations in Maricopa and Pinal Counties, and a number of time series graphs that include hourly PM₁₀ data from Pinal and Maricopa Counties, wind speed, and visibility from Chandler Airport. ADEQ also included a detailed GIS analysis with PM₁₀ concentrations, sustained wind speeds, wind gusts, wind direction, base velocity radar, and visibility to track the transport of PM₁₀ throughout the region. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. ADEQ also provided a discussion for every map that described the conditions at that time. Time-lapse videos of the event can be found at the following locations:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_08112012.mp4
- Superstition Mountains: http://www.phoenixvis.net/videos/mpeg4/SUPM_08112012.mp4

While not included in the demonstration, it is important to note that NOAA’s National Climatic Data Center Storm events database included dust storm observations on August 11, 2012, at 4:30 PM (central deserts) and 5:00 PM (greater Phoenix area). The timing of these dust storm reports for this event is consistent with the issuance of a NWS Dust Storm Warning for the period of 4:00 PM to 6:00 PM, NWS preliminary local storm reports of dust storms, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of blowing dust and dust storms.

ADEQ stated that the evidence presented shows a clear causal relationship “between the windblown dust and the PM₁₀ exceedances measured in the Phoenix PM₁₀ nonattainment area on August 11, 2012.” ADEQ further stated that “the wind, visibility, PM₁₀, and radar data shown in this section illustrate the spatial and temporal extent of the dust storm as it moved through Maricopa County. In addition,

meteorological data tables found in Appendix A show that the sharp increase in PM₁₀ concentrations coincided with gusty winds, low visibilities, and airport observer reports of blowing dust. The fact that PM₁₀ concentrations in Pinal County peaked prior to PM₁₀ concentrations peaking in Maricopa County illustrates that a vast majority of the dust that impacted the nonattainment area monitors originated outside of Maricopa County and was transported into the Phoenix PM₁₀ nonattainment area.”

The analysis in Sections II, III, and Appendix A specifically, the PM₁₀ time series graphs, winds speed and direction measurements, GIS maps, time-lapse video evidence, NOAA dust storm observations, NWS advisories, NWS preliminary local storm reports, and NWS station reports of reduced visibility, blowing dust and dust storms, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedances measured at the West Chandler and Higley monitors. Furthermore, while exceedances occurring at only a few monitors in the network are inherently more complex, the GIS analysis (Figures 3-7 through 3-10 in ADEQ’s demonstration) indicates higher wind speeds were measured in the eastern portion of the nonattainment area influenced the spatial extent of PM₁₀ throughout the Phoenix PM₁₀ nonattainment area and was likely responsible for the exceedances at the West Chandler and Higley monitors.

Table 37: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section III: p. 1-10, App. A, App. B, App. D	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 38: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section VII: p. 1	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “PM₁₀ exceedances in the Phoenix area on August 11, 2012, were shown to be caused by transport of PM₁₀ into the Phoenix area from gusty winds associated with thunderstorm outflow ” and that “the event therefore qualifies as a natural event.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 39: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section VII: p. 1	Section VII: p. 1	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the weight of evidence presented in this submittal provides no alternative that could tie the exceedance of August 11, 2012, to any causal source other than PM₁₀ transported by gusty winds due to thunderstorm outflow, confirming that there would have been no exceedance but for the presence of this uncontrollable natural event.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 40: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 11, 2012	Section VI: p.1	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 41 outlines EPA’s evaluation of these requirements.

Table 41: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p.2 App. D	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p.2	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ¹¹	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p.2-3 App. E ¹²	Yes

¹¹See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

¹²A copy of the affidavit was not included in App. E, as stated in Section I of the final demonstration, but was submitted to EPA as part of the February 13, 2013 submission.

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 34 on August 11, 2012. EPA has determined that the flagged exceedances at these locations on this day meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the event provide sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedances, there would have been no exceedances but for the event, and the measured exceedances were in excess of normal historical fluctuations.

Event Day: August 14, 2012

Table 42: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. ($\mu\text{g}/\text{m}^3$)
August 14, 2012	Durango Complex	04-013-9812-1	179
	West 43 rd	04-013-4009-1	254

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, "BACM on significant anthropogenic sources were in place and enforced during the events, and proactive tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing prior-approved required controls are adequate for meeting the requirements of an exceptional event and should be considered 'reasonable' for these purposes."

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 25 mph in multiple locations throughout the Phoenix PM₁₀ nonattainment area and Pinal County. For example, maximum sustained wind speeds of 34 mph with gusts of 41 mph, and 31 mph with gusts of 40 mph were measured at Luke Air Force Base, and Casa Grande Municipal Airport, respectively. Sustained wind speeds of 23 mph with gusts of 33 mph were also measured at Phoenix Sky Harbor Airport.

ADEQ further explained that "despite the deployment of comprehensive control measures and sophisticated response programs, high wind conditions associated with the thunderstorm outflow transported high concentrations of PM₁₀ into, and also overwhelmed controls within, the Phoenix PM₁₀ nonattainment area. Widespread sustained winds in excess of 20 mph with gusts over 40 mph were strong enough to overwhelm available efforts to limit PM₁₀ concentrations during the event. The fact that these were natural events involving strong winds that transported PM₁₀ emissions into and across Maricopa County, with a majority of the PM₁₀ emissions recorded by Maricopa County area monitors coming from sources outside of the Phoenix PM₁₀ nonattainment area, provides strong evidence that the exceedances of August 14, 2012, recorded within the Phoenix PM₁₀ nonattainment area were not reasonably controllable or preventable."

Section III of ADEQ's documentation included a complex GIS analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located to the south of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀

concentrations throughout the area, and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 43: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section V: p. 1-7, Section III: p. 1-12, App A	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “the PM₁₀ concentrations measured...on August 14, 2012, resulted in one of the highest 24-hr averages...measured over the five-year period.” ADEQ's analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on August 14, 2012, were in excess of normal historical fluctuations.

Table 44: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section IV: p. 1-2, App. C	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ's demonstration included a conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a discussion of the event that occurred on August 14, 2012, and a general map of the region of the thunderstorm development in relation to the Phoenix PM₁₀ nonattainment area.

Section III of the demonstration included satellite imagery visibility photos, time-lapse video evidence, the raw data tables for numerous NWS stations in Maricopa and Pinal Counties, and a number of time series graphs that include hourly PM₁₀ data from Pinal and Maricopa Counties, wind speed, and visibility from Phoenix Sky Harbor Airport. ADEQ also included a detailed GIS analysis with PM₁₀ concentrations, sustained wind speeds, wind gusts, wind direction, base velocity radar, and visibility to track the transport of PM₁₀ throughout the region. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. ADEQ also provided a discussion for every map that described the conditions at that time. Time-lapse videos of the event can be found at the following locations:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_08142012.mp4

The timing of the August 14, 2012, event is consistent with the issuance of a NWS Blowing Dust Advisory for the period of 8:00 PM to 11:00 PM, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of thunderstorms, blowing dust, haze, and dust storms.

ADEQ stated that the evidence presented shows a clear causal relationship “between the windblown dust and the PM₁₀ exceedances measured in the Phoenix PM₁₀ nonattainment area on August 14, 2012.” ADEQ further stated that “The wind, visibility, PM₁₀, and radar data shown in this section illustrate the spatial and temporal extent of the dust storm as it moved through Maricopa County. In addition,

meteorological data tables found in Appendix A show that the sharp increase in PM₁₀ concentrations coincided with the gusty winds, low visibilities, and airport reports of blowing dust. The fact that PM₁₀ concentrations in Pinal County spiked before PM₁₀ concentrations increased in Maricopa County shows that a vast majority of the dust that impacted the nonattainment area monitors originated outside of Maricopa County and was transported into the Phoenix PM₁₀ nonattainment area.”

The analysis in Sections II, III, and Appendix A specifically, the PM₁₀ time series graphs, winds speed and direction measurements, GIS maps, time-lapse video evidence, NWS advisories, and NWS station reports of reduced visibility, blowing dust and dust storms, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedances measured at the West 43rd Avenue and Durango Complex monitors. Furthermore, while exceedances occurring at only a few monitors in the network are inherently more complex, the GIS analysis (Figures 3-7 through 3-10 in ADEQ’s demonstration) indicates higher wind speeds were measured in the western portion of the nonattainment area and variation in wind direction at nearby monitors influenced the spatial extent of PM₁₀ throughout the Phoenix PM₁₀ nonattainment area and was likely responsible for the exceedances at the West 43rd Avenue and Durango Complex monitors.

Table 45: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section III: p. 1-12, App. A, App. B, App. D	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 46: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section VII: p. 1	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “PM₁₀ exceedances in the Phoenix area on August 14, 2012, were shown to be caused by transport of PM₁₀ into the Phoenix area from gusty winds associated with thunderstorm outflow” and that “the event therefore qualifies as a natural event.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 47: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section VII: p. 1	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the weight of evidence presented in this submittal provides no alternative that could tie the exceedance of August 14, 2012, to any causal source other than PM₁₀ transported by gusty winds due to thunderstorm outflow, confirming that there would have been no exceedance but for the presence of this uncontrollable natural event.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 48: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
August 14, 2012	Section VI: p. 1	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 49 outlines EPA’s evaluation of these requirements.

Table 49: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p. 1 App. D	Yes.
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p. 2	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ¹³	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p. 2-3 App. E ¹⁴	Yes

¹³See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

¹⁴A copy of the affidavit was not included in App. E, as stated in Section I of the final demonstration, but was submitted to EPA as part of the February 13, 2013 submission.

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused exceedances of the 24-hour PM₁₀ NAAQS at the locations outlined in Table 42 on August 14, 2012. EPA has determined that the flagged exceedances at these locations on this day meet the definition of an exceptional event: the exceedances affected air quality, were not reasonably controllable or preventable, and meet the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the event provide sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedances, there would have been no exceedances but for the event, and the measured exceedances were in excess of normal historical fluctuations.

Event Day: September 6, 2012

Table 50: EPA PM₁₀ Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	24-hour Avg. ($\mu\text{g}/\text{m}^3$)
September 6, 2012	West Chandler	04-013-4004-1	164

Not Reasonably Controllable or Preventable (nRCP)

In addressing reasonable controls, ADEQ provided detailed information on the current set of required controls in the Phoenix PM₁₀ nonattainment area, including information on rule implementation, rule effectiveness, compliance and enforcement, real-time monitoring alert systems and public notification activities that occurred on the event days. ADEQ stated, "BACM on significant anthropogenic sources were in place and enforced during the events, and proactive tracking and response to the events by regulatory agencies and local governments confirmed the uncontrollable nature of the dust emissions; therefore, these pre-existing prior-approved required controls are adequate for meeting the requirements of an exceptional event and should be considered 'reasonable' for these purposes."

ADEQ provided documentation showing that sustained wind speeds associated with these events were above 20 mph in multiple locations nearby and upwind of the exceeding monitoring stations throughout the Phoenix PM₁₀ nonattainment area and Pinal County. For example, maximum sustained wind speeds of 23 mph with gusts of 40 mph, 24 mph with gusts of 29, and 24 mph with gusts of 33 mph were measured at Chandler Municipal Airport, Phoenix Sky Harbor Airport, and Casa Grande Municipal Airport, respectively.

ADEQ further explained that "despite the deployment of comprehensive control measures and sophisticated response programs, high wind conditions associated with the thunderstorm outflow transported high concentrations of PM₁₀ into, and also overwhelmed controls within, the Phoenix PM₁₀ nonattainment area. Widespread wind gusts over 30 mph were strong enough to overwhelm available efforts to limit PM₁₀ concentrations during the event. The fact that these were natural events involving strong winds that transported PM₁₀ emissions into and across Maricopa County, with a majority of the PM₁₀ emissions recorded by Maricopa County area monitors coming from sources outside of the Phoenix PM₁₀ nonattainment area, provides strong evidence that the exceedances of September 6, 2012, recorded within the Phoenix PM₁₀ nonattainment area were not reasonably controllable or preventable."

Section III of ADEQ's documentation included a complex GIS analysis of the event that supports the PM₁₀ transport described above. This analysis indicates that monitors in the Phoenix PM₁₀ nonattainment area were affected by PM₁₀ transport from outside the nonattainment area, with the main source areas located to the south of the nonattainment area. Some of these source areas are located in Pinal County, portions of which were recently designated as a moderate nonattainment area (West Pinal) for the 1987 24-hour PM₁₀ NAAQS (77 FR 32024, May 31, 2012). Currently, the state is undergoing the appropriate process of developing a state implementation plan (SIP), due January 2, 2014, that provides for attainment of the PM₁₀ standard as expeditiously as practicable but no later than the end of the sixth calendar year after redesignation. The SIP development process includes the requirement to identify and implement reasonably available control measures for the area. In addition to transport, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations throughout the area, and the wind speeds associated with the event sufficiently establishes that the event was not reasonably controllable or preventable.

Table 51: Documentation of nRCP

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section V: p. 1-8, Section III: p. 1-10, App. A	Sufficient	Yes

Historical Fluctuations (HF)

To demonstrate that this requirement was met, ADEQ provided 5-year time series plots of both PM₁₀ daily maximum hourly averages and PM₁₀ 24-hour averages and stated that these figures show that “the PM₁₀ concentrations measured at the West Chandler monitor on September 6, 2012, resulted in some of the highest 24-hr averages...measured over the five-year period.” ADEQ's analysis sufficiently establishes that the 24-hour PM₁₀ concentrations measured on September 6, 2012, were in excess of normal historical fluctuations.

Table 52: Documentation of HF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section IV: p. 1-2	Sufficient	Yes

Clear Causal Relationship (CCR)

Section II of ADEQ's demonstration included a conceptual model of the events, including a general overview of the geographic setting of the monitors, and climate information. The conceptual model also included a discussion of the event that occurred on September 6, 2012.

Section III and Appendix A of the demonstration included satellite imagery visibility photos, time-lapse video evidence, the raw data tables for numerous NWS stations in Maricopa County, and a number of time series graphs that include hourly PM₁₀ data from Pinal and Maricopa Counties, wind speed, and visibility from Chandler Airport. ADEQ also included a detailed GIS analysis with PM₁₀ concentrations, sustained wind speeds, wind gusts, wind direction, base velocity radar, and visibility to track the transport of PM₁₀ throughout the region. These data show the spatial and temporal representation of the event as it moves throughout Maricopa and Pinal Counties. ADEQ also provided a discussion for every map that described the conditions at that time. Time-lapse videos of the event can be found at the following locations:

- South Mountain: http://www.phoenixvis.net/videos/mpeg4/SOMT_09062012.mp4
- Superstition Mountains: www.phoenixvis.net/videos/mpeg4/SUPM_09062012.mp4

While not included in the demonstration, it is important to note that NOAA's National Climatic Data Center Storm events database included dust storm observations on September 6, 2012, at 4:15 PM (central deserts) and 4:50 PM (greater Phoenix area). The timing of these dust storm reports for this event is consistent with the issuance of a NWS Dust Storm Warning for the period of 4:16 PM to 7:00 PM, NWS Blowing Dust Advisory for the period of 4:41 PM to 5:00 PM, NWS Severe Thunderstorm Warning for the period of 4:19 PM to 5:00 PM, NWS preliminary local storm reports of dust storms, the observed increased PM₁₀ concentrations in the area, increased wind speed, reduced visibility, and NWS station reports of thunderstorms, blowing dust, haze, and dust storms.

ADEQ stated that the evidence presented shows a clear causal relationship “between the windblown dust and the PM₁₀ exceedances measured in the Phoenix PM₁₀ nonattainment area on September 6, 2012.” ADEQ further stated that “The wind, visibility, PM₁₀, and radar data shown in this section illustrate the

spatial and temporal extent of the dust storm as it moved through Maricopa County. In addition, meteorological data tables found in Appendix A show that the sharp increase in PM₁₀ concentrations coincided with the gusty winds, low visibilities, and airport observer reports of blowing dust. The fact that PM₁₀ concentrations in Pinal County spiked prior to PM₁₀ concentrations increasing in Maricopa County illustrate that a vast majority of the dust that impacted the nonattainment area monitors originated outside of Maricopa County and was transported into the Phoenix PM₁₀ nonattainment area.”

The analysis in Sections II, III, and Appendix A specifically, the PM₁₀ time series graphs, winds speed and direction measurements, GIS maps, time-lapse video evidence, NOAA dust storm observations, NWS advisories, NWS preliminary local storm reports, and NWS station reports of reduced visibility, blowing dust and dust storms, sufficiently establishes that there was a clear causal relationship between uncontrollable emissions generated from thunderstorm outflow winds and the exceedance measured at the West Chandler monitor. Furthermore, while exceedances occurring at only one monitor in the network are inherently more complex, the GIS analysis (Figures 3-6 through 3-9 in ADEQ’s demonstration) indicates that a shift in wind direction from the southwest to west influenced the spatial extent of PM₁₀ throughout the Phoenix PM₁₀ nonattainment area and was likely responsible for the isolated exceedance at the West Chandler monitor.

Table 53: Documentation of CCR

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section III: p. 1-10, App. A, App. B, App. C	Sufficient	Yes

Affects Air Quality (AAQ)

ADEQ stated that based on the information presented in the demonstrations for both the CCR and HF requirements, “we can reasonably conclude that the event in question affected air quality.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event affected air quality.

Table 54: Documentation of AAQ

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section VII: p. 1	Sufficient	Yes

Natural Event

ADEQ stated that based on the documentation for both the nRCP and CCR requirements, “PM₁₀ exceedances in the Phoenix area on September 6, 2012, were shown to be caused by transport of PM₁₀ into the Phoenix area from gusty winds associated with thunderstorm outflow” and that “the event therefore qualifies as a natural event.” ADEQ’s summary regarding the CCR and HF requirements sufficiently establishes that the event was a natural event.

Table 55: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section VII: p. 1	Sufficient	Yes

No Exceedance or Violation But For the Event (NEBF)

ADEQ provided a summary of the analysis and information regarding the nRCP and CCR requirements and stated that “the weight of evidence presented in this submittal provides no alternative that could tie the exceedance of September 6, 2012, to any causal source other than PM₁₀ transported by gusty winds due to thunderstorm outflow, confirming that there would have been no exceedance but for the presence of this uncontrollable natural event.” ADEQ’s summary regarding the nRCP and CCR requirements sufficiently establishes that the NEBF criterion has been met.

Table 56: Documentation of NEBF

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
September 6, 2012	Section VI: p. 1	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14 (c) specifies the schedule and procedural requirements an air agency must follow to request data exclusion. Table 49 outlines EPA’s evaluation of these requirements.

Table 57: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the State provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section I: p. 1 App. C	Yes
Were flags and initial description placed on the data by July 1 st of the following year?	40 CFR §50.14 (c)(2)(iii)	Section I: p. 1	Yes
Was the demonstration 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?	40 CFR §50.14 (c)(3)(i)	February 13, 2013 letter ¹⁵	Yes
Was the public comment process followed and documented?	40 CFR §50.14 (c)(3)(v)	Section I: p. 1 App. D ¹⁶	Yes

¹⁵See letter from Eric Massey, Director, Air Quality Division, ADEQ, to Deborah Jordan, Director, U.S. EPA Region IX Air Division, dated February 13, 2013.

¹⁶A copy of the affidavit was not included in App. D, as stated in Section I of the final demonstration, but was submitted to EPA as part of the February 13, 2013 submission.

Conclusion

EPA has reviewed documentation provided by ADEQ to support claims that dust emissions generated by monsoonal thunderstorm high winds were transported into the Phoenix PM₁₀ nonattainment area from areas in Pinal County and caused an exceedance of the 24-hour PM₁₀ NAAQS at the location outlined in Table 50 on September 6, 2012. EPA has determined that the flagged exceedance at this location on this day meets the definition of an exceptional event: the exceedances affected air quality, was not reasonably controllable or preventable, and met the definition of a natural event. In addition to transport into the area, information pertaining to the controls implemented within the nonattainment area, the spatial extent of elevated PM₁₀ concentrations measured in the area, and the wind speeds associated with the low pressure system provide sufficient evidence to conclude that the event was not reasonably controllable or preventable. Furthermore, EPA has determined that there was a clear causal relationship between the event and the measured exceedance, there would have been no exceedance but for the event, and the measured exceedance was in excess of normal historical fluctuations.

CONCLUSION

EPA finds that the weight of evidence is sufficient for concurrence on the flagging of the data for the monitors identified in Table 1 on September 11 & 12, 2011, June 16, June 27, July 11, August 11, August 14, and September 6, 2012. These concurrences do not constitute final EPA action to exclude these data from consideration for purposes of determining the attainment status of the area. Final actions will come only after EPA completes notice and comment rulemaking on any such determinations.