ACLPI ARIZONA CENTER FOR LAW IN THE PUBLIC INTEREST
dedicated to ensuring government accountability and protecting the legal rights of Arizonans

January 1, 2013

VIA ELECTRONIC MAIL
Andra Juniel
Air Assessment Section
Arizona Department of Environmental Quality
1110 W. Washington Street, 3415-A
Phoenix, AZ 85007.

RE: Response to ADEQ December 2012 Request For Public Comments on Exceptional Events In The Greater Phoenix Area

Dear Ms. Juniel:

We submit the following comments regarding the exceptional event demonstrations:

In petitioning EPA to exclude data under an exceptional events claim, a central question concerns the weight of evidence needed in order to make informed decisions about public health. Exceptional event demonstrations should be genuinely diagnostic and supported by rigorous data analysis and empirical observations in meteorology – not illusory correlations or vagaries of weather. Public program directors must make the protection of public health the highest priority. 42 USC 7619 (b)(3)(A)(i).

A study carried out by Arizona State University, in partnership with Arizona Department of Health Services and Arizona Department of Environmental Quality; found that PM10 concentrations in central Phoenix have statistically significant associations with asthma incidents. The study showed that for every additional 36 µg/m3 of daily mean PM10, the probability that children aged five to eighteen requiring emergency room care for asthma related illness increased by approximately fourteen percent. Considering ADEQ's own research, which clearly shows a link between ambient PM10 levels and childhood asthma; and amid rising rates of respiratory-related hospitalizations (2007 – 2010 Phoenix hospital first time asthma diagnoses data from ADHS), the exceptional events demonstrations should have examined the dust events more thoroughly, including local PM10 sources. In their current form, the demonstrations are not convincing and leave too much uncertainty. Excluding unhealthy levels of valid air quality data, stands in stark contrast to ADEQ's commitment to protecting children's health in Arizona.

Therefore, and in plain terms, we believe that an exceptional event should require exceptional evidence.

1. The Demonstrations are Deficient.

We believe that the exceptional events demonstrations submitted by ADEQ contain serious deficiencies and an independent reanalysis of the technical work cannot be sufficiently undertaken in their current form. Moreover, the demonstrations fail to provide a reasonable degree of transparency about analytical methods and disregard data reporting and comparability standards. See ANSI/ASQ E4-2004 and 67 FR 8452-8460. Consequently, the ability of the public and other qualified third parties to fully evaluate the demonstrations is severely diminished. Some of the problems observed are:

- Five-minute PM10 concentration and meteorological data are used to support the demonstrations, but only hourly data from EPA's AQS database are made available to the public.
- Web-links for viewing time-lapse video for each event are provided, but some of the links are not working. Also, for video links that do work, image compression to mpeg and Flash formats do not provide adequate video resolution for assessing dust before full impact.
- The demonstrations state: "additional documentation may be provided at a later date". Any new data or information related to these exceptional events demonstrations should be made available for public review.

2. The Demonstrations Should be Tested by Modeling.

There are distinct types of dust events. Dust clouds can detach and travel at slower speeds than the storms or winds that formed them. Even under conditions where no new dust is lifted, slow dust advection can have air quality impacts in urban areas. Advection at higher speeds can continue to lift dust from sources along its path. Localized dust storms can lift and move surface dust from nearby sources. But, wind speed alone can't lift dust; turbulence is also needed. Cohesive forces tend to hold soils together, and are stronger than aerodynamic forces for PM10 particles. Turbulent winds, wind shear, surface stress, vertical and horizontal flux and threshold friction velocity all play important roles in lifting dust. So, before any credible theories about dust storm impacts can be made, surface layer meteorology needs to be thoroughly examined. There are a number of models that can provide meteorological and dust production estimates. WRF (Weather Research and Forecast model) and the U.S. Air Force dust emission scheme for WRF-CHEM and GOCART, to name a few. But, neither ADEQ nor ADEQ's consultants elected to support their assumptions by testing them with models. We modeled these exceptional event

demonstrations using WRF and will provide model results online for public review -free of charge. Model results for future demonstrations will also be made available.

3. The Historical Fluctuations are Oversimplified.

The sections describing historical fluctuations are oversimplified for all demonstrations. Section 6.2.3 of EPA's 2011 guidance document for preparing a high-wind exceptional events package specifies that air agencies are expected to provide, in part, a time series comparison of wind speeds and resultant pollutant concentrations,,although, this expectation has puzzlingly disappeared from EPA's 2012 revision to the same guidance. With public health as a guiding principle, ADEQ should have examined the events in more detail before releasing such tendentious demonstrations. Multivariate analyses of winds and pollutant concentrations are invaluable decision-making tools, yet ADEQ has decided to rely on oversimplified methods that do not tell the whole story. Figure 1 (in the attached Appendix) is a comparison of PM10 concentrations, wind speeds and wind directions for South Phoenix between 2007 and 2011. PM10 data is from AQS and are the same data used in the historical fluctuations charts in the exceptional events demonstrations. However, ADEQ's charts appear to be missing data from the later part of 2007, and so we have included that data in our charts. Wind speed and wind direction data are from Sky Harbor and were processed using EPA's AERMINUTE model. Our charts indicate that PM10 concentrations in South Phoenix are more responsive to wind speeds between 3.75 and 11.25 meters per second. Hourly PM10 within this wind speed range fluctuate normally between 0 and 500 ug/m3, with multiple concentration peaks as high as ~4000 ug/m3 during 2007, 2008, 2009, 2010 and 2011. PM10 concentrations for wind speeds over 11.25 meters per second are much lower, at approximately ½ to ¼. Wind directions indicate that PM10 concentrations from the east and south-east remain generally unchanged between 2007 and 2011. But, PM10 concentrations from the west, south-west increased in 2011, compared to previous years. With this information in-hand, ADEQ could then narrow down potential causes.

4. July 18, 2011 Demonstration:

The demonstration for July 18, 2011, claims that the dust storm impacted south Phoenix at 17:50 hours. At that time, the hourly wind speed at Sky Harbor airport was approximately 35 miles per hour from the south south-east. Ground-based radar (NEXRAD) data were examined starting at 17:50 hours and stepped backward every five minutes. Figure 2 in the Appendix shows a storm at approximately 35 miles to the south south-east of Sky Harbor at 16:50 hours – one hour and 35 miles from Sky Harbor. Surface friction velocities from our WRF modeling are approximately 0.7 m/s for the area around the storm and for the Phoenix area. This indicates that PM10 recorded by air quality monitors in Phoenix is potentially a product of local windblown dust, and dust generated within Pinal County (around Casa Grande).

Further, if the July 18 2011 event–average PM10 concentrations from the Glendale PM10 monitor are subtracted from event relevant PM10 concentrations from the South Phoenix PM10 monitor, the south Phoenix monitor would still exceed the 24-hour PM10 standard. The South Phoenix monitor site is directly impacted by windblown dust from numerous open area sources. The Glendale monitor site is not. The South Mountain visibility camera is approximately the same latitude as the Glendale monitor and visibility at the camera is (relatively) clear, until the dust cloud impacts the camera. Dust storm impacts to the Glendale monitor should be fairly representative of overall dust storm impacts from the July 18, 2011 dust storm.

When the dust storm reportedly impacts the South Phoenix monitor (at 17:50, according to the demonstration), dust from local sources have already increased ambient PM10 concentrations at South Phoenix, but not Glendale. This is evident in the PM10 data and visibility images. In fact, the visibility cameras captured several dust devils occurring in south Phoenix, well before 17:50 –dust devils can also be seen in other videos for other areas just before the July 18 2011 event.

Finally, the July 18, 2011 demonstration claims that the Buckeye exceedance is very rare, at 99.5 percentile. But having a high relative ranking provides little value if no further investigation is attempted. The chart included in the Appendix as Figure 3 examines the values above the 99.5 percentile (PM10 from July 18, 2011 dust storm) for the Buckeye monitor during 2007 through 2011. There are 10 values above the 99.5 percentile. 9 occurred during summer months at varying wind speeds. One occurred in November.

5. August 25, 2011 through August 28, 2011.

These demonstrations rely upon recorded wind speeds of 30 mph at the Mesa Willians airport (p. 40); however, these data are marked as suspect by NCDC.

6. Public Comment Period is Inadequate.

ADEQ has designated only thirty days for public review of fifteen—a phenomenally high number—exceptional events demonstration packages. Various other states are allowing up to sixty days for reviewing only one exceptional event demonstration. Moreover, the public review period opened December 3rd and closes January 1st (a legal holiday). ADEQ administrators must have been aware that public participation would be limited during December, especially considering Christmas and New Year's holidays.

Furthermore, according to ADHS, risk factors for asthma include: low socioeconomic status, living in an inner-city environment, and race (Hispanic and African American). Most of the air quality data in the demonstrations are among the highest on record for the South and

Central Phoenix neighborhoods; that can be considered high risk for asthma. What efforts have been made by the State to promote public participation (specifically for these exceptional events demonstration packages) with residents and community leaders of south and central Phoenix neighborhoods? Have school principals, churches and community leaders in south and central Phoenix been invited to attend public meetings to discuss these specific exceptional events demonstration packages?

Sincerely,

Joy E. Herr-Cardillo

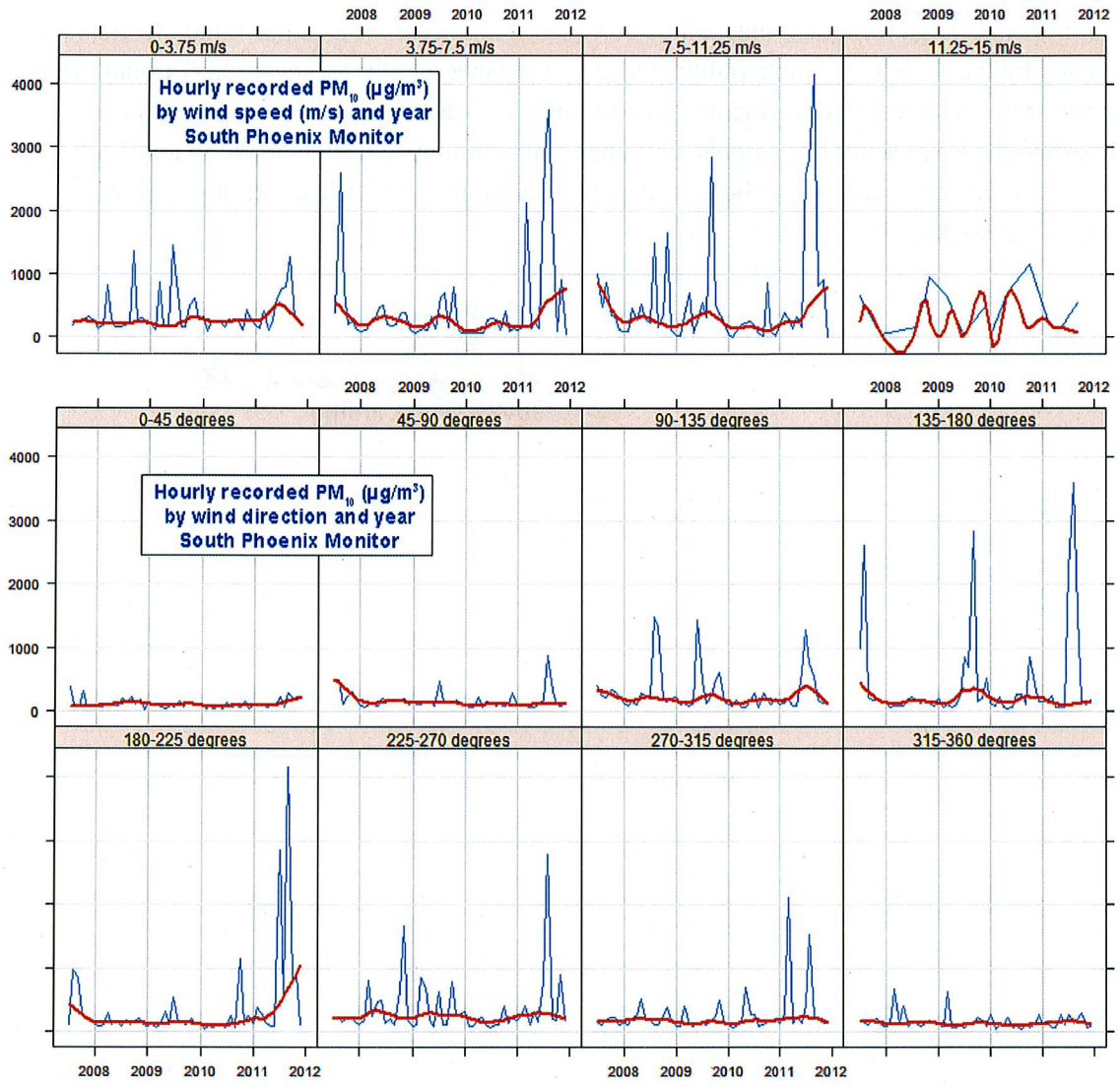


Figure 1. Hourly PM10 concentrations from the South Phoenix PM10 monitor vs. wind speed and wind direction for years 2007 through 2011. Compare to time-domain charts in Exceptional events packages, done by ADEQ consultants.

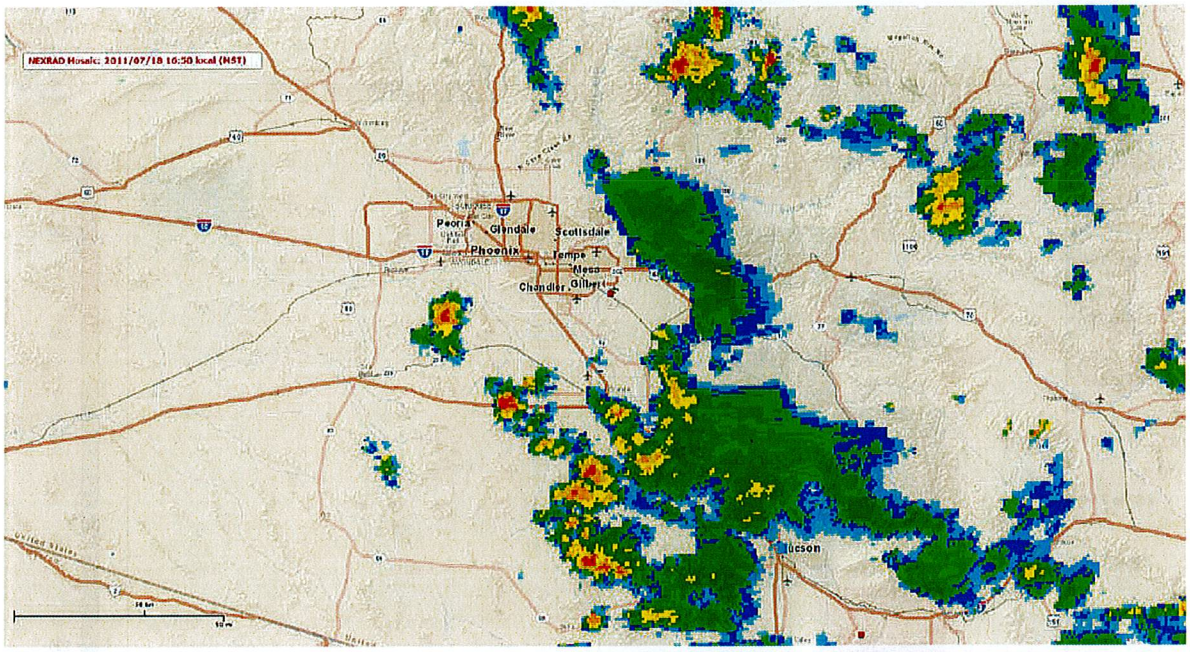


Figure 2. NOAA NEXRAD radar imagery. One hour before dust impacts South Phoenix monitor and Sky Harbor air port records an hourly average wind speed of approximately 35 miles per hour. Storm is approximately 35 miles from Sky harbor airport.

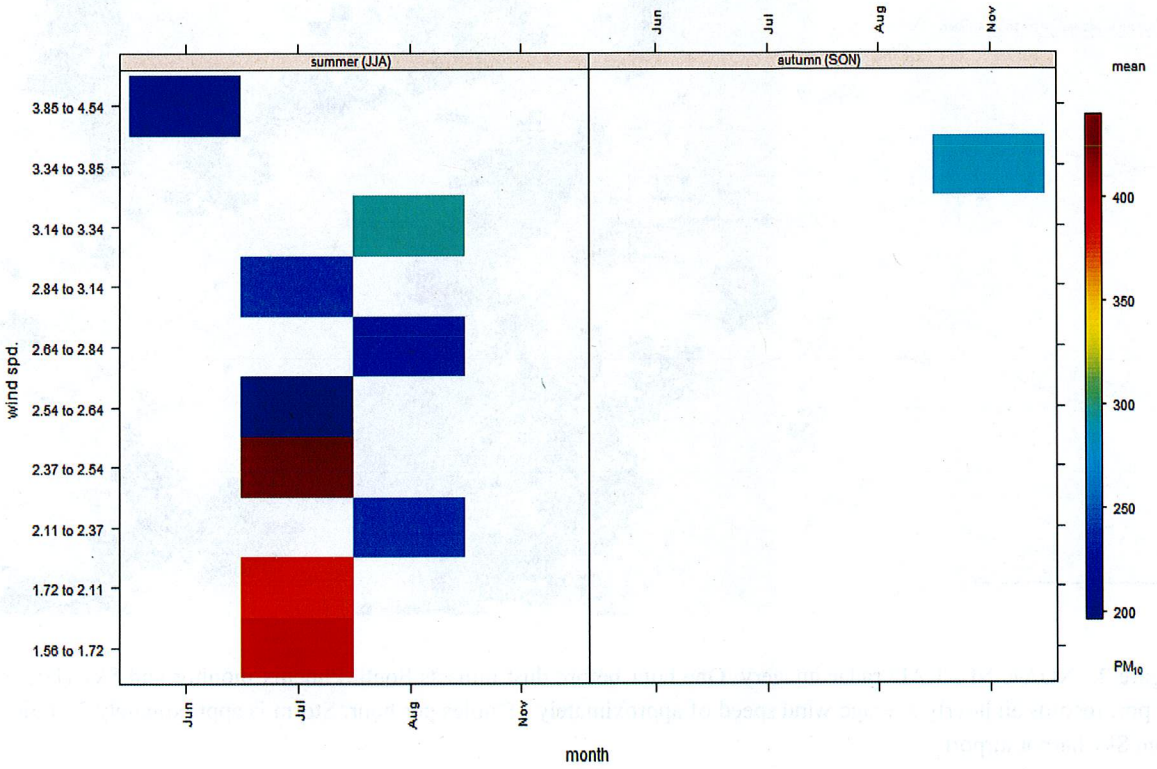


Figure 3. Buckeye daily PM10 values above 99.5 percentile (196 ug/m3) by wind speed and season.

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Janice K. Brewer
Governor

Henry R. Darwin
Director

January 25, 2013

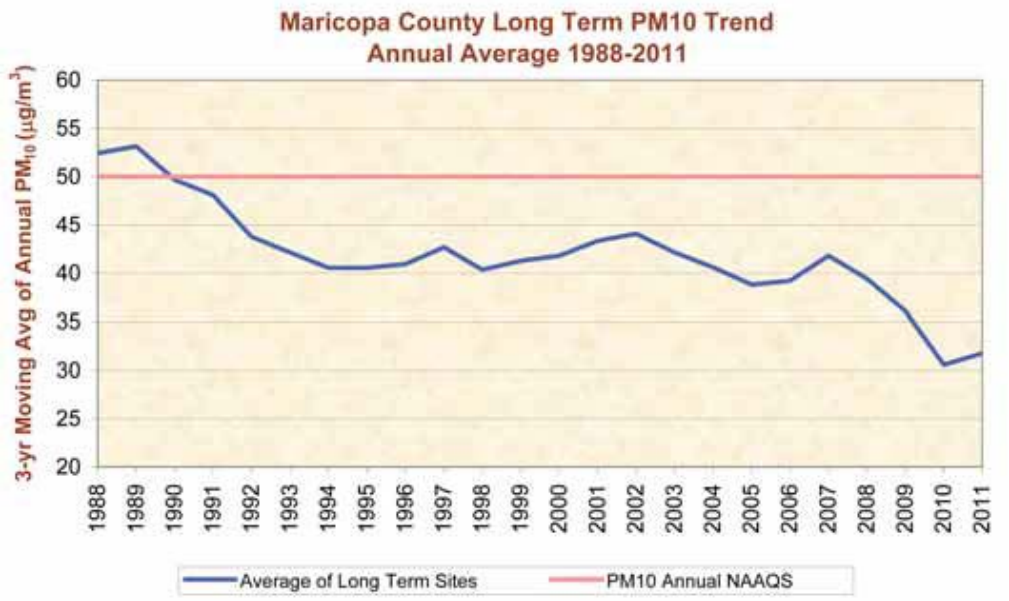
Joy E. Herr-Cardillo
Arizona Center for Law in the Public Interest
2205 E. Speedway Blvd
Tucson, AZ 85719

RE: Response Submitted on January 1, 2013 to ADEQ Concerning the Request for Public Comments on the Exceptional Event Demonstration Packages for the Greater Phoenix Area Posted on December 3, 2012.

Dear Ms. Herr-Cardillo;

Thank you for reviewing and providing comments to these exceptional event demonstrations. We agree that ADEQ's highest priority is to protect public health. Collectively, we have made great strides in improving the levels of PM10 in Maricopa County.

Recently, we published our 25th Anniversary report. This report shows that the PM10 trend in Maricopa County has decreased by 40% over the last two decades due to the implementations of numerous control measures and cooperation with other air quality agencies and stakeholders.



http://www.azdeq.gov/function/about/download/25th_anniversary_book-web.pdf

Your letter also mentioned the study carried out by ASU, ADHS and ADEQ on PM10 concentrations and asthma incidences. One of the recommendations, Chapter 8 Asthma Warning System, recommended ADEQ adopt a two part program; a predictive air pollution forecast system and an automated communications network that would advise the news media and citizens via phone, text and/or email with the daily air quality forecast. ADEQ has done just that and provides forecasts to Maricopa County (and products to Yuma, Nogales and Green Valley). We coordinate with Maricopa County's Clean Air Make More, so that the ADEQ forecasts go directly to their website and subscribers, as well. Now, more than ever, citizens, mothers of asthmatic children, school nurses, or other school officials can get accurate and timely air quality forecast information sent directly to them on a daily basis. To subscribe go to: https://public.govdelivery.com/accounts/AZDEQ/subscriber/new

ADEQ has also implemented an Air Quality Flag program that can be used by schools to provide a visual indication of the air quality forecast to students, faculty and local residents. http://www.azdeq.gov/ceh/flag.html

Additionally, ADEQ's Air Quality program adheres to the principles of ensuring conformity with EPA and ADEQ quality assurance programs, and submittal of the ambient air monitoring data to the Federal air quality database that is accessible to the public.

The point of the exceptional event rule is to provide a means to carefully screen air quality data to ensure that events that overwhelm reasonable controls are accurately represented in all monitoring data and analysis. For the exceptional event days, these data are flagged in the EPA database. The exceptional event demonstrations provide EPA with an analysis and seek EPA's concurrence that these events overwhelmed Best Available Control Measures (BACM) and Most Stringent Measures (MSM) already in place and that the exceedances are due to exceptional events that were beyond established controls at the time of the event. These demonstrations were prepared following the EPA guidance. They demonstrate that these events met the definition and criteria for exclusion as allowed in the Exceptional Event Rule, 40 CFR Parts 50 and 51.

Attached are more specific responses to your comments. We appreciate your participation in this process and join you in the commitment to continue to protect public health for the citizens of Arizona.

Sincerely,

Eric C. Massey, Director
Air Quality Division

Comment 1

Comment: The demonstrations did not provide a reasonable degree of transparency about analytical methods so that independent reanalysis could be undertaken.

Response: These demonstrations include a description of analytical method, specifically those including time series geographic information system (GIS) analysis. All other data included constitutes hourly average time series plots obtained from EPA's Air Quality System (AQS) database or operating agency.

EPA quality assurance procedures were followed with collection of all state and local ambient data included in the demonstration. ADEQ relies on National Weather Service (NWS) quality systems for meteorological data.

ADEQ has the videos available to the public upon request in the event that a user is unable to open a link in the document. ADEQ has verified function of all video web links with the exception of one. The links provided in the August 25 through 28, 2011 demonstration were incorrect and have been corrected in the final version. ADEQ has the videos available to the public upon request. The compression method used to create the videos aimed to provide both the best resolution possible and minimize file size so that users can readily obtain the files.

ADEQ reviewed the draft documents and found two documents containing the statement that "additional documentation may be provided at a later date". The statement refers to exceedances recorded outside of the Maricopa County non-attainment area, specifically Pinal County, during the same time period and further explains that theses exceedances may be addressed in a separate exceptional event submittal in the future and will be made available for public review at that time.

ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

Comment 2

Comment: The demonstrations should be tested by modeling.

Response: The exceptional event demonstrations rely on actual measured values including, particulate concentration and meteorological parameters. EPA guidance recommends that the agency use actual measured data to perform a demonstration that the events were exceptional in nature. The addition of model derived data into the analysis would not provide additional benefit in characterizing the events. Models are generally used to predict a future occurrence rather while actual measured data represent what did occur. Dust models, like those listed by the commenter, have not historically been capable of reproducing actual measured particulate concentrations and should be reserved for predictive exercises such as dust forecasting. ADEQ was unable to find the referenced modeling data on the commenter's website and, therefore, is unable to provide

further comment on its use. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

Comment 3

Comment: The historical fluctuations are oversimplified.

Response: The historical fluctuation analysis conducted for these demonstrations meet recommendations in the latest EPA guidance and have been approved as an appropriate method in past exceptional event requests submitted by ADEQ. The purpose of the historical analysis is to provide a comparison of the requested exceptional event day to past measurements. Its purpose is not to attempt to determine potential contributing sources on the exceedance day. The Conceptual Model and Clear Causal Relationship sections of the demonstration provide an explanation of the conditions during the event. ADEQ has determined that the Historical Fluctuation section clearly represents the specific exceedance day in the context of past measurements. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

Comment 4

1st paragraph relating to the July 18, 2011 demonstration and timing of the South Phoenix winds, 17:50 arrival time of dust at South Phoenix and modeled surface friction velocity.

Response: ADEQ is unable to verify the commenter's suggestion that the demonstration specifies the impact at the South Phoenix monitor occurred precisely at 17:50. The South Phoenix site recorded a maximum hourly PM10 concentration of 2861µg/m3 during the 1800 hour which corresponds to area maximum particulate concentrations provided in Table 5-2. The table illustrates area-wide PM10 concentrations, Sky Harbor winds and visibility. The plot clearly shows a wind speed increase between 1700 and 1800 and a corresponding PM10 increase and visibility decrease. The radar derived proximity of the storm cell to the Phoenix area, approximately 25 miles south south-east as noted by the commenter, is not a clear indicator of the position of the storm outflow. In this event the outflow arrived ahead of the thunderstorm as evident in the details provided in the exceptional event demonstration. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

2nd paragraph relating to the method of subtracting the Glendale monitor value from the South Phoenix value and suggestion that Glendale represents overall dust storm impacts.

Response: The process of subtracting one area monitor from another is not an appropriate methodology for evaluating region-wide dust storm events. Further, ADEQ disagrees that the Glendale site represents overall dust storm impacts. The impact of the outflow dust is evident at nearly all Phoenix area PM10 monitors although the magnitude varies from site to site. This variability is described in the exceptional event document and is attributed to an influx of particulate matter from outside the non-attainment boundary and the contribution of local sources where local controls were overwhelmed. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

3rd paragraph relating to the arrival of dust impacts at South Phoenix at 17:50, local dust sources already increasing PM10 ant South Phoenix but not Glendale, and video of dust devils at South Phoenix well before 17:50.

Response: ADEQ is unable to verify the commenter's suggestion that the demonstration specifies the impact at the South Phoenix monitor occurred precisely at 17:50. The visibility videos show, as do hourly measurements, an earlier, less intense, dust cloud moving through the area at approximately 1600 and 1700. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

4th paragraph relating to ADEQ's claims that the Buckeye exceedance is very rare and in the 99.5 percentile while 10 other values are above 99.5 percentile (9 during summer months 1 in November).

Response: This is the purpose of the historical fluctuations analysis, to provide the past maximum PM10 data so this event can be compared to the historical record and show the extent to which it varies from the norm. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

Comment 5

Comment: The August 25, 2011 through August 28, 2011 demonstrations rely on recorded wind speeds of 30 mph at Mesa Williams airport (p. 40), however these data are marked as suspect by NCDC.

Response: The data does have an "s" flag. But it does not mean the value is erroneous.

According to Appendix L: Hourly Data Quality Control Document, of the NCDC Technical Document, one test as a part of the automated QA/QC process involves a "check to see if the wind speed has increased or decreased by more that 20 knots from the average of previous and following hourly observations". If the change is greater than 20 knots, a flag will be placed on the data. We believe this is what occurred in reference to the "s" flag placed on the 30 mph reading at the Mesa Williams airport station. A wind speed of 5 mph was recorded before and 9 mph was recorded after the 30 mph reading. The suspect flag was likely placed on the data as part of the automated QA/QC process due to the sudden onset, and subsequent sudden decrease, in winds. Such sudden wind increases are not uncommon during the Arizona Monsoon due to the generation and propagation of outflow boundaries. These outflows can cause sudden increases in winds that can be very short lived, which would account for the short-term high wind reading and subsequent data flag. Additional high winds were reported in other parts of Maricopa and Pinal Counties including upwind at Casa Grande Municipal Airport, which saw sustained winds above 20 mph with gusts to 25 mph within the hour of, but preceding, the 30 mph report at Mesa Williams. The NCDC QA Rules Effective January, 2005 state:1) flags will be available for most data elements if data are suspect, 2) 's" will be appended to the value on the web form or in a column following the suspect value in the

ASCII form, and 3) if data are flagged as erroneous, it will not be printed. ADEQ reviewed the comment and no additional changes to the demonstration are necessary.

Comment 6

Comment: The public notice period is inadequate.

Response: There is no specific timeframe provided in the Exceptional Event Rule, 40 CFR 50.14(c)(3), only that an opportunity is provided for public comment.

> *Submission of demonstrations*.(i) A State that has flagged data as being due to an exceptional event and is requesting exclusion of the affected measurement data shall, after notice and opportunity for public comment, submit a demonstration to justify data exclusion to EPA.

ADEQ typically provides a 30 day comment period from the public for review of data and proposed actions by ADEQ, which was done for these demonstrations.