High Wind Event of March 29, 2016

Data Flagging and

EPA Concurrence Documentation

City of Albuquerque

Environmental Health Department

Air Quality Program

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High Wind Event of March 29, 2016

As required by the "Treatment of Data Influenced by Exceptional Events"

> EPA is requiring that States submit appropriate documentation which demonstrates why a particular event should be considered exceptional for the affected area. The EPA will review the documentation submitted by States concerning high wind events and will make decisions concerning whether to exclude the data as being influenced by an exceptional event on a case-by-case basis.

This Analysis will present:

1. Documentation of the event showing clear causal relationship between the measured exceedance or high value and the natural wind event. The type and amount of documentation provided will be sufficient to demonstrate that the natural event occurred, and that it impacted a particular monitoring site in such a way to cause the PM10 concentrations measured.
2. Through local media, email and facsimile the public was informed of the high wind event.
3. AQP requires control measure implementation for surface disturbance operations, and that AQP enforcement personnel enforced fugitive dust permits and the requirements of AQR 20.11.20.
4. This high wind event analysis was made available for public review and comment.
5. This high wind event analysis was submitted to the U.S. EPA Region 6 for review and concurrence.

This Analysis will answer the technical elements listed under the 2016 EER (Exceptional Event Rule, see following page):

- Initial Notification of potential exceptional event (40 CFR §50.14(c)(2)]
    - The AQP notified EPA Region 6 on January 29, 2017 of the intent to provide an EER demonstration for this event.
- A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s) [40 CFR §50.14(c)(3)(iv)(A)]
- A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation [40 CFR §50.14(c)(3)(iv)(B)]
- Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the clear causal relationship requirement [40 CFR §50.14(c)(3)(iv)(C)]
- A demonstration that the event was both not reasonably controllable and not reasonably
- preventable [40 CFR §50.14(c)(3)(iv)(D)]
- A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event [40 CFR §50.14(c)(3)(iv)(E)]
- Documentation that the State followed the public comment process and conducted at least a 30-day comment period [40 CFR §50.14(c)(3)(v)(A)]
    - Submit the public comments with the demonstration [40 CFR §50.14(c)(3)(v)(B)]
    - Address in the demonstration those comments disputing or contradicting factual evidence provided in the demonstration [40 CFR §50.14(c)(3)(v)(C)]

The previous 2016 EER list is from the following Regulatory Crosswalk between the 2007 and 2016 Exceptional Events Rules.

> **Note to Users:** This Word table provides a crosswalk between the 2007 Exceptional Events Rule and the 2016 Exceptional Events Rule and shows how the regulatory elements relate. All of the content comes directly from the regulations.

Regulatory Crosswalk between the 2007 and 2016 Exceptional Events Rules

Technical Criteria Under the 2016 EER	Related Criteria Under the 2007 EER
Initial notification of potential exceptional event [40 CFR §50.14(c)(2)]	N/A
A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s) [40 CFR §50.14(c)(3)(iv)(A)]	N/A
A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation [40 CFR §50.14(c)(3)(iv)(B)]	The event affects air quality [40 CFR §50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]
	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 [40 CFR §50.14(c)(3)(iv)(B)]
	There would have been no exceedance or violation but for the event [40 CFR §50.14(c)(3)(iv)(D)]
Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the clear causal relationship requirement [40 CFR §50.14(c)(3)(iv)(C)]	The event is associated with a measured concentration in excess of normal historical fluctuations, including background [40 CFR §50.14(c)(3)(iv)(C)]
A demonstration that the event was both not reasonably controllable and not reasonably preventable [40 CFR §50.14(c)(3)(iv)(D)]	The event is not reasonably controllable or preventable [40 CFR 50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]
A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event [40 CFR §50.14(c)(3)(iv)(E)]	The event is caused by human activity that is unlikely to recur at a particular location or a natural event [40 CFR 50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]
Documentation that the State followed the public comment process and conducted at least a 30-day comment period [40 CFR §50.14(c)(3)(v)(A)]	The State must document that the public comment process was followed [40 CFR §50.14(c)(3)(v)]
Submit the public comments with the demonstration [40 CFR §50.14(c)(3)(v)(B)]	N/A
Address in the demonstration those comments disputing or contradicting factual evidence provided in the demonstration [40 CFR §50.14(c)(3)(v)(C)]	N/A

Every effort has been made to address the 2017 EER requirements without reference to the 2006 EER elements. Due to the close relationship of some 2006 and 2017 EER requirements there may be language in this EER demonstration that appears to be more closely realated to the 2006 EER requirements.

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Analysis Preamble

High Winds were observed for Tuesday March 29, 2016. At one AQP air monitoring station the 24 hour Standardized PM10 values exceeded the PM10 24 hour National Ambient Air Quality Standard (NAAQS). Data collected by the AQP show verification by the National Weather Service (NWS) that high winds did occur. On the date the NWS submitted a High Wind Warning that was reported by all television news media outlets within the City of Albuquerque and the County of Bernalillo. Media outlets reported sustained wind gusts of 55-65 mph.

One AQP monitoring station reported PM10 values exceeding the National Ambient Air Quality Standard of 150 $\mu g/m^3$ (see Appendix B, AQS AMP300 Report, Violation Day Count Report).

Date	Site	POC	Value	
3/29/16	35-001-0029	3	187	$\mu g/m^3$

The event occurred on Tuesday March 29nd, starting at approximately 09:00AM and ending approximately 18:59. The event lasted approximately 10 hours and had a significant impact on the South Valley station.

Peak winds at the site exceeded the 25 mph threshold:

Site	Max 1 minute wind	Max 5 minute wind	Max hourly wind
South Valley (35-001-0029)	34.0 (15:17)	24.0 (15:19)	30.3 (15:00)

For the South Valley 8.7% (47 minutes of 540 minutes) of all the minutes monitored during the event on 3/29/16, exceeded the 25 MPH threshold.

The month of March did result in other extreme weather events including a wind storm exactly one week prior on from 3/21/2016-3/23/2016 which resulted in an exceedance on 3/22/2016. March 29, 2016 was a noteworthy day in respect to being the second vigorous storm within one week.

As reported by the NOAA Storm Events Database:

> "The second high wind event in less than a week impacted New Mexico as yet another strong upper level trough and deep surface low moved over the state. The strongest winds impacted western New Mexico and around the central mountain chain. Peak wind gusts averaged 55 to 65 mph. Gusty winds around the Albuquerque west side caused more problems with tumbleweeds. Blowing dust was also reported to have lowered visibility below 5 miles at times across portions of the state."

High winds were reported across the state ranging from 40 mph to over 60 mph. The winds that did occur on March 29, 2016 were high enough to produce excessive windborne dust that overwhelmed existing dust control measures utilized within the boundaries of Bernalillo County.

The following media report show the high winds on 3/29/16.

John’s Tuesday Evening Forecast

Winds trend down...

 **By John Smith**Published: March 29, 2016, 4:36 pm

Winds will continue through the evening before starting to come down overnight. Snow showers will continue across the San Juans of Colorado and the Northern Mountains of New Mexico through the night, but will diminish during the day Wednesday.

Winds will not be as strong Wednesday, but will still gust between 40 and 45 mph along and east of the central mountain chain Wednesday afternoon. It will be noticeably cooler Wednesday with afternoon highs 10° – 15° below average.

Thursday a cold front will edge into the northeast and advance across the state Friday. This will provide the east with the shot at a few light showers to end the week. The state will dry out and warm back up through the weekend and early next week.

Kristen’s Tuesday Afternoon Forecast

Critical fire danger with a chance of rain/snow...

 **By Kristen Currie**Published: March 29, 2016, 6:43 am Updated: March 29, 2016, 12:46 pm

TUESDAY: A strong storm sitting to the northwest will cause winds to crank across New Mexico today. Sustained winds will range between 25-35mph / gusts 40-50mph in lower elevations while areas within the higher terrain can expect sustained winds 35-45mph / gusts 50-60mph. Gusty winds and dry conditions (humidity <10%) will elevate fire danger across New Mexico. Afternoon temperatures, although slightly cooler than Monday, will be mild in the 50s, 60s and 70s. Spotty to scattered rain and snow showers will move in over the Four Corners region, although, accumulation looks to be light.

WEDNESDAY: A strong overnight cold front will drop afternoon temperatures 10-20degrees statewide. The good news? Winds will still be breezy… but not nearly as strong as what we have on tap Tuesday. A mix of sun and clouds will blanket the state with only a slight chance for a few pop up showers over the Northern Mountains and Southern Colorado.

THURSDAY: Winds will continue to relax and temperatures will begin to warm again as we finish the work week.

John’s Monday Evening Forecast

Another windy day...

 **By John Smith**Published: March 28, 2016, 4:56 pm

Another storm will approach New Mexico tonight, and again this storm is expected to go north through Colorado. This will mean another windy day across nearly the entire state. High Wind Warnings and Wind Advisories have been posted across nearly all of New Mexico for winds gusting between 45 and 60 mph.

There will be a few showers across northern and western New Mexico during the day Tuesday, but the most action will be across Southern Colorado. The San Juans of Colorado are under a Winter Weather Advisory where 5″ – 10″ of new snow are expected.

We cool down behind the storm for Wednesday. Afternoon highs will be 10° – 15° below average across the state. Expect less wind and warmer temperatures for the latter part of the week and the weekend.

Albuquerque issues health alert due to blowing dust

By **Victoria Velarde**Published: March 29, 2016, 1:16 pm Updated: March 29, 2016, 8:35 pm

ALBUQUERQUE (KRQE) – The City of Albuquerque's Environmental Health Department has issued a health alert due to blowing dust.

The alert is in effect from 1:10 p.m. to 8 p.m. Tuesday.

The Environmental Health Department is advising people with respiratory and heart diseases to limit outdoors activities. The department also provided the following guidelines:

- Keep windows and doors closed. If needed for comfort, use air conditioners or heating systems on recycle/recirculation mode.
- Limit your time spent outdoors.
- If symptoms of heart or lung disease occur, (including shortness of breath, chest tightness, chest pain, palpitations or unusual fatigue) contact your health care provider.
- Individuals with heart or lung disease should follow their health management plan from their health care provider. Asthmatic individuals should follow a prescribed asthma management plan.
- Avoid outdoor exercise.

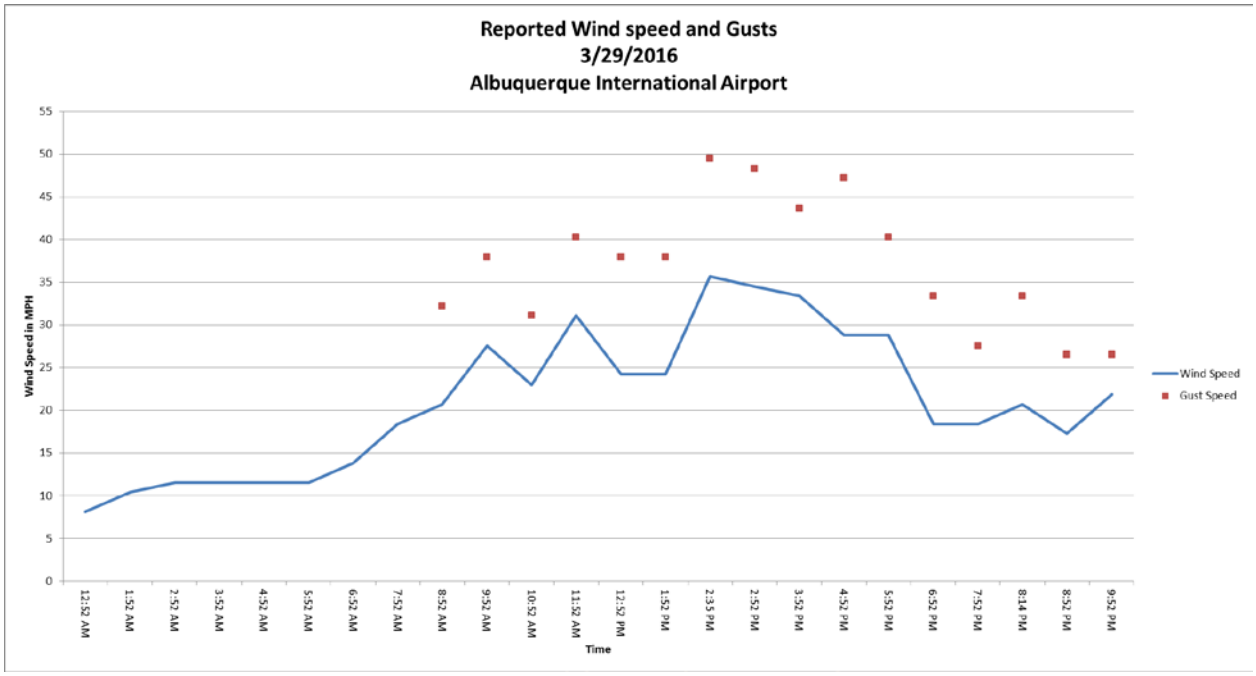
Additional material concerning this March event:

2016 Annual Weather Highlights – Monthyreview
Albuquerque, NM
NWS Weather Forecast Office

March 2016 was much drier and warmer than normal across nearly all of New Mexico .

The first 11 days of the month were mostly dry with above normal temperatures across all of New Mexico. Finally a small, but potent storm delivered rain and mountain snow showers on the 12th, as well as a few thunderstorms. But the dry conditions returned for the rest of the month, aside from a light to moderate snow event in the northeast on the 26th. Two long duration high wind events impacted New Mexico from the 21-23 and 28-30. Snow began to fall over northern New Mexico late on the 31st.

NWS Daily Summary Reported Data
Wind Speed 20 mph (South)
Max Wind Speed 39 mph
Max Gust Speed 49 mph
Visibility 10 miles
Source: NWS Daily Summary



https://www.wunderground.com

Hourly Weather History & Observations

Time (MDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed
12:52 AM	51.1 °F	19.0 °F	28%	29.65 in	10.0 mi	SE	8.1 mph	-
1:52 AM	52.0 °F	19.0 °F	27%	29.63 in	10.0 mi	SSE	10.4 mph	-
2:52 AM	53.1 °F	19.0 °F	26%	29.61 in	10.0 mi	SSE	11.5 mph	-
3:52 AM	52.0 °F	19.9 °F	28%	29.61 in	10.0 mi	SSE	11.5 mph	-
4:52 AM	52.0 °F	21.0 °F	30%	29.59 in	10.0 mi	South	11.5 mph	-
5:52 AM	51.1 °F	23.0 °F	33%	29.60 in	10.0 mi	South	11.5 mph	-
6:52 AM	51.1 °F	25.0 °F	36%	29.60 in	10.0 mi	South	13.8 mph	-
7:52 AM	52.0 °F	27.0 °F	38%	29.60 in	10.0 mi	South	18.4 mph	-
8:52 AM	55.0 °F	28.0 °F	35%	29.61 in	10.0 mi	South	20.7 mph	32.2 mph
9:52 AM	57.9 °F	27.0 °F	31%	29.61 in	10.0 mi	South	27.6 mph	38.0 mph
10:52 AM	61.0 °F	25.0 °F	25%	29.59 in	10.0 mi	South	23.0 mph	31.1 mph
11:52 AM	64.0 °F	21.0 °F	19%	29.56 in	10.0 mi	South	31.1 mph	40.3 mph
12:52 PM	66.9 °F	19.0 °F	16%	29.51 in	10.0 mi	South	24.2 mph	38.0 mph
1:52 PM	69.1 °F	16.0 °F	13%	29.46 in	10.0 mi	South	24.2 mph	38.0 mph
2:35 PM	70.0 °F	15.1 °F	12%	29.62 in	3.0 mi	SSW	35.7 mph	49.5 mph
2:52 PM	69.1 °F	16.0 °F	13%	29.44 in	6.0 mi	SW	34.5 mph	48.3 mph
3:52 PM	69.1 °F	17.1 °F	14%	29.43 in	10.0 mi	SW	33.4 mph	43.7 mph
4:52 PM	66.9 °F	19.0 °F	16%	29.44 in	10.0 mi	SW	28.8 mph	47.2 mph
5:52 PM	66.0 °F	18.0 °F	16%	29.46 in	10.0 mi	SW	28.8 mph	40.3 mph
6:52 PM	64.9 °F	19.0 °F	17%	29.48 in	10.0 mi	SSW	18.4 mph	33.4 mph
7:52 PM	63.0 °F	19.0 °F	18%	29.53 in	10.0 mi	SW	18.4 mph	27.6 mph
8:14 PM	55.0 °F	26.1 °F	33%	29.73 in	10.0 mi	North	20.7 mph	33.4 mph
8:52 PM	51.1 °F	26.1 °F	38%	29.65 in	10.0 mi	North	17.3 mph	26.5 mph
9:36 PM	-	-	N/A%	-	-	North	-	-
9:52 PM	48.9 °F	25.0 °F	39%	29.67 in	10.0 mi	North	21.9 mph	26.5 mph
10:52 PM	48.0 °F	24.1 °F	39%	29.69 in	10.0 mi	North	16.1 mph	23.0 mph
11:52 PM	46.9 °F	23.0 °F	39%	29.69 in	10.0 mi	North	12.7 mph	18.4 mph

https://www.wunderground.com

The Natonal Weather Service also reported a maximum 2 minute wind speed of 41 MPH with a peak wind gust of 53 MPH.

WFO Monthly/Daily Climate Data

071
CXUS55 KABQ 011154
CF6ABQ
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: ALBUQUERQUE NM
MONTH: MARCH
YEAR: 2016
LATITUDE: 35 2 N
LONGITUDE: 106 37 W

TEMPERATURE IN F:							:PCPN:		SNOW:	WIND				:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	68	36	52	7	13	0	0.00	0.0	0	4.2	14	240	M	M	4		18	190
2	73	34	54	9	11	0	0.00	0.0	0	11.4	30	290	M	M	3		35	290
3	71	38	55	10	10	0	0.00	0.0	0	4.9	16	330	M	M	6		20	330
4	74	38	56	10	9	0	0.00	0.0	0	5.4	36	90	M	M	4		44	90
5	70	49	60	14	5	0	0.00	0.0	0	14.5	37	90	M	M	6	78	47	90
6	71	50	61	15	4	0	T	0.0	0	7.8	26	230	M	M	8		37	220
7	60	43	52	6	13	0	0.00	0.0	0	9.5	28	250	M	M	5		40	210
8	56	36	46	0	19	0	0.0	0.0	0	8.1	23	160	M	M	5		28	160
9	63	34	49	2	16	0	0.00	0.0	0	8.3	18	330	M	M	2		23	330
10	66	36	51	4	14	0	0.00	0.0	0	6.8	14	90	M	M	1		17	190
11	72	37	55	8	10	0	0.00	0.0	0	5.4	14	10	M	M	4		18	360
12	63	35	49	2	16	0	T	0.0	0	13.1	38	270	M	M	5	78	50	270
13	67	30	49	1	16	0	0.00	0.0	0	4.9	20	280	M	M	4		27	290
14	71	41	56	8	9	0	0.00	0.0	0	10.9	31	250	M	M	6		36	240
15	61	37	49	1	16	0	0.00	0.0	0	10.6	26	330	M	M	4		34	330
16	66	36	51	3	14	0	0.00	0.0	0	9.9	24	310	M	M	4		31	310
17	71	34	53	5	12	0	0.00	0.0	0	5.6	23	290	M	M	1		26	280
18	71	36	54	6	11	0	0.00	0.0	0	8.5	26	80	M	M	1		33	90
19	64	33	49	0	16	0	0.00	0.0	0	9.1	37	80	M	M	2		44	80
20	62	32	47	-2	18	0	0.00	0.0	0	7.3	28	80	M	M	2		32	80
21	75	39	57	8	8	0	0.00	0.0	0	9.8	24	180	M	M	5		30	170
22	77	45	61	12	4	0	0.00	0.0	0	18.4	41	250	M	M	5	7	53	250
23	54	36	45	-5	20	0	0.00	0.0	0	19.8	37	290	M	M	3		47	280
24	62	32	47	-3	18	0	0.00	0.0	0	5.3	16	270	M	M	2		21	270
25	66	32	49	-1	16	0	0.00	0.0	0	8.8	30	280	M	M	3		36	290
26	63	33	48	-2	17	0	0.00	0.0	0	12.3	32	290	M	M	4		41	290
27	63	31	47	-3	18	0	0.00	0.0	0	4.9	13	10	M	M	3		17	350
28	70	39	55	4	10	0	0.00	0.0	0	9.8	28	180	M	M	5		35	190
29	**70**	**44**	**57**	**6**	**8**	**0**	**T**	**T**	**0**	**19.8**	**39**	**220**	**M**	**M**	**8**	**7**	**49**	**210**
30	54	38	46	-5	19	0	T	T	0	11.4	26	240	M	M	7		34	260
31	58	28	43	-8	22	0	0.00	0.0	0	7.1	26	90	M	M	4		34	90
SM	2052	1142		412		0	T	T		293.6				M		126		
AV	66.2	36.8								9.5	FASTST		M	M	4		MAX(MPH)	
									MISC ---->	#	41	250				#	53	250

The “7” in column 16 denotes DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS. 3/29/2016 is noted as having the second highest peak wind speed of the month, the highest average wind speed and the second highest maximum wind speed.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Current Location: Elev: 5837 ft. Lat: 35.1450° N Lon: -106.7950° W
Station: **ALBUQUERQUE DOUBLE EAGLE II AIRPORT, NM US 03034**

Local Climatological Data
Hourly Observations
March 2016

Generated on 11/14/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Date	Time (LST)	Station Type	Sky Conditions	Visibility	Weather Type (see documentation)	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Hum	Wind Speed (MPH)	Wind Dir (Deg)	Wind Gusts (MPH)	Station Press (inHg)	Press. Tend	Net 3-Hr Change (inHg)	Sea Level Press. (inHg)	Report Type	Precip Total (in)	Altimeter Setting (inHg)
					AU | AW | MW	(F)	(C)	(F)	(C)	(F)	(C)	%										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
29	0015	7	CLR:00	10.00		44	6.4	34	1.2	20	-6.9	38	10	200		24.05				FM-15		29.83
29	0035	7	CLR:00	10.00		45	7.1	35	1.5	20	-6.6	37	10	190		24.04				FM-15		29.82
29	0055	7	CLR:00	10.00		46	7.8	35	1.8	20	-6.5	36	9	200		24.04				FM-15		29.82
29	0115	7	CLR:00	10.00		45	7.0	35	1.5	20	-6.5	38	7	200		24.03				FM-15		29.81
29	0135	7	CLR:00	10.00		44	6.5	34	1.4	21	-6.3	40	7	200		24.03				FM-15		29.81
29	0155	7	CLR:00	10.00		46	8.0	36	2.3	23	-5.2	39	9	200		24.03				FM-15		29.81
29	0215	7	CLR:00	10.00		50	10.0	38	3.5	23	-5.1	34	13	190		24.02				FM-15		29.80
29	0235	7	CLR:00	10.00		50	10.2	39	3.6	24	-4.7	35	13	190		24.02				FM-15		29.80
29	0255	7	CLR:00	10.00		52	11.0	40	4.2	24	-4.2	34	16	200		24.01				FM-15		29.79
29	0315	7	CLR:00	10.00		52	11.1	40	4.4	25	-4.0	35	16	210		24.00				FM-15		29.78
29	0335	7	CLR:00	10.00		52	11.2	40	4.4	25	-4.1	34	15	210	22	24.00				FM-15		29.77
29	0355	7	CLR:00	10.00		51	10.5	39	3.9	24	-4.5	35	14	200		24.00				FM-15		29.78
29	0415	7	CLR:00	10.00		50	10.0	39	3.6	24	-4.2	37	14	200		24.00				FM-15		29.77
29	0435	7	CLR:00	10.00		47	8.1	37	2.6	23	-4.8	40	9	200		24.00				FM-15		29.77
29	0450	7	*	10.00		45	7.0	36	2.0	23	-5.0	42	9	180		24.00				FM-15		29.78
29	0547	7	BKN:07 170	10.00		43	6.0	34	1.1	21	-6.0	42	5	VRB		24.00				FM-15		29.78
29	0747	7	BKN:07 180	10.00		52	11.0	41	4.8	27	-3.0	38	21	180		24.00				FM-15		29.77
29	0847	7	BKN:07 180	10.00		55	13.0	42	5.7	28	-2.0	36	21	170	29	24.00				FM-15		29.77
29	0947	7	BKN:07 180	10.00		55	13.0	42	5.6	27	-3.0	33	21	170	30	23.99				FM-15		29.76
29	1047	7	BKN:07 180	10.00		63	17.0	46	7.6	27	-3.0	25	26	170	37	23.96				FM-15		29.73
29	1215	7	BKN:07 180	10.00		66	19.0	47	8.3	27	-3.0	22	26	170	37	23.93				FM-15		29.69
29	1248	7	BKN:07 180	7.00		66	19.0	45	7.0	19	-7.0	17	33	180	45	23.90				FM-15		29.66
29	1349	4		3.00		68	20.0			19	-7.0	16	33	180	46					FM-15		29.63
29	1353	7	SCT:04 11 BKN:07 18	3.00		68	20.0	45	7.5	19	-7.0	16	33	180	46	23.88				FM-15		29.63
29	1447	7	SCT:04 28 BKN:07 35	5.00	HZ ||HZ	66	19.0	45	7.0	19	-7.0	17	33	200	41	23.87				FM-15		29.62
29	1547	7	SCT:04 29 SCT:04 110 BKN:07 180	5.00	HZ ||HZ	66	19.0	45	7.0	19	-7.0	17	31	210	43	23.88				FM-15		29.63
29	1647	7	SCT:04 110 BKN:07 180	10.00		64	18.0	44	6.8	21	-6.0	19	28	230	39	23.90				FM-15		29.65
29	1748	7	BKN:07 110	10.00		63	17.0	44	6.6	21	-6.0	20	29	240	37	23.91				FM-15		29.67
29	1849	7	BKN:07 110	10.00		57	14.0	40	4.5	18	-8.0	21	22	260	29	23.95				FM-15		29.71
29	1949	7	BKN:07 100	10.00		46	8.0	38	3.1	27	-3.0	46	8	330	*	24.01				FM-15		29.79
29	2049	7	BKN:07 100	10.00		45	7.0	36	2.4	25	-4.0	46	15	310		24.03				FM-15		29.81
29	2115	7	SCT:04 70 OVC:08 90	10.00		44	6.5	35	1.9	24	-4.2	47	11	320		24.04				FM-15		29.82
29	2135	7	SCT:04 70 OVC:08 100	10.00		43	6.1	35	1.6	24	-4.3	48	8	350	16	24.05				FM-15		29.83
29	2155	7	OVC:08 90	10.00		41	5.2	34	1.0	24	-4.2	51	5	050		24.05				FM-15		29.83
29	2215	7	OVC:08 90	10.00		41	5.0	34	1.0	24	-4.3	51	5	360		24.05				FM-15		29.83
29	2235	7	OVC:08 90	10.00		42	5.3	34	1.3	24	-4.6	49	5	030		24.06				FM-15		29.84
29	2255	7	BKN:07 65 OVC:08 90	10.00		42	5.5	34	1.2	23	-4.8	48	8	030		24.06				FM-15		29.84
29	2315	7	SCT:04 65 SCT:04 80 OVC:08 90	10.00		42	5.3	34	1.2	23	-5.0	48	5	050		24.06				FM-15		29.85

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Current Location: Elev: 5310 ft. Lat: 35.0419° N Lon: -106.6155° W
Station: **ALBUQUERQUE INTERNATIONAL AIRPORT, NM US 23050**

Local Climatological Data
Hourly Observations
March 2016

Generated on 11/14/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Date	Time (LST)	Station Type	Sky Conditions	Visibility	Weather Type (see documentation)	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Hum %	Wind Speed (MPH)	Wind Dir (Deg)	Wind Gusts (MPH)	Station Press (inHg)	Press. Tend	Net 3-Hr Change (inHg)	Sea Level Press. (inHg)	Report Type	Precip Total (in)	Altimeter Setting (inHg)
					AU | AW | MW	(F)	(C)	(F)	(C)	(F)	(C)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
29	0052	7	BKN:07 230	10.00		52	11.1	38	3.4	19	-7.2	27	10	150		24.50			29.62	FM-15	0.00	29.80
29	0152	7	BKN:07 200 BKN:07 250	10.00		53	11.7	39	3.7	19	-7.2	26	11	160		24.49	6	+0.02	29.61	FM-15	0.00	29.79
29	0200	4		9.94		53	11.7	39	3.7	19	-7.2	26	11	160		24.50	6	+0.02	29.61	FM-12		
29	0252	7	OVC:08 210	10.00		52	11.1	38	3.6	20	-6.7	28	11	160		24.48			29.60	FM-15	0.00	29.78
29	0352	7	OVC:08 210	10.00		52	11.1	39	3.7	21	-6.1	30	11	170		24.46			29.58	FM-15	0.00	29.76
29	0452	7	OVC:08 230	10.00		51	10.6	39	3.8	23	-5.0	33	11	170		24.47	5	+0.02	29.59	FM-15	0.00	29.77
29	0500	4		9.94		51	10.6	39	3.8	23	-5.0	33	11	170		24.48	5	+0.02	29.59	FM-12		
29	0552	7	SCT:04 230	10.00		51	10.6	39	4.1	25	-3.9	36	14	170		24.46			29.59	FM-15	0.00	29.76
29	0652	7	SCT:04 230	10.00		52	11.1	41	4.8	27	-2.8	38	18	170		24.47			29.60	FM-15	0.00	29.77
29	0752	7	SCT:04 230	10.00		55	12.8	42	5.8	28	-2.2	35	21	180	32	24.47	3	-0.00	29.61	FM-15	0.00	29.77
29	0800	4		9.94		55	12.8	42	5.8	28	-2.2	35	21	180		24.48	3	-0.00	29.61	FM-12		
29	0852	7	BKN:07 230	10.00		58	14.4	43	6.4	27	-2.8	31	28	180	38	24.46			29.61	FM-15	0.00	29.76
29	0952	7	FEW:02 100 BKN:07 250	10.00		61	16.1	44	6.8	25	-3.9	25	23	190	31	24.45			29.59	FM-15	0.00	29.75
29	1052	7	FEW:02 100 BKN:07 210	10.00		64	17.8	44	6.9	21	-6.1	19	31	180	40	24.43	8	+0.04	29.56	FM-15	0.00	29.72
29	1100	4		9.94		64	17.8	44	6.9	21	-6.1	19	31	180		24.44	8	+0.04	29.56	FM-12		
29	1152	7	FEW:02 100 SCT:04 230 OVC:08 300	10.00		67	19.4	45	7.3	19	-7.2	16	24	190	38	24.39			29.50	FM-15	0.00	29.68
29	1252	7	FEW:02 120 SCT:04 210 OVC:08 300	10.00		69	20.6	45	7.4	16	-8.9	13	24	190	38	24.36			29.45	FM-15	0.00	29.64
29	1335	7	FEW:02 120 SCT:04 210 OVC:08 300	3.00	DU ||DU	70	21.1	46	7.5	15	-9.4	12	36	210	49	24.34				FM-16		29.62
29	1352	7	FEW:02 120 SCT:04 210 OVC:08 300	6.00	DU ||DU	69	20.6	45	7.4	16	-8.9	13	34	220	48	24.34	6	+0.09	29.43	FM-15	0.00	29.62
29	1400	4		5.59		69	20.6	45	7.4	16	-8.9	13	34	220		24.35	6	+0.09	29.43	FM-12		
29	1452	7	SCT:04 140 SCT:04 170 OVC:08 300	10.00	VCDU ||	69	20.6	46	7.6	17	-8.3	14	33	220	44	24.34			29.42	FM-15	0.00	29.61
29	1552	7	FEW:02 70 SCT:04 150 OVC:08 220	10.00	VCDU ||	67	19.4	45	7.3	19	-7.2	16	29	220	47	24.34			29.44	FM-15	0.00	29.62
29	1652	7	SCT:04 80 BKN:07 150 OVC:08 200	10.00	VCDU ||	66	18.9	44	6.9	18	-7.8	16	29	220	40	24.35	3	-0.01	29.45	FM-15	0.00	29.63
29	1700	4	74	9.94		66	18.9	44	6.9	18	-7.8	16	29	220		24.36	3	-0.01	29.45	FM-12		
29	1752	7	SCT:04 110 BKN:07 150 BKN:07 250	10.00	VCDU ||	65	18.3	44	6.8	19	-7.2	17	18	210	33	24.37			29.48	FM-15	0.00	29.65
29	1852	7	BKN:07 100 BKN:07 180 BKN:07 250	10.00		63	17.2	43	6.3	19	-7.2	18	18	220	28	24.40			29.53	FM-15	0.00	29.69
29	1914	7	BKN:07 100 BKN:07 200	10.00		55	12.8	42	5.4	26	-3.3	33	21	350	33	24.44				FM-16		29.73
29	1952	7	BKN:07 100 BKN:07 200	10.00		51	10.6	40	4.3	26	-3.3	38	17	360	26	24.48	3	-0.13	29.65	FM-15	0.00	29.78
29	2000	4		9.94		51	10.6	40	4.3	26	-3.3	38	17	360		24.49	3	-0.13	29.65	FM-12		

The storm events database also shows that the event was not isolated to Bernalillo County and the winds ranged from central New Mexico into Northern New Mexico.

Storm Events Database

Prev / Search Results / Next

Event Details:

Event	**High Wind**
Magnitude	**52 kts.**
State	**NEW MEXICO**
County/Area	**SANDIA/MANZANO MOUNTAINS**
WFO	**ABQ**
Report Source	**Public**
NCEI Data Source	**CSV**
Begin Date	**2016-03-29 11:00:00.0 MST-7**
End Date	**2016-03-29 12:00:00.0 MST-7**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**The second high wind event in less than a week impacted New Mexico as yet another strong upper level trough and deep surface low moved over the state. The strongest winds impacted western New Mexico and around the central mountain chain. Peak wind gusts averaged 55 to 65 mph. Gusty winds around the Albuquerque west side caused more problems with tumbleweeds. Blowing dust was also reported to have lowered visibility below 5 miles at times across portions of the state. Fortunately no significant fires or damage resulted from this event.**
Event Narrative	**A weather station in the upper reaches of Juan Tabo Canyon reported sustained winds of 46 mph with a peak gust of 60 mph during the early afternoon.**

Storm Events Database

Event Details:

Event	**High Wind**
Magnitude	**57 kts.**
State	**NEW MEXICO**
County/Area	**SOUTHWEST MOUNTAINS**
WFO	**ABQ**
Report Source	**Public**
NCEI Data Source	**CSV**
Begin Date	**2016-03-29 09:29:00.0 MST-7**
End Date	**2016-03-29 17:00:00.0 MST-7**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**The second high wind event in less than a week impacted New Mexico as yet another strong upper level trough and deep surface low moved over the state. The strongest winds impacted western New Mexico and around the central mountain chain. Peak wind gusts averaged 55 to 65 mph. Gusty winds around the Albuquerque west side caused more problems with tumbleweeds. Blowing dust was also reported to have lowered visibility below 5 miles at times across portions of the state. Fortunately no significant fires or damage resulted from this event.**
Event Narrative	**Sources around Red Hill reported numerous peak wind gusts of 58 mph while the Magdalena Ridge Observatory peaked out at 66 mph.**

The following Forecast was sent at 10:21AM on 03/29/2016

ALBUQUERQUE FORECAST

A broad low pressure system covers most of the Western U.S. this morning. Several disturbances are rotating around the main low like spokes on a wheel. As one of those spokes passes through the Four Corners today, strong winds will develop over Albuquerque. The National Weather Service has a Wind Advisory in effect for Albuquerque from 11 AM to 8 PM. Contractors should be prepared to shut down operations quickly today.

The cold front will pass through this evening and then cooler temperatures are in store for the remainder of the work week. There is a slight chance of showers as the front passes through this evening. More likely though is that any precipitation will be limited to higher elevations.

Today: South to southwest winds 25-35 mph with gusts to 50 mph. Partly cloudy. Highs 67-71.

Tonight: Partly cloudy with a slight chance of showers. Southwest winds 25-35 mph with gusts to 45 mph becoming west and decreasing to 10 to 20 mph. Lows 32-40.

Wednesday: Partly cloudy. Breezy west wind 15-25 mph. Highs 53-57.

This forecast is being sent as a public service to area contractors and businesses that must comply with Albuquerque-Bernalillo County's fugitive dust regulation. Please call David Duran at 768-1957 or Tony Romero at 228-6989 for assistance.

A contractor shutdown notification was also issued at 12:23PM on 3/29/2016:

Subject: notice to area contractors regarding fugitive dust regulation
Issued: 03/29/16, 12:15 PM
Expires: 03/29/16, 8:00 PM

From: Albuquerque Environmental Health Department, Air Quality Program

This notice is being sent as a public service to area contractors and businesses that must comply with Albuquerque-Bernalillo County's fugitive dust regulation. Please call David Duran, (505)768-1957 (drduran@cabq.gov) or Tony Romero, (505)228-6989 for assistance.

The Air Quality Program has documented a high wind event today. In accordance with 20.11.20.16 NMAC which states during a high wind event all persons who own or operate a fugitive dust source where active operations have occurred or are occuring must use reasonably available control measures found in Paragraph 5 of subsection C of 20.11.20.16 NMAC. Paragraph 5 states that it is MANDATORY during a high wind event that all active operations that are capable of producing fugitive dust be stopped. Active operations are defined as earth moving, discing, trenching, blading, scraping, clearing, detonation and demolition activities, movement of any motorized vehicles on any unpaved roadway or surface.

At 1:13PM on 03/29/2016, the AQP proactively issued a Health Alert stating the following:

FOR IMMEDIATE RELEASE
CONTACT: Jeff Stonesifer (505) 250-2689

March 29, 2016

CITY OF ALBUQUERQUE ENVIRONMENTAL HEALTH DEPARTMENT ISSUES HEALTH ALERT DUE TO BLOWING DUST

Issue time: Tuesday, March 29, 2016 at 1:10 PM

The City of Albuquerque Environmental Health Department's Air Quality Program is issuing a health alert for those with respiratory conditions. High winds may cause elevated levels of particulate matter. This alert is in effect for the following period:

Tuesday, March 29, 2016, at 1:10 PM

To

Tuesday, March 29, 2016 at 8:00 PM

Blowing dust contributes to particulate pollution. People who are sensitive to blowing dust, such as those with asthma, chronic bronchitis and other respiratory and heart diseases, are encouraged to limit outdoor activity. Children and older adults may also be affected by particulate pollution. Schools and senior citizen facilities may want to provide indoor activities to minimize exposure to elevated outdoor particulate levels.

During blowing dust events, the following actions are recommended, especially for individuals sensitive to particulate pollution:

- Keep windows and doors closed. If needed for comfort, use air conditioners or heating systems on recycle/recirculation mode.
- Limit your time spent outdoors.
- If symptoms of heart or lung disease occur, (including shortness of breath, chest tightness, chest pain, palpitations or unusual fatigue) contact your health care provider.
- Individuals with heart or lung disease should follow their health management plan from their health care provider. Asthmatic individuals should follow a prescribed asthma management plan.
- Avoid outdoor exercise.

###

Actions Taken by the City of Albuquerque

In 2004 the Albuquerque/Bernalillo County Air Quality Control Board put into place the Albuquerque/Bernalillo County Air Quality Regulation (AQR) and developed reasonably available control measures (RACM) for those businesses involved in active anthropogenic surface disturbance activities within Bernalillo County. Development of the regulation involved stakeholder input and public comment. Protection of the public health is the foundation upon which this document is based. See appendix A for AQR 20.11.20.

In conjunction with AQR 20.11.20 the AQP notifies businesses and contractors of potential high winds greater than 20 miles per hour. A notice reminds businesses and contractors that they are required to follow their individual permits and the requirements of AQR 20.11.20.

With the implementation of AQR 20.11.20 the AQP has an active fugitive dust program that works with businesses and contractors in permit implementation and enforcement activities. During any high wind event enforcement staff are mobilized to contact and evaluate surface disturbance activities and implement enforcement of permit and AQR 20.11.20 requirements.

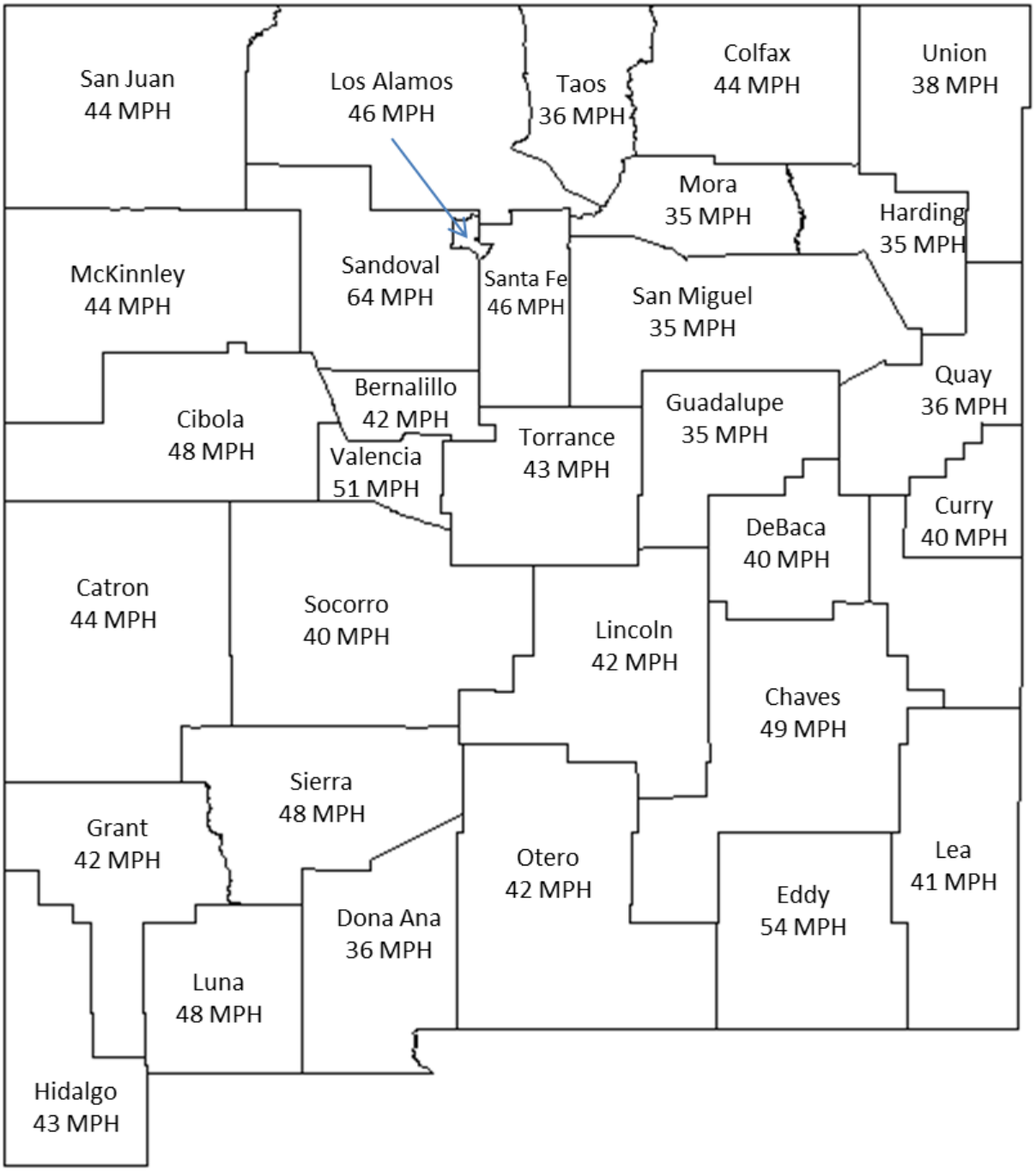
The City of Albuquerque also has a 311 Citizen Contact Center (CCC) where citizens can call in and submit a complaint or service request. The 311 CCC receives numerous complaints and requests for inspector action concerning blowing fugitive dust during elevated winds.

On March 29, 2016 the City's 311 CCC received zero (0) dust complaints concerning the March 29, 2016 event.

High winds were experienced across the state. The two maps below show the counties and those counties peak wind speed reported through NOAA's Storm Events Database.

Across the state of New Mexico 32 of 33 counties (96%) were reported as having high winds, reduced visibility or provided other wind related issues.

New Mexico Counties impacted by the 3/29/2016 high winds and the associated wind speeds.



Site Evaluation

2ZV (35-001-0029)
Site 2ZV was established to monitor PM10 in a potential sensitive area of the County. The site also monitors for PM2.5, Carbon Monoxide and Ozone. For PM10 the site is listed in the AQS database as meeting SLAMS siting criteria starting January 1, 2011.

The site features include to the immediate north a mixture of agricultural, small commercial and residential structures. To the far north lies the metro area of the City of Albuquerque.

To the east lies several commercial and residential properties, most of the commercial properties comprise junk yards and other automotive recycling facilities. Farther to the east lies the Tijeras Arroyo that can often channel easterly winds from the Monzano Mountains into the Rio Grande valley. Also to the east are Kirtland Air Force Base and Albuquerque Sunport airport.

The South is comprised mostly of mixed residential and agricultural land. To the West lies the Rio Grande (River), immediately to the west is also the waste water treatment facility serving the metro City of Albuquerque and much of Bernalillo County.

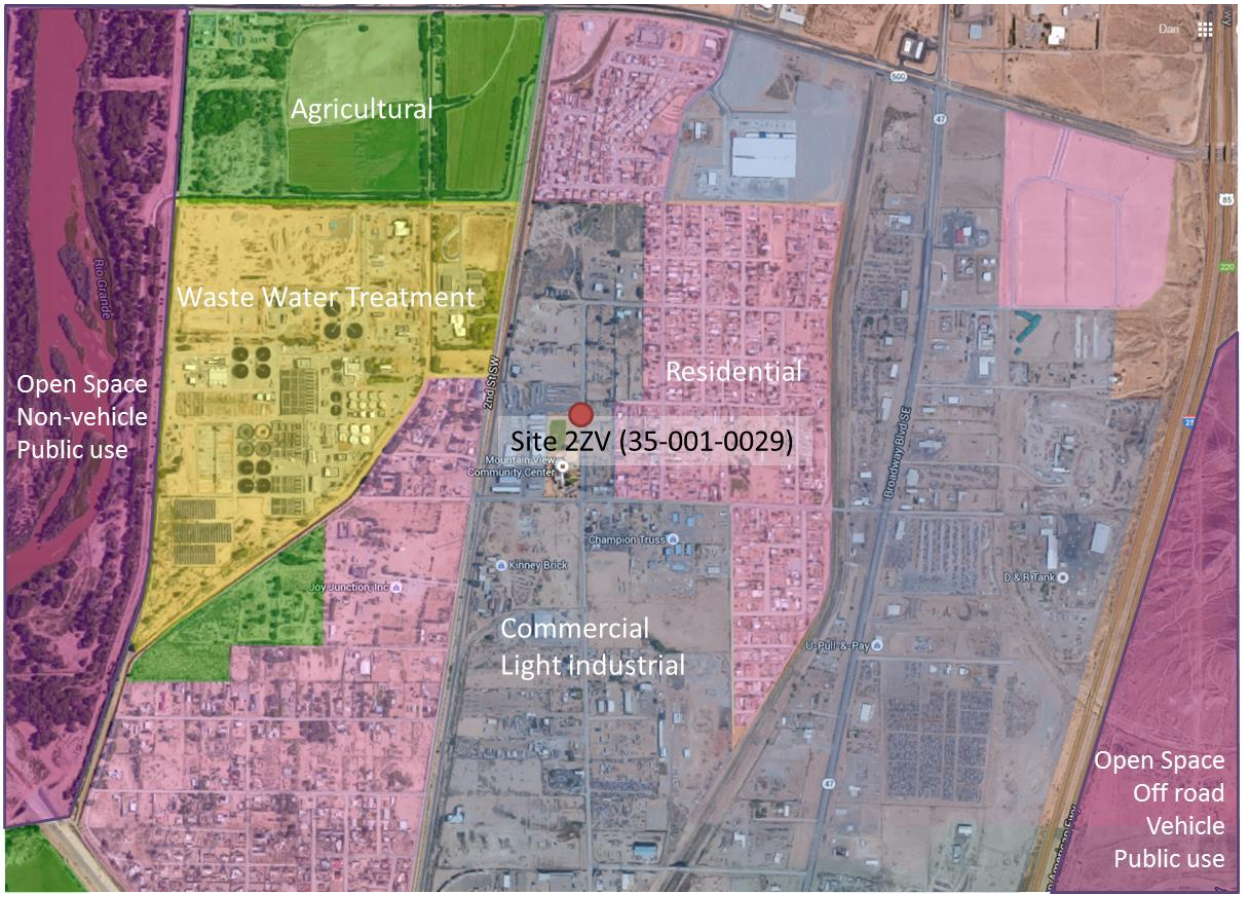
Prolonged drought conditions have also increased the prevalence of windborne dust in the area. 2011 saw only 4.72 inches of rain and 2012 saw only 5.46 inches of rain. The average annual rainfall for the Albuquerque area is 9.45 of rain (30 year normal). 2011 will go down as tied for the 9th warmest year on record since 1893 and was the 7th driest on record since 1892. 2012

was the 16th driest year on record, going back to 1892 and was the warmest year on record since 1892. Abnormally dry conditions continued into 2016. From 2011 the driest spells occurred from 2013-2015 (https://weatherspark.com/history/29561/2014/Albuquerque-New-Mexico-United-States).

Anthropogenic Sources

2ZV or South Valley anthropogenic sources of dust include small residential properties and small commercial properties. The residential properties typically provide no ground cover and are comprised of exposed dirt lots with exposed dirt yards and exposed dirt driveways. The commercial properties are similar to the residential properties with no ground cover and consist or small lots of exposed dirt. Many of the small commercial facilities include a residence on the property and often are a combination of private residence and home based business including junk yards, semi-truck parking yards, pallet recycling, and fire wood storage.

Site 2ZV is an area where the dominant source of dust is anthropogenic. The source is predominately due to residential and small commercial properties with little to no vegetative cover and with the small commercial properties having no soil stabilization such as asphalt or cement paving. Other areas that also impact the area are due to recreational vehicle usage to the east and some active agricultural use to the northwest, west, southwest.



Map of 2ZV and land type use designations.

High Wind Observations

High Winds were observed for the day of March 29, 2016 at both sites. The site operates one MetOne BAM1020 continuous monitor for PM10.

Equipment Located at each Site

Site	POC 1
South Valley (35-001-0029)	MetOne BAM1020

The 24 hour high value for the site is listed below:

Date	Site	POC	Value	
3/29/16	35-001-0029	3	187	$\mu g/m^3$

The event occurred on Tuesday March 29th at approximately 09:00AM and ended approximately 18:59. The event lasted approximately 10 hours and had a significant impact on the South Valley station.

Peak winds at the site are as follows:

Site	Max 1 minute wind	Max 5 minute wind	Max hourly wind
South Valley (35-001-0029)	34.0 (15:17)	24 (15:19)	30.3 (15:00)

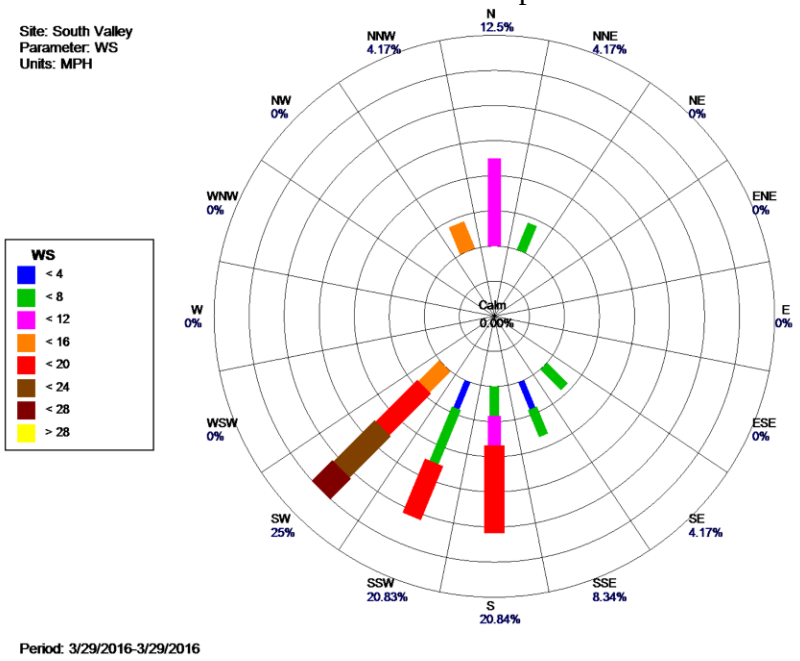
Correlation Results:

Site	WS/PM10 24-Hour Correlation Value
South Valley (35-001-0029)	73.4

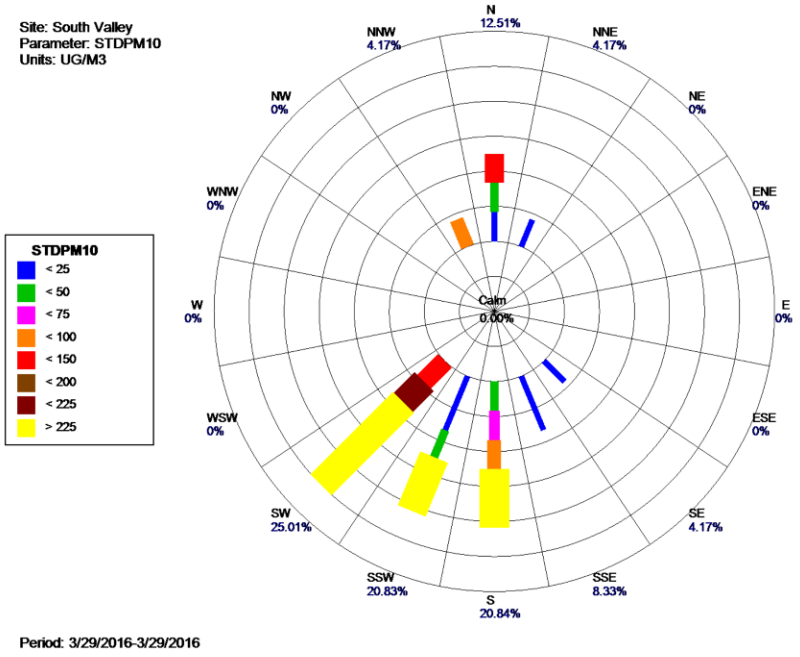
There is a good correlation between the wind speed data and PM10 data.

The data presented here is PM10 standardized temperature and pressure (STP).

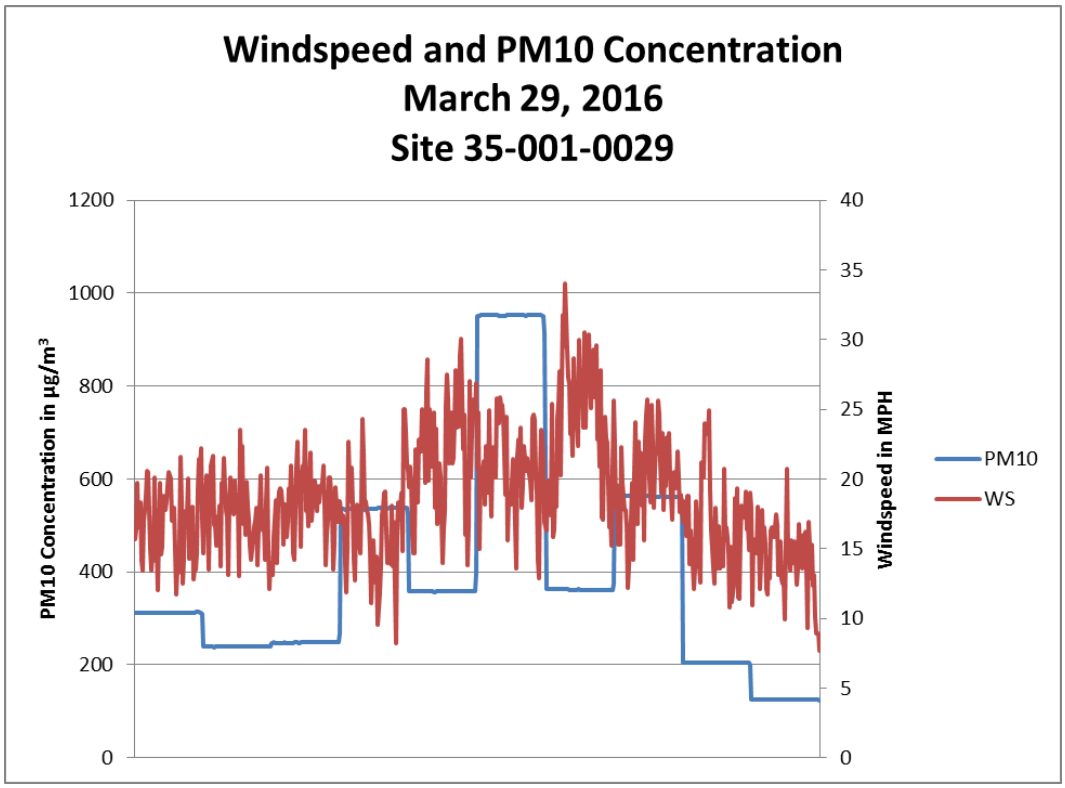
2ZV (35-001-0029) Wind Rose Charts:
Wind Rose of Wind Direction and Wind Speed –

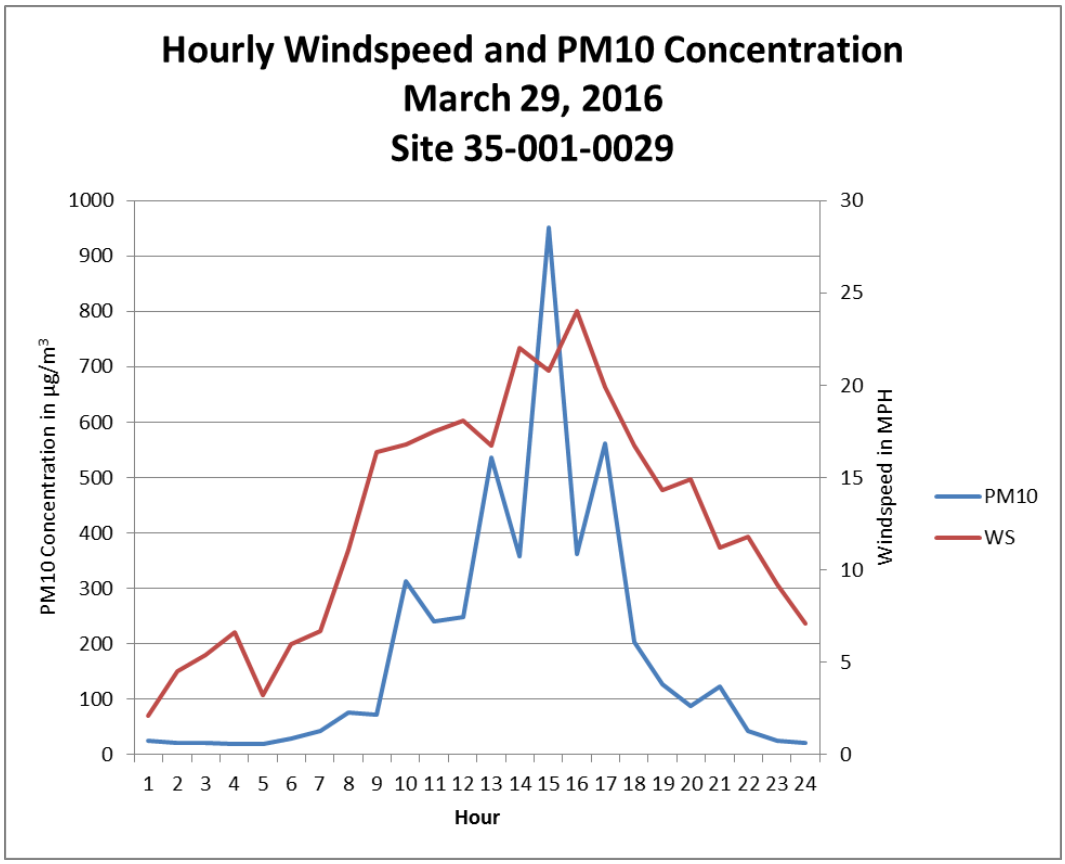


Wind Rose of Wind Direction and PM10 Concentration –



Site specific graph showing PM10 increasing as wind speed increases for site 2ZV (35-001-0029).





Enforcement Activities

The Fugitive Dust Program is staffed by three full-time enforcement personnel. In addition to the Fugitive Dust Program staff the AQP also has four additional enforcement personnel available for high wind event enforcement activities.

Enforcement personnel were available to address fugitive dust concerns during the March 29, 2016 wind event.

Due to the severity of the event dust abatement activities and reasonably available control measures (RACM) were overwhelmed. As reported by the NWS, on the day of the event wind gusts were recorded at over 50 mph at the NWS site KABQ (Albuquerque International Airport).

Enforcement personnel were sent to cover their respective areas and verify that during the event that the businesses or contractors were following the requirements of their fugitive dust permit and the requirements of AQR 20.11.20. As required by AQR 20.11.20 that it is "MANDATORY during a high wind event that all active operations that are capable of producing fugitive dust be stopped."

Conclusion

The AQP has presented data that a weather event produced very high winds on March 29, 2016. The high winds overwhelmed RACM and efforts to reduce air borne particulate matter around the South Valley and Jefferson Air Monitoring Stations. There is a clear and causal relationship of the exceedance values and the high winds. Due to the March 29, 2016 exceptional event the AQP requests EPA concurrence of the appropriately flagged data.

- Documentation of the event shows a clear causal relationship between the measured exceedance or high value and the natural wind event. The wind event was sufficient to overwhelm industry standard RACM in use at the time of the event.
- Through local media and email the public was informed of the high wind event and the potential health issues related to dust.
- AQP activated control measure implementation for surface disturbance operations, and the AQP enforcement personnel enforced fugitive dust permits and the requirements of AQR 20.11.20.
- This high wind event analysis was made available for public review and comment.
- This high wind event analysis was submitted to the U.S. EPA Region 6 for review and concurrence.

Answers to the EER Technical Questions:

- A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation [40 CFR §50.14(c)(3)(iv)(B)]

There are a few factors that make this event not reasonably controllable or preventable:

A. Winds were in excess of 25 mph. In fact wind speeds reached gusts of over 50 mph and sustained hourly average winds in excess of 25 mph as monitored at the site.
B. The City of Albuquerque has in place controls requiring developers to reduce the potential amount of dust leaving their properties. Those requirements were in place during this event and City personnel reminded developers of their permit requirements. Even with reasonably available control measures requirements in place, as noted by Appendix A - Part 20 Fugitive Dust Control, those controls were overwhelmed by the severity and length of this wind event.

- Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the clear causal relationship requirement [40 CFR §50.14(c)(3)(iv)(C)]

A. Calculated correlations between the wind speed and PM10 concentrations show that there is a clear correlation between the two with a calculated correlation value of 70.1 at South Valley and 76.3 at Jefferson. If the winds had not been blowing in excess of 25 mph for a sustained period of time (the entire event last approximately 10 hours) then the particulate matter would not have been lofted and sustained resulting in an excess of particulate matter in the air.

B. Wind Rose charts also show that the severity of the winds shows clear causal relationship between the wind speed, wind direction and the particulate matter during the event.
C. Historical data evaluation estimates the potential for any given day to exceed the standard and either of the two sites as 0.5% or less. The fact that high winds over 25mph do occur every year, but a very small percentage of these result in a PM10 value greater than 85% of the NAAQS.
D. Long term drought conditions have added to the potential for higher PM10 concentrations.

Data Analysis of days when wind speeds approached or exceeded 25 mph

This was not a simple event where the winds were in excess of 25 mph. This was a long term significant event where wind gust exceeded 50 mph with sustained winds of over 25 mph that lasted 10 hours.

Other issues that exacerbated the conditions at the sites include a prolonged drought which retarded ground cover vegetation growth, reduced native plant vegetation, and increased the friability of the dirt of all areas around the sites. Wind gust were recorded in excess of 50 mph by and National Weather Service and sustained winds of over 25 mph hour were recorded over the time of the event.

Hourly High Wind observations with NOAA wind speed data compared to South Valley site wind speed and PM10 data.

Date	Hourly 2ZV Max WS, mph	NOAA Reported Max Wind speed/Gust, mph	2ZV 24 hour PM10 concentration	Correlation r value
2/19/2011	24.1	77	77	0.81
3/7/2011	21.5	59	18	0.68
4/3/2011	24.4	60	50	0.72
4/9/2011	25.1	51	62	0.83
4/19/2011	13.2	72	16	0.37
4/26/2011	25.3	59	39	0.70
4/29/2011	21.9	40	31	0.65
5/1/2011	22.1	62	37	0.82
6/19/2011	19.8	63	41	0.52
6/26/2011	14.4	78	21	0.42
8/29/2011	11.8	63	24	0.67
11/5/2011	17.3	62	41	0.35
12/1/2011	33.2	87	power failure	0.80
12/22/2011	20.7	74	21	-0.17
2/23/2012	19.3	59	48	0.74
3/1/2012	20.4	46	71	0.80
3/8/2012	27.3	67	205*	0.68
3/7/2012	22.3	67	116	0.84
3/18/2012	31.8	66	279*	0.88
4/14/2012	25.9	60	99	0.68
4/26/2012	26.2	66	227*	0.89
5/11/2012	23.2	59	29	0.20
5/18/2012	15.3	64	29	0.39
5/20/2012	17.7	60	49	0.31
5/26/2012	26.7	46	146	0.84
8/11/2012	10.3	59	31	-0.61
9/17/2012	21.6	70	51	0.56
11/10/2012	15.4	43	69	0.09
12/9/2012	19.4	49	24	0.69
12/19/2012	22.1	57	45	0.67
1/11/2013	18.2	40	62	-0.18
3/23/2013	25.1	60	113	0.78
4/8/2013	22.4	58	133	0.64
4/17/2013	19.6	40-44	95	0.56
5/17/2013	17	59	77	0.80
6/10/2013	10.8	56	NA	-0.19
6/18/2013	22.2	59	47	0.58
6/20/2013	9.4	64	53	0.29
6/30/2013	18.7	57	27	0.43
7/14/2013	22.2	57	13	0.55
7/19/2013	16	59	17	0.20
7/26/2013	20.2	70	18	0.29
10/10/2013	26.3	59	58	0.68
12/3/2013	9.9	63	45	-0.18

* = data flagged for exceptional event, high winds

days with 1 hour windspeed >25mph

Date	Hourly 2ZV Max WS, mph	NOAA Reported Max Wind speed/Gust, mph	2ZV 24 hour PM10 concentration	Correlation r value
2/19/2014	NA	82	147	0.55
2/27/2014	NA	63	83	0.69
3/17/2014	NA	74	55	0.59
3/26/2014	NA	63	55	0.51
4/26/2014	26	60-65	64	0.78
4/27/2014	20.7	42	48	0.69
4/28/2014	21.5	60	32	0.60
5/7/2014	23.1	58	23	0.76
5/11/2014	23.2	61	37	0.75
5/23/2014	15.2	59	15	0.03
6/7/2014	21.5	59	92	0.46
6/30/2014	13.8	59	73	0.01
7/13/2014	10.9	57	21	-0.28
7/22/2014	15.7	56	33	0.62
9/15/2014	13.2	64	24	0.43
9/29/2014	15	59	30	0.36
10/12/2014	20.5	63	41	0.72
12/22/2014	17.9	62	57	-0.14
5/18/2015	22.3	58	77	0.42
5/24/2015	12.2	40	15	0.28
8/16/2015	10.8	55	14	0.22
9/15/2015	9.8	55	39	-0.21
9/22/2015	8.6	55	13	0.63
10/15/2015	26.5	66	64	0.90
3/12/2016	16.7	58	42	0.10
3/22/2016	22.3	61	225*	0.76
3/29/2016	24	60	187*	0.73
4/25/2016	22.9	55	equipment error	0.50
5/1/2016	21.8	67	8	0.60
5/6/2016	23	58	205*	0.84
6/6/2016	17.7	69	power failure	0.33
9/10/2016	21.5	60	24	0.73
11/17/2016	22.9	94	144	0.83
12/16/2016	16.5	64	104	0.50

* = data flagged for exceptional event, high winds

days with 1 hour windspeed >25mph

There are several examples of where the wind speed was near or even exceeded 25 mph without an exceedance or near exceedance of the PM10 NAAQS. In total there are more instances of where the winds were near or above 25 mph without a negative impact on the PM10 values. Of all the data presented above there were no days where a one hour wind speed value over 20 mph created a situation where the PM10 value exceeding 85% (127.5 $\mu g/m^3$) of the NAAQS.

There is a greater chance that any daily value will be less than 85% of the PM10 NAAQS simply based on the number of overall high PM10 values noted across several years. The prevalence of high winds, where those winds approach or exceed 25 mph, constitute approximately 5 to 10 days per month during the months of March through June. The prevalence of the number of PM10 concentrations greater than 85% of the PM10 NAAQS is 1 to 2. This means that the potential for any value to exceed 85% of the PM10 NAAQS typically less than 40% of those days and results in even a smaller probability when the entire season is added to the factor. This is further supported when you consider the total number of days where the wind speed approaches 25 mph. The correlation r value provides additional support of the fact that the winds on specific days provided the underlying reason for the elevated dust when the wind speeds approached 25 mph. Correlation r values for most of the wind events have near perfect correlation values of $r \geq 0.80$. This shows a clear relationship that the elevated PM10 is directly related to the wind speed, in most of these situations the PM10 value was not greater than (>) 85% of the NAAQS. One occurrence where the r value is low was on 5/11/12 with an r=0.20, this low r value is a result of high winds occurring during a thunderstorm which kept the PM10 concentration low.

There are several instances during the presumed City's windy season where winds are elevated and do not result in an exceedance or a near exceedance of the PM10 NAAQS. The result of the 3/29/16 exceedance values at the South Valley and Jefferson sites are due to the high winds experience on that day. If it were true that if PM10 NAAQS exceedances occur on days when the wind speed was close to 25 MPH then the results should be several exceedances or near exceedances of the PM10 NAAQS every year. The elevated dust can also be associated to the anthropogenic sources of dust as well as the prolonged drought conditions which has reduced the native vegetation on those areas not recently disturbed by human activity. The fact that anthropogenic sources, small scale business activities and exposed residential properties do exist around the sites is not the primary reason of the 3/29/16 exceedance, the primary reason was the exceptionally high winds that impacted a large area of the state. If anthropogenic sources were the primary cause of the exceedance then both sites would experience significantly more exceedances or near exceedances of the PM10 NAAQS when wind speeds are near or above 25 mph. There is also the issue of Bernalillo County being surrounded by other State Counties where high winds were also observed. Since Bernalillo County is not an isolated location it can be expected that the windborne dust within Bernalillo County was impacted by sources outside of the County.

		Dates of reported high winds, NOAA National Climatic Data Center, Storm Events Database											
		Quarter 1			Quarter 2			Quarter 3			Quarter 4		
Year	# of High wind days reported by NOAA	January	February	March	April	May	June	July	August	September	October	November	December
2000	3							7/29/2000	8/8/2000	9/18/2000			
2001	2						6/19/2001	7/2/2001					
2002	1					5/21/2002							
2003	4							7/7/2003		9/9/2003		11/22/2003	12/15/2003
2004	3				4/3/2004		6/26/2004		8/29/2004				
2005	0												
2006	2						6/6/2006 6/26/2006						
2007	3		2/28/2007				6/6/2007						12/1/2007
2008	5			3/14/2008	4/10/2008	5/1/2008 5/22/2008					10/11/2008		
2009	3						6/6/2009	7/29/2009					12/8/2009
2010	9			3/26/2010	4/1/2010 4/29/2010	5/10/2010	6/19/2010 6/23/2010			9/3/2010	10/25/2010		12/15/2010
2011	14		2/19/2011	3/7/2011	4/3/2011 4/9/2011 4/19/11 4/26/2011 4/29/2011	5/1/2011	6/19/2011 6/26/2011		8/29/2011			11/5/2011	12/1/2011 12/22/2011
2012	15		2/23/2012	3/1/2012 3/8/2012 3/18/2012	4/14/2012 4/26/2012	5/11/2012 5/18/2012 5/23/2012 5/26/2012			8/11/2012	9/17/2012		11/10/2012	12/9/2012 12/19/2012
2013	14	1/11/2013		3/23/2013	4/8/2013 4/17/2013	5/17/2013	6/10/2013 6/18/2013 6/20/2013 6/30/2013	7/14/2013 7/19/2013 7/26/2013			10/10/2013		12/3/2013
2014	18		2/9/2014 2/19/2014 2/27/2014	3/17/2014 3/26/2014	4/26/2014 4/28/2014	5/7/2014 5/11/2014 5/23/2014	6/7/2014 6/30/2014	7/13/2014 7/22/2014		9/15/2014 9/29/2014	10/12/2014		12/22/2014
2015	6					5/18/2015 5/24/2015			8/16/2015	9/15/2015 9/22/2015	10/15/2015		
2016	9			3/12/16 3/22/16 3/29/16	4/25/2016	5/1/2016 5/6/2016	6/6/2016			9/10/2016		11/17/2016	12/16/2016
	# of high wind days by month	1	6	12	16	17	17	9	4	9	5	4	11
	Percentage of total high wind days by month	1%	5%	11%	14%	15%	15%	8%	4%	8%	5%	4%	10%
	number of high wind days by quarter	19			50			22			20		
		high winds due to Thunderstorms											
	RED Text	days PM10 >85% of NAAQS											

Quarterly Impact of High Winds

Based on the above table the average quarterly impact of high winds are as follows:

Quarter	1	2	3	4
Average number of high wind events from 2000-2016	0.94	2.58	1.35	1.05

Since 2010 and based on the data reported by NOAA's Storm Events Database there is a 17% chance that any given day with high winds will produce a value greater than (>) 85% of the NAAQS, when considering full calendar years there is only a 0.5% chance that any given day will be a value greater than (>) 85% of the NAAQS. Other interesting results from the NOAA data shows that from 2000-2009 there were 26 events producing high winds, of those 26 days 14

(53.8%) were related to thunderstorms. From 2010-2016 there were 85 high wind events with 14 (16.4%) of those days related to thunderstorms. As reported by NOAA, historical high winds have occurred in the Albuquerque Metro and Bernalillo County area starting in June and typically lasting through September. It has only been after 2010 that high wind activities have started in March and lasted through December. Since 2000 winds have occurred, and continue to occur primarily from June through December and account for more than 65% of all NOAA reported high winds over a 15 year period. Of those reported high wind days none exceed 85% of the PM10 NAAQS. Starting in 2011 NOAA has seen an increase of high wind activity starting in March and continuing through June. There were 76 days reported by NOAA from 2011 through 2016 which account for 14.4% where the PM10 values are greater than 85% of the PM10 NAAQS and only a 7% chance that the high winds will result in a value greater than the NAAQS. This does show that extremely high winds do not always cause very high PM10 values in Bernalillo County. Of all the days reported by NOAA as having very high winds only 14% of those days result in elevated PM10 values and over a 7 year period there is less than 3% chance of the days if you consider every day of every year.

What the data, from 2011 to 2016, have in common are drought conditions. This can also be seen in the increase of non-thunderstorm related high winds. Thunderstorms were consistent in June through September and resulted in most of the high wind activity from 2000-2009. From June 2010 through 2016 there were 14 high wind events related to thunderstorm activity resulting in 16.6% of the high winds as a result of thunderstorm activity.

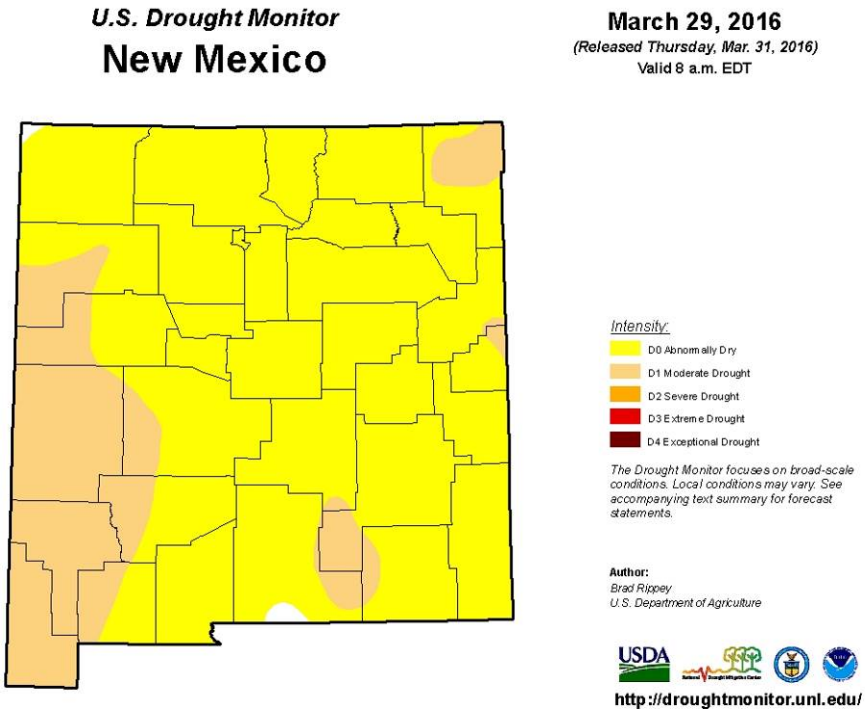
From 2011 through 2016 Bernalillo County, as a percentage of the population, was under the following levels of Abnormally Dry to Exceptional Drought Conditions:

Year	None	Abnormally Dry	Moderate Drought	Severe Drought	Extreme Drought	Exceptional Drought
2016	23.32	76.67	0	0	0	0
2015	1.53	65.67	32.79	0	0	0
2014	0	22.46	48.06	29.48	0	0
2013	0	0.11	23.14	21.49	27.01	28.25
2012	0	13.45	25.69	60.86	0	0
2011	0	17.31	3.85	17.98	56.13	4.73
2011-2016 Average	4.13	32.82	22.18	21.57	13.81	5.48

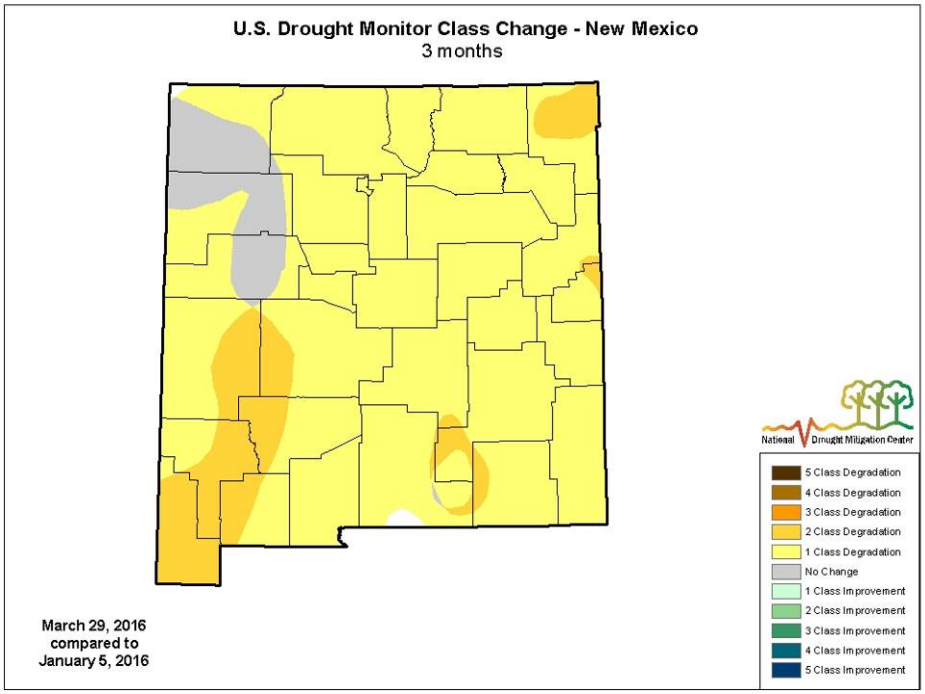
http://droughtmonitor.unl.edu/

From 2011-2016 63% of Bernalillo County population was under some level of drought condition.

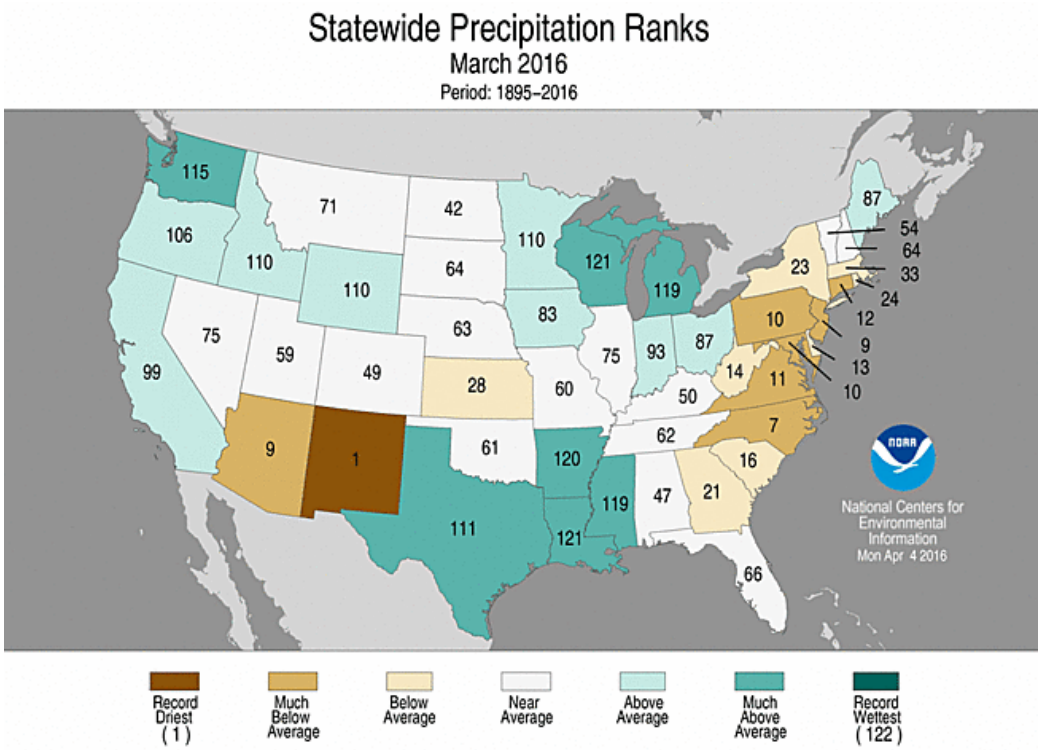
The week of 3/29/2016 also shows the continuation of abnormally dry conditions for New Mexico:



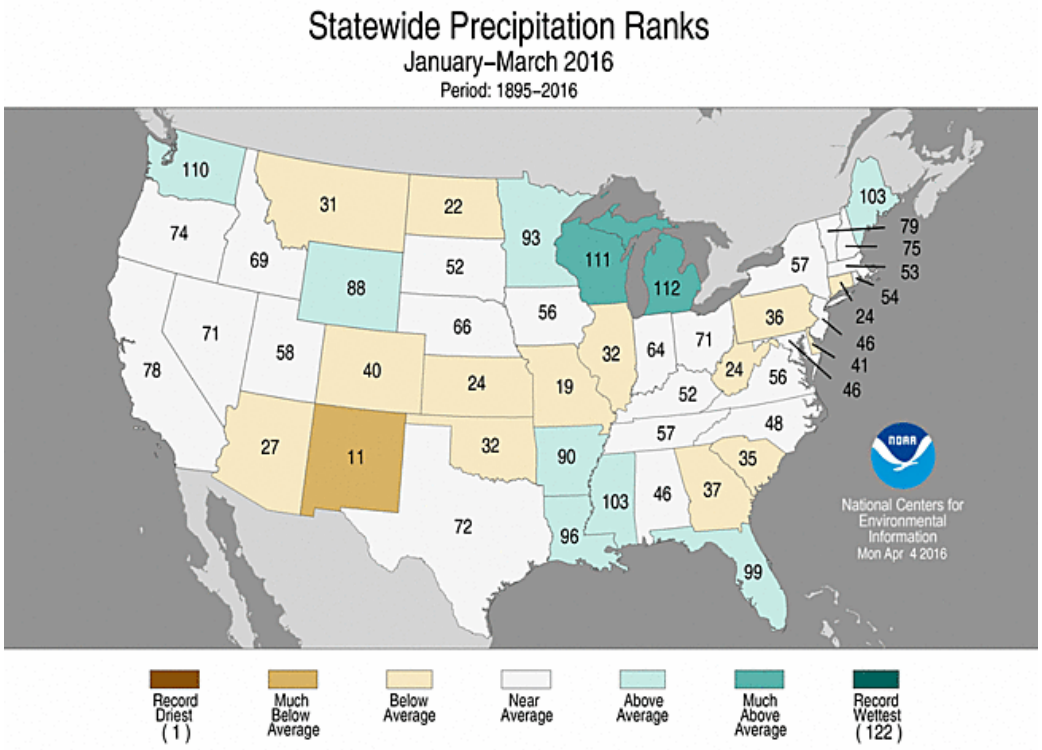
The short term reality is that by March 29, 2016 the drought conditions had diminished slightly by 1 class Designation over a three month period, including the 2016 winter months:



Based on the NOAA National Centers for Environmental Information March 2016 ranks as a record driest month

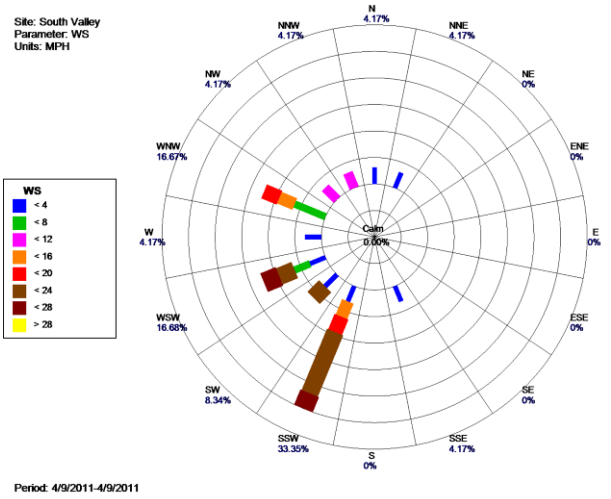


“New Mexico had its driest March on record with 0.06 inch of precipitation, only 8 percent of average.” (https://www.ncdc.noaa.gov/sotc/national/201603)

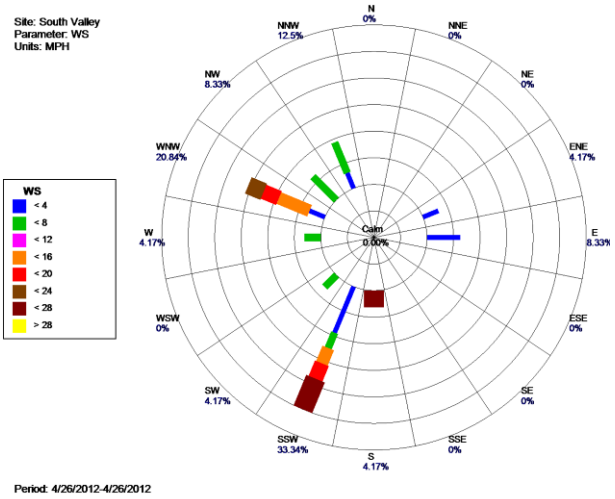


“New Mexico had its 11th driest year-to-date.”
(https://www.ncdc.noaa.gov/sotc/national/201603)

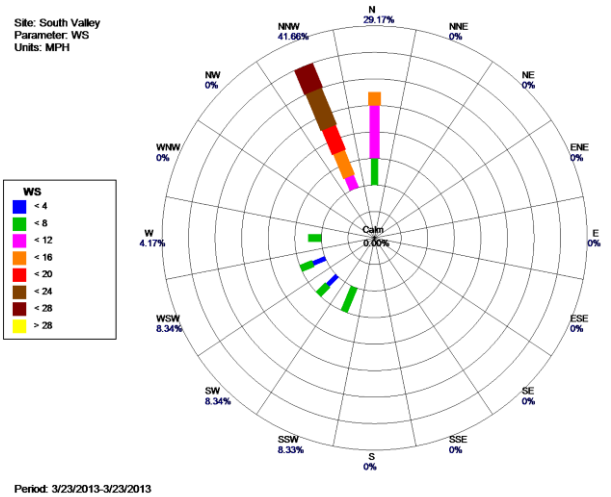
South Valley wind rose of days when wind speeds exceeded 25 mph



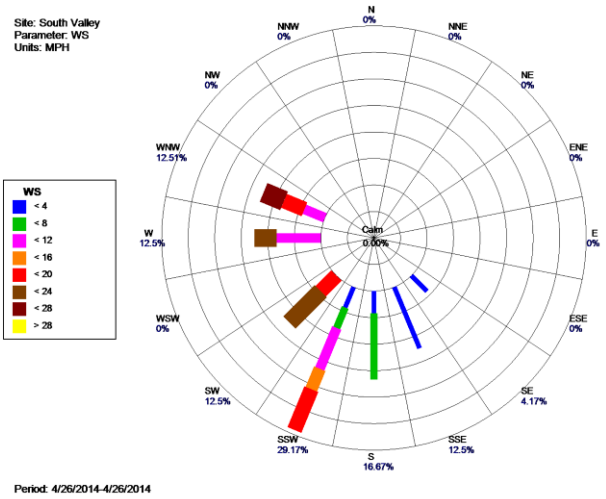
2ZV – 4/9/2011
Hourly Max WS, mph = 25.1
NOAA Reported Max WS, mph = 51
24 hour PM10 concentration, µg/m^3 = 62
Correlation r value = 0.83



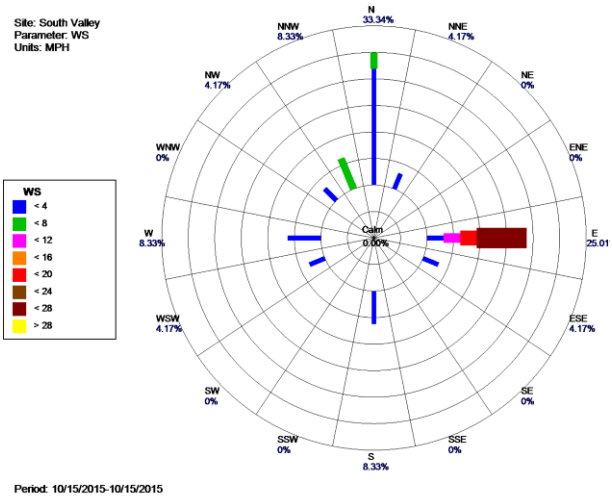
2ZV – 4/26/2012
Hourly Max WS, mph = 26.2
NOAA Reported Max WS, mph = 66
24 hour PM10 concentration, µg/m^3 = 227
Correlation r value = 0.89



2ZV – 3/23/2013
Hourly Max WS, mph = 25.1
NOAA Reported Max WS, mph = 60
24 hour PM10 concentration, µg/m^3 = 113
Correlation r value = 0.78



2ZV – 4/26/2014
Hourly Max WS, mph = 26.0
NOAA Reported Max WS, mph = 65
24 hour PM10 concentration, µg/m^3 = 64
Correlation r value = 0.78



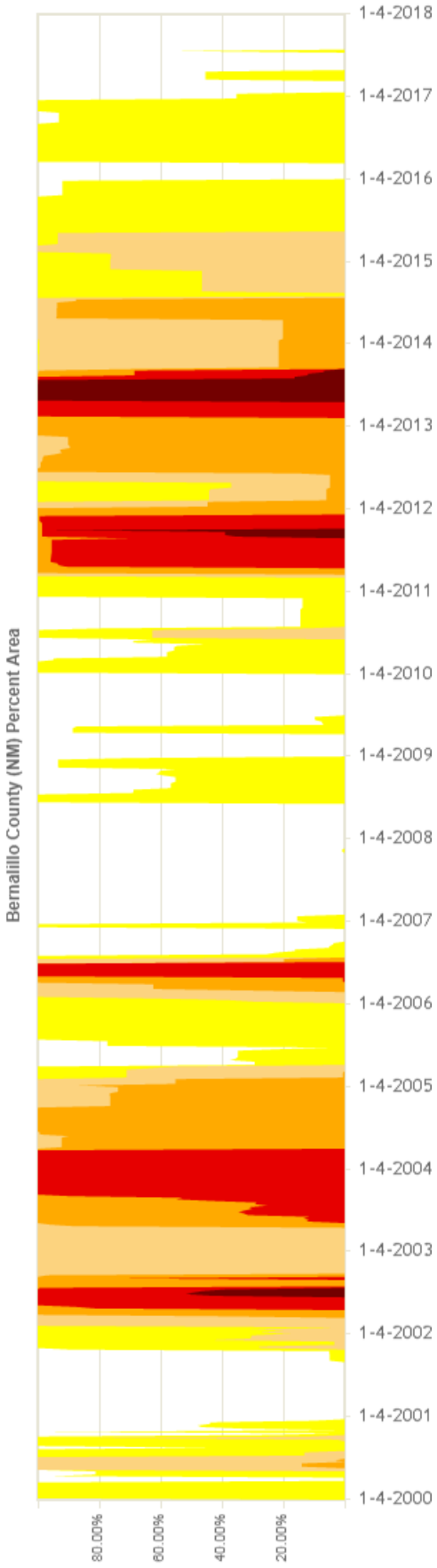
2ZV – 10/15/2015
Hourly Max WS, mph = 26.5
NOAA Reported Max WS, mph = 66
24 hour PM10 concentration, µg/m^3 = 64
Correlation r value = 0.90

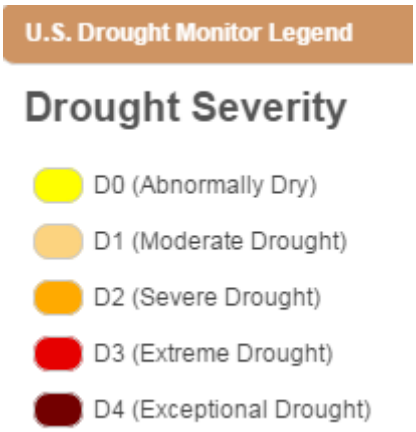
- A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation [40 CFR §50.14(c)(3)(iv)(B)

  A. The event that lasted 10 hours and impacted one site in Bernalillo County. The event also affected air quality across New Mexico. Particulate matter was seen suspended in the air for an extended period of time throughout Bernalillo County and surrounding counties.

- A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event [40 CFR §50.14(c)(3)(iv)(E)]

  A. The event was a significant event resulting in elevated PM10 values due to high winds. Elevated winds lasted for approximately 10 hours and generated wind born particulate matter for an extended period of time. Although the event was exacerbated due to the large area of anthropogenic sources the extremely high winds overwhelmed any possible dust abatement in place at the time of the event. The event itself was not due to direct human activity generating dust and putting that dust into the air. Peak wind gusts, as reported by the National Weather Service, where greater than 40 mph and would have overwhelmed any attempt to reduce dust becoming airborne.
  B. In situations where human activity was involved and RACM was in place, the RACM was overwhelmed by the severity of the winds and the length of time the event lasted.
  C. The event was exacerbated by nature in that the southwest has experienced a prolonged drought with record low rainfall occurring in from 2011 through 2015 and continued abnormally dry conditions through 2016. Prolonged drought conditions have also increased the prevalence of windborne dust in the area. These conditions has reduced already sparse native vegetation, including shrubs, weeds and grasses, that would have been prevalent prior to the drought or during years of with typical rainfall. 2011 saw only 4.72 inches of rain and 2012 saw only 5.46 inches of rain. The average annual rainfall for the Albuquerque area is 9.45 inches of rain (30 year normal). 2011 will go down as tied for the 9th warmest year on record since 1893 and was the 7th driest on record since 1892. 2012 was the 16th driest year on record, going back to 1892 and was the warmest year on record since 1892. The prolonged drought has reduced the amount of native vegetation available to stabilize undisturbed areas around the sites and has increase the potential impact of the anthropogenic sources in and around the sites.
     The following pages show the severity of the drought conditions in the days leading up to the wind event and the chart title “Bernalillo County (NM) Percent Area” details the historical impact of the drought over several years. The following pages show that the drought conditions of Bernalillo County are from moderate to exceptional from 2011 through 2015. Since 2011the majority of the calendar years have been listed as being under some level of drought conditions. These are all conditions that add to the potential of wind generated airborne dust.


Bernalillo County (NM) Percent Area
1-4-2018
1-4-2017
1-4-2016
1-4-2015
1-4-2014
1-4-2013
1-4-2012
1-4-2011
1-4-2010
1-4-2009
1-4-2008
1-4-2007
1-4-2006
1-4-2005
1-4-2004
1-4-2003
1-4-2002
1-4-2001
1-4-2000
80.00%
60.00%
40.00%
20.00%


U.S. Drought Monitor Legend
Drought Severity
D0 (Abnormally Dry)
D1 (Moderate Drought)
D2 (Severe Drought)
D3 (Extreme Drought)
D4 (Exceptional Drought)

- A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event [40 CFR §50.14(c)(3)(iv)(E)]

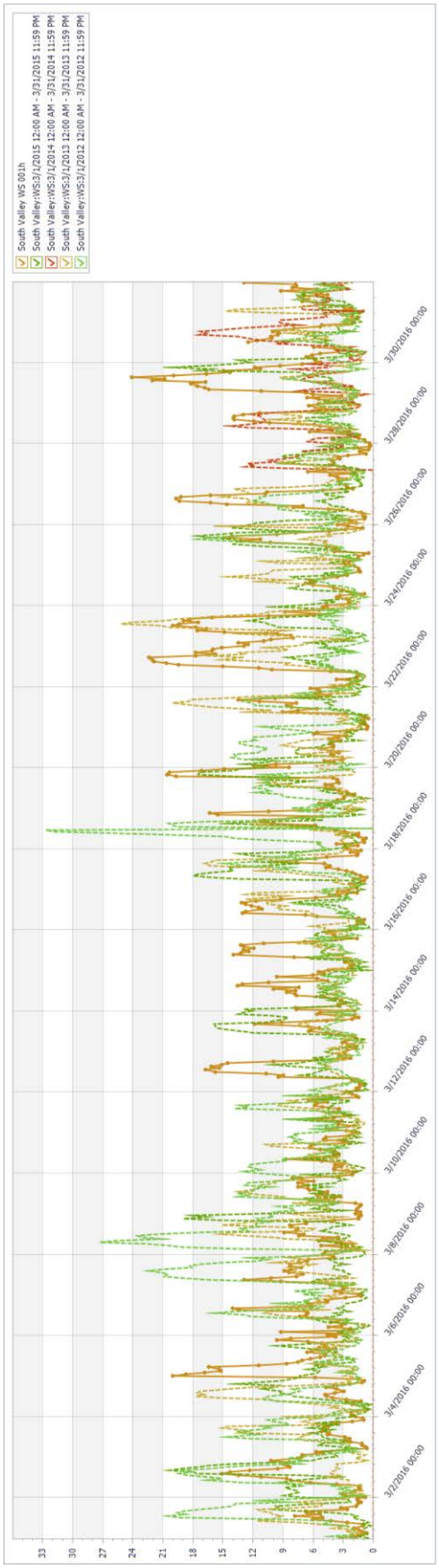
  A. The Event was in excess of normal historical fluctuations. Typical National Weather Service reported wind speeds experienced at the Albuquerque International Airport over the past four years are listed below:

South Valley (35-001-0029)				
Year	Highest annual 1-Hour wind speed Date	Highest annual 1-Hour maximum wind speed	Highest March 1-Hour maximum Wind speed	Avg. March Wind Speed
2012	3/18/2012	31.8	31	6.0
2013	10/10/2013	26.3	25	5.4
2014	4/26/2014	26.0	17	5.0
2015	10/15/2015	26.5	20	4.9
2016	7/1/2016	29.9	24	5.8

  B. Highest March wind speeds experienced at the South Valley site are 31 mph for one hourWhile the maximum speed for March 2016 are not overly peculiar from other years the maximum average March wind speed for 2016 does exceed 25 mph resulting in elevated PM10 values which are higher than other years, this can be indicative of the length that the event lasted.

Winds of the magnitude and length of time experienced on 3/29/16 are unusual for March in and around the metro Albuquerque and Bernalillo County area. A storm lasting 10 hours with winds in excess of 50 mph is unusual for the area.

Historical view of wind speeds across 5 years of local data.



Annual Frequency Distribution of Hourly Wind Speed and 24-Hour PM10 Data

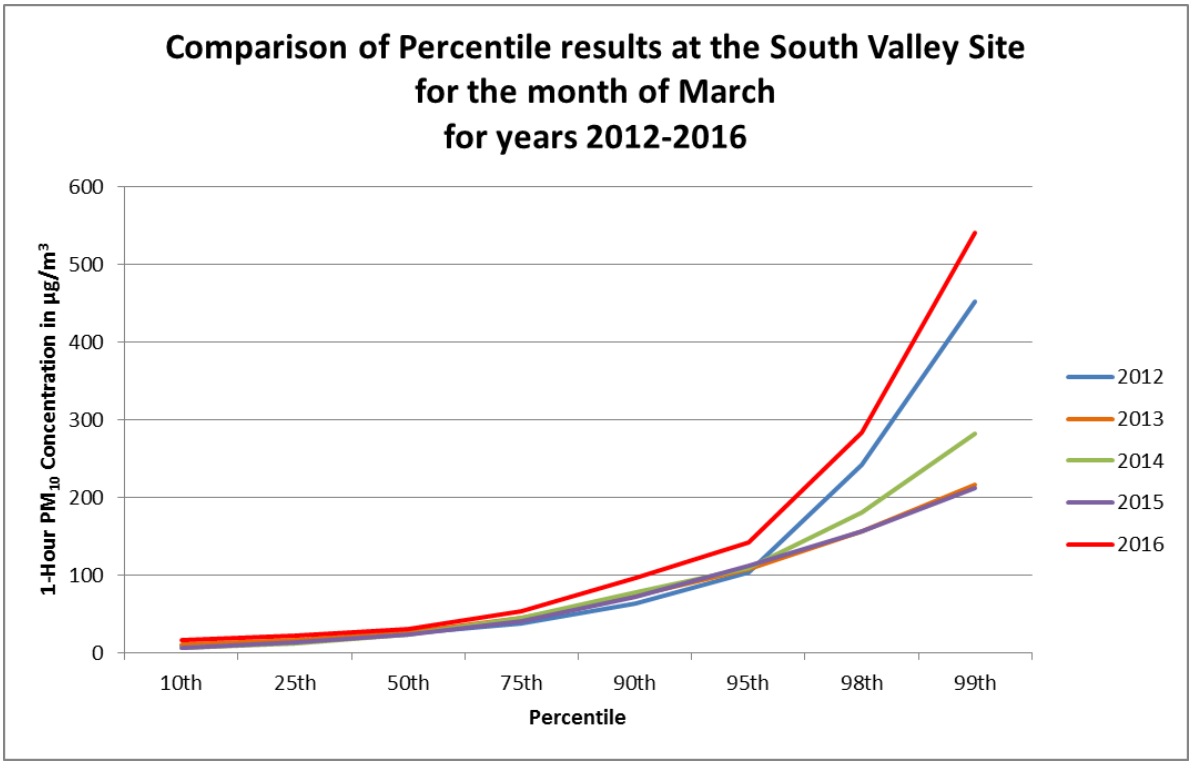
South Valley March Frequency Distribution, PM10 values are 24-Hour									
Year	Percentile	10	25	50	75	90	95	98	99
2016	Wind speed	3.1	4.1	5.5	6.9	9.7	12.5	15	15.6
	PM10	13	20	28	41	55	62	94	109
2015	Wind speed	2.7	3.3	4.3	6.5	8.9	9.8	11.9	20.4
	PM10	13	18	28	42	57	68	79	96
2014	Wind speed	3.3	4.2	5.6	7.4	9.1	10.8	12.5	13.5
	PM10	12	19	29	44	61	73	98	109
2013	Wind speed	3.3	4	4.9	7	8.2	10.3	12.5	14.1
	PM10	15	20	30	43	61	73	104	110
2012	Wind speed	2.69	3.1	5.3	8.7	11.3	14.7	19.5	33.7
	PM10	14	21	29	39	55	75	99	115

Local wind speed data is from the AQP database
PM10 frequency distribution data is from AQS AMP260 Report

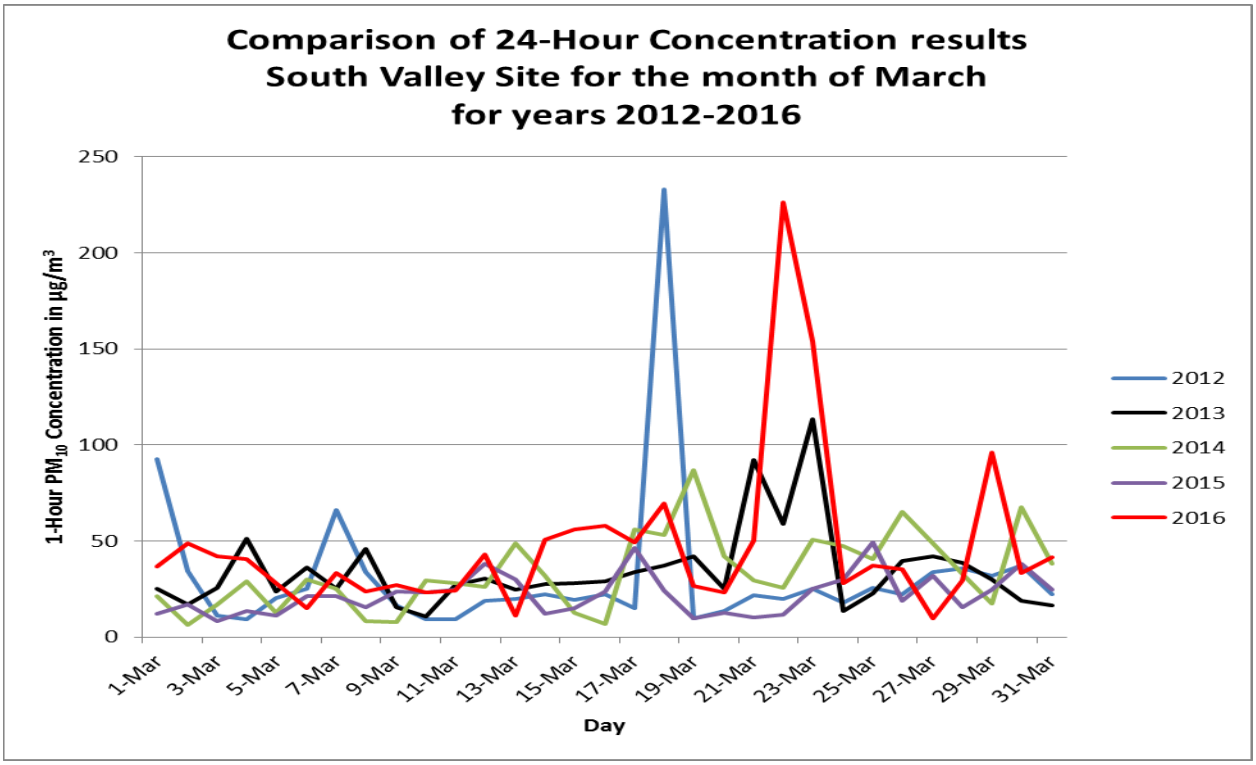
The 2016 data is not overly dis-similar to all the other yearly data. This shows that the high wind event impacted the site outside of what is normal and was in excess of normal historical fluctuations with the highest PM10 concentration values lying in the 99th to 100th percentile.

The above tables do not show that high PM10 occurs when wind speeds are low. What the table above shows is that the majority of high PM10 values occur in the top 1% of the data and that this coincides with the fact that the data shows that the high PM10 values occur in the same percentile as the peak winds. The 98th percentile shows that 98% of the winds experienced in the area are less than 15 mph and do not result in PM10 values greater than 85% of the PM10 NAAQS, except for 2016 where the wind speeds in the 98th and 99th percentile are greater than 15 mph.

The frequency distribution shows that the highest PM10 values typically occur in the top 1% of all the data, in relationship to 24-hour average values, except for 2016. The 2016 data deviates and shows that the highest concentrations for the year actually occur in the top 2% of the data. This does not mean that each peak one hour value, within the top 1% of data, resulted in a 24 hour PM10 concentration greater than 85% of the PM10 NAAQS. It does reinforce the fact that there are high winds but these high winds do not constantly result in elevated particulate matter. Although wind events do occur every year they do not automatically result in a PM10 concentration greater than 85% of the PM10 NAAQS.



Comparing the percentile results from the South Valley site shows a clear separation of the 95th, 98th and 99th percentile results from prior years data.



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Appendix A – Part 20 Fugitive Dust Control

TITLE 20 ENVIRONMENTAL PROTECTION

CHAPTER 11 ALBUQUERQUE - BERNALILLO COUNTY AIR QUALITY CONTROL BOARD PART 20 FUGITIVE DUST CONTROL

20.11.20.1 ISSUING AGENCY: Albuquerque - Bernalillo County Air Quality Control Board. P.O. Box 1293, Albuquerque, New Mexico 87103. Telephone: (505) 768-2601. [20.11.20.1 NMAC - Rp, 20.11.20.1 NMAC, 3/17/08]

20.11.20.2 SCOPE:

A. 20.11.20 NMAC is applicable to all sources of fugitive dust in Bernalillo county, unless otherwise exempt.

B. **Exempt:** 20.11.20 NMAC does not apply to sources within Bernalillo county that are:

(1) located on Indian lands over which the Albuquerque - Bernalillo county air quality control board lacks jurisdiction;

(2) hard rock mining pits and operations contained within the mining pit and permitted pursuant to the state of New Mexico Mining Act; for the purposes of 20.11.20 NMAC, sand and gravel mining operations are not exempt;

(3) emergency maintenance operations that are intended to address an imminent threat to property or persons; however, reasonably available control measures must be employed once the emergency has been addressed, if appropriate, and a report of all activities shall be filed with the department no later than 10 days after the incident has been concluded and the department shall determine if additional action, including a permit application submittal, is required before additional non-emergency activities occur at the site; and

(4) stationary source operations subject to 20.11.41 NMAC, *Authority to Construct*, or 20.11.42 NMAC, *Operating Permits*, that produce fugitive dust as defined in 20.11.20 NMAC, but only if the source of fugitive dust is addressed and controlled through permit conditions required by a 20.11.41 NMAC or 20.11.42 NMAC permit; however construction at a stationary source site, whether it involves new construction or a site modification, is subject to 20.11.20 NMAC.

C. **Conditionally Exempt:** The following five sources of fugitive dust emissions in Bernalillo county shall be conditionally exempt from the requirements of 20.11.20 NMAC, unless the department determines that the fugitive dust emitted from a conditionally exempt source's active operations or inactive disturbed surface area may adversely and significantly affect human health within Bernalillo county:

(1) areas zoned for agriculture and used for growing a crop;

(2) bicycle trails, hiking paths and pedestrian paths, horse trails or similar paths used exclusively for purposes other than travel by motor vehicles;

(3) unpaved roadways on privately-owned easements serving residential dwellings;

(4) lots smaller than three-quarters of an acre used for any purpose; and

(5) unpaved roadways within properties used for ranching, or properties owned or controlled by the United States department of energy or department of defense, or United States department of agriculture forest service lands or United States department of interior park service lands if the public does not have motor vehicle access to the roadways.

[20.11.20.2 NMAC - Rp, 20.11.20.2 NMAC, 3/17/08]

20.11.20.3 STATUTORY AUTHORITY: 20.11.20 NMAC is adopted pursuant to the authority provided in the New Mexico Air Quality Control Act, NMSA 1978 Sections 74-2-4, 74-2-5; the Joint Air Quality Control Board Ordinance; Bernalillo county Ordinance No. 94-5, Sections 4 and 5; and the Joint Air Quality Control Board Ordinance, Revised Ordinances of Albuquerque 1994 Sections 9-5-1-4 and 9-5-1-5.
[20.11.20.3 NMAC - Rp, 20.11.20.3 NMAC, 3/17/08]

20.11.20.4 DURATION: Permanent.
[20.11.20.4 NMAC - Rp, 20.11.20.4 NMAC, 3/17/08]

20.11.20.5 EFFECTIVE DATE: March 17, 2008, unless a later date is cited at the end of a section. [20.11.20.5 NMAC - Rp, 20.11.20.5 NMAC, 3/17/08]

20.11.20.6 OBJECTIVE: To ensure that every person shall use reasonably available control measures or other effective measures on an ongoing basis to prevent or abate fugitive dust, if the fugitive dust may with reasonable probability injure human health or animal or plant life or as may unreasonably interfere with the public welfare, visibility or the reasonable use of property, as required by 20.11.20 NMAC.
[20.11.20.6 NMAC - Rp, 20.11.20.6 NMAC, 3/17/08]

20.11.20.7 DEFINITIONS: In addition to the definitions in 20.11.20.7 NMAC, the definitions in 20.11.1 NMAC apply unless there is a conflict between definitions, in which case the definition in 20.11.20.7 NMAC shall govern.

A. **"Active operations"** means any anthropogenic activity that is capable of generating, or generates fugitive dust, including but not limited to: bulk material storage, handling or processing; earth moving; soil or surface disturbance (e.g. discing, trenching, blading, scraping, clearing, grubbing, topsoil removal); construction, renovation, or demolition activities; movement of motorized vehicles on any paved or unpaved roadway or surface, right-of-way, lot or parking area; or the tracking out or transport of bulk material onto any paved or unpaved roadway.

B. **"Anthropogenic"** means human-caused changes in the natural or built condition of the environment.

C. **"Bulk material"** means sand, gravel, soil, aggregate or any other inorganic or organic solid material capable of creating fugitive dust.

D. **"Business day"** means Monday through Friday, except city of Albuquerque holidays.

E. **"Construction activity"** means any activity preparatory to or related to building, altering, rehabilitating, demolishing or improving property that results in a disturbed surface area, including but not limited to grading, excavation, loading, crushing, pavement milling, cutting, clearing, grubbing, topsoil removal, blading, shaping, dry sweeping, blasting and ground breaking.

F. **"Crop"** means an agricultural plant harvested for consumption, utilization or sale.

G. **"Disturbed surface area" or "surface disturbance"** means the natural or manmade area of the earth's surface that, as a result of anthropogenic activity, may become a source of transported material, track-out, or visible fugitive dust.

H. **"Division"** means the city of Albuquerque air quality division or its successor agency.

I. **"Dust suppressant"** means hygroscopic materials, or non-toxic chemical

stabilizers used to reduce or control fugitive dust emissions during suspended operations and as a long term reasonably available control measure.

J. "Earth moving activity" means grading, cutting, filling, soil disturbance (e.g. discing, trenching, blading, scraping, clearing, topsoil removal, grubbing), soil mulching, loading or unloading of dirt or other bulk materials, including adding to or removing from open storage piles or stockpiles of bulk materials.

K. "Fugitive dust" or "dust" means organic or inorganic particulate matter. Water vapor, steam, or particulate matter emissions emanating from a duct or stack of process equipment are not fugitive dust.

L. "Fugitive dust control construction permit" or "permit" means a fugitive dust control permit approved by the department and issued pursuant to 20.11.20 NMAC that contains an approved fugitive dust control plan and authorizes active operations to begin when the permit is signed by a division manager, supervisor, scientist, field operations officer or health specialist.

M. "Fugitive dust control plan" or "plan" means the part or portion of the fugitive dust control construction permit or programmatic permit application that details the reasonably available control measures and other effective measures the permit applicant commits to use to reduce the quantity of visible fugitive dust, transported material, or track-out leaving the property or area under the control of the permittee and shall include contingency fugitive dust control measures, which shall be a requirement of every fugitive dust control permit.

N. "Greenwaste" means organic matter including, grass clippings, leaves, weeds, small shrub or tree limb cuttings, brush, stumps, and soils.

O. "High wind event" means a condition announced by the department consisting of wind speeds of approximately 30 miles per hour or greater that, when accompanied by dry soil conditions, that is likely to result in widespread reduced visibility due to blowing fugitive dust and that may result in elevated monitored particulate levels that may cause or contribute to an exceedance or violation of the national ambient air quality standards.

P. "Inactive disturbed surface area" means any disturbed surface area on which active operations have been suspended.

Q. "Large area disturbance" means a project or development, totaling more than 25 acres upon which active operations have been conducted and includes areas used for storage of bulk material, building or construction materials, machinery or vehicles.

R. "Open storage pile" means the accumulation of bulk material that is not fully enclosed, covered or chemically stabilized.

S. "Owner or operator" means a person who owns, leases, operates, controls, or supervises a source that directly or indirectly produces or is capable of producing fugitive dust.

T. "Parking lot" or "parking area" means a location where motor vehicles routinely park whether or not the area is zoned for parking.

U. "Paved" or "paving" or "paved roadway" means asphalt, recycled asphalt, concrete or asphaltic concrete, routinely-maintained asphalt millings, or combinations thereof, that cover a surface traveled or used by motor vehicles.

V. "Permittee" means a person and all legal heirs, successors, and assigns who has applied for and obtained a fugitive dust control construction or programmatic permit issued by the department pursuant to 20.11.20 NMAC.

W. "Person" means an individual, firm, partnership, corporation, association, organization, company, joint stock association, business trust, owner, or body politic, including a municipality, local, state or federal government agency or political subdivision, and includes an

employee, officer, operator, contractor, supplier, installer, user, leaseholder, trustee, receiver, assignee or other person acting in a similar representative capacity with the authority to control transported material or emissions of particulate matter generated at a disturbed surface area or generated by activities associated with a disturbed surface area or inactive disturbed surface area.

X. "Privately-owned" means real property that is not wholly or partially owned, leased or otherwise controlled by a federal, state or local government or governmental agency or political subdivision.

Y. "Programmatic permit" means a fugitive dust control permit valid for up to five years issued to a permittee that performs routine maintenance or routine ongoing active operations on real property, but does not include full depth reconstruction of a roadway or substantial removal and replacement of a manmade facility. A programmatic permit shall include an approved fugitive dust control plan and shall be effective when signed by a division manager, supervisor, scientist, field operations officer or health specialist.

Z. "Property line" means the exterior boundary of real property, as indicated by plats, plot maps or other indication of ownership limits.

AA. "Publicly-maintained" means under the jurisdiction of, or maintained by a federal, state, or local government or governmental agency or political subdivision.

BB. "Publicly-owned" means real property that is wholly or partially owned, leased or otherwise controlled by a federal, state or local government or governmental agency or political subdivision. Publicly-owned real property includes easements and rights-of-ways, streets, roadways, sidewalks, alleys and other public ways, parks, irrigation and drainage facilities, and any other publicly controlled real property that can be the source of fugitive dust.

CC. "Reasonably available control measure" or "control measure" means a device, system, process modification, apparatus, technique, work practice, or combination thereof, that mitigates fugitive dust and includes the measures in 20.11.20.23 NMAC and any other regulatory control program that results in equivalent protection of a disturbed surface or inactive disturbed surface area, whether or not the purpose of the control measure is to mitigate dust or to meet another requirement of 20.11.20 NMAC or any other statute or regulation.

DD. "Responsible person" means the person designated in a fugitive dust control permit application or permit amendment who agrees to be and shall be responsible for complying with 20.11.20 NMAC, and with the permit and plan to the extent specified in the permit.

EE. "Short cut" means a non-dedicated roadway or route used by motor vehicle drivers to save time by avoiding use of a dedicated and authorized roadway.

FF. "Silt" means bulk material that passes through a 200-mesh screen using the ASTM-D 2487-93, "*classification of soils for engineering purposes (united soil classification system*)" method, or most current ASTM (American society for testing and materials) method. Material that will pass through a 200-mesh screen is 74 microns or less in size.

GG. "Source" or "source of fugitive emissions" means the origin of fugitive dust emissions.

HH. "Stabilized" or "stabilization" means ongoing practices that are sufficient to prevent elevated monitored particulate levels that may cause or contribute to an exceedance or violation of the national ambient air quality standards by meeting the objective established in 20.11.20.6 NMAC and the requirements of the general provisions established in 20.11.20.12 NMAC.

II. "Stockpile" means the depositing of bulk material by mechanical means for the purpose of creating a pile formation on top of an existing natural or man-made surface.

JJ. "Stop work order" means an order issued by the department pursuant to the provisions of 20.11.20 NMAC that requires a person to cease active operations.

KK. "Track-out" or "tracking" means bulk material deposited by a motor vehicle or vehicles upon an unpaved or paved publicly or privately owned roadway if the bulk material can become airborne due to mechanical or wind action.

LL. "Transfer of permit" means an agreement approved in writing by the department that meets the conditions outlined in Paragraphs (1) through (6) of Subsection D of 20.11.20.14 NMAC.

MM. "Transported material" means particulate matter transported by wind, water or other action that, once deposited, can become airborne due to mechanical or wind action.

NN. "Unpaved roadway" means an unpaved route traveled by a motorized vehicle.

OO. "Visible fugitive dust" means airborne particulate matter from a source, resulting in particulate matter emissions that can be detected by the human eye or a detection method approved by the department. Visible fugitive dust can be an indicator of PM_{10}.

PP. "Visible fugitive dust detection method" means the method described in 20.11.20.26 NMAC, which is one method used to determine compliance with 20.11.20 NMAC. [20.11.20.7 NMAC - Rp, 20.11.20.7 NMAC, 3/17/08]

20.11.20.8 VARIANCES: A person may request a variance from 20.11.20 NMAC in accordance with the procedures established in 20.11.7 NMAC. [20.11.20.8 NMAC - Rp, 20.11.20.8 NMAC, 3/17/08]

20.11.20.9 SAVINGS CLAUSE: An amendment to *Fugitive Dust Control*, 20.11.20 NMAC, which is filed with the state records center and archives shall not affect actions pending for violation of a city or county ordinance, or prior versions of 20 NMAC 11.20 and 20.11.20 NMAC, *Airborne Particulate Matter*, 20.11.20 NMAC *Fugitive Dust Control*, or a permit. Prosecution for a violation of a prior statute, ordinance, part or permit shall be governed and prosecuted under the statute, ordinance, part or permit wording in effect at the time the violation was committed. [20.11.20.9 NMAC - Rp, 20.11.20.9 NMAC, 3/17/08]

20.11.20.10 SEVERABILITY: If any section, subsection, sentence, phrase, clause or wording of 20.11.20 NMAC or the federal standards incorporated herein is for any reason held to be unconstitutional or otherwise invalid by any court or the United States environmental protection agency, the decision shall not affect the validity of remaining portions of 20.11.20 NMAC. [20.11.20.10 NMAC - Rp, 20.11.20.10 NMAC, 3/17/08]

20.11.20.11 DOCUMENTS: Documents incorporated and cited in 20.11.20 NMAC may be viewed at the Albuquerque environmental health department, 400 Marquette NW, Albuquerque, NM. [20.10.20.11 NMAC - Rp, 20.11.20.11 NMAC, 3/17/08]

20.11.20.12 GENERAL PROVISIONS:

A. Each person shall use reasonably available control measures or any other effective control measure during active operations or on inactive disturbed surface areas, as necessary to prevent the release of fugitive dust, whether or not the person is required by 20.11.20 NMAC to obtain a fugitive dust control permit. It shall be a violation of 20.11.20

NMAC to allow fugitive dust, track out, or transported material from any active operation, open storage pile, stockpile, paved or unpaved roadway disturbed surface area, or inactive disturbed surface area to cross or be carried beyond the property line, right-of-way, easement or any other area under control of the person generating or allowing the fugitive dust if the fugitive dust may:

(1) with reasonable probability injure human health or animal or plant life;

(2) unreasonably interfere with the public welfare, visibility or the reasonable use of property; or

(3) be visible for a total of 15 minutes or more during any consecutive one hour observation period using the visible fugitive dust detection method in 20.11.20.26 NMAC or an equivalent method approved in writing by the department.

B. Failure to comply with 20.11.20.12 NMAC, a fugitive dust control permit, plan, term or condition shall be a violation of 20.11.20 NMAC.

C. Prior to issuing a fugitive dust control construction permit authorizing commencement of active operations, the department shall:

(1) document, in the form of photographs in electronic or hard copy formats or video recordings, the conditions of the properties that are closest to the property subject to the permit and any other properties the department believes are appropriate;

(2) maintain the documentation for one year after completion of the permitted project;

(3) include in the permit a requirement that the permittee remedy damage to real properties caused by a violation of the permit; and

(4) make the documentation available as evidence, upon request, to all parties involved in a property damage dispute allegedly caused by fugitive dust.

D. A permittee whose violation of 20.11.20 NMAC results in fugitive dust being deposited upon real property beyond the limits of the permitted area shall take all actions necessary to remedy damage caused by a violation proven with credible evidence. Such remedies may include, but not be limited to, compensation, removal of the fugitive dust and/or repair of any damage after obtaining permission from property owners or operators before doing any remedial work on the damaged property. It shall be a separate violation of 20.11.20 NMAC to fail to remove the fugitive dust and repair the damage as specified in a written schedule or any extension agreed to by the permittee and the owner of the damaged property. If the parties cannot agree to a schedule, the department may establish deadlines and failure to comply with the deadlines shall be a separate violation of 20.11.20 NMAC. No violation will occur if the failure to perform the corrective action is for reasons beyond the control of the person performing the work including without limitation acts of God or government preemption in connection with a national emergency or if the owner of the allegedly damaged property refuses to grant reasonable permission and access to conduct the remediation activities.

E. Stockpiles shall be no higher than 15 feet above the existing natural or man-made grade that abuts the stockpile, unless otherwise approved in advance and in writing by the department.

F. Each person shall comply with all applicable provisions of the Clean Air Act, the New Mexico Air Quality Control Act, joint air quality control board ordinances, regulations of the board, and permits issued by the department.

[20.11.20.12 NMAC - Rp, 20.11.20.12 NMAC, 3/17/08]

20.11.20.13 FUGITIVE DUST CONTROL PROGRAMMATIC PERMITS:

A. A fugitive dust control programmatic permit is required for single or multiple facility locations to address real property totaling three-quarters of an acre or more that is

subject to routine maintenance, routine surface disturbance activities, or routine ongoing active operations. A programmatic permit application and fugitive dust control plan shall be submitted on forms provided by the department. Programmatic permits are valid for up to five years. The permittee shall pay the annual programmatic permit fee required by 20.11.2 NMAC, *Fees*, for each year covered by the programmatic permit. Receipt of the annual fee by the department shall result in an automatic annual renewal of the programmatic permit. A new programmatic permit application and fugitive dust control plan shall be submitted every five years or sooner if the surface disturbance activities or fugitive dust abatement strategies are modified. A filing and review fee is not required for a programmatic permit.

B. A person responsible for sloped (i.e. slopes having a steepness of three-to-one or steeper) and bottom portions of interior and riverside drains and canals used for irrigation purposes, and arroyos and public flood control facilities subject to routine maintenance or repair, sedimentation and water erosion shall obtain either a variance as provided by 20.11.7 NMAC or a programmatic permit as provided by Subsection A of 20.11.20.13 NMAC if the person does not elect to submit an application and obtain a fugitive dust control construction permit pursuant to 20.11.20.14 NMAC.

C. No signs or photographic documentation shall be required for the permits or activities subject to 20.11.20.13 NMAC. Appropriate permit application documentation shall be determined by the department. [20.11.20.13 NMAC - Rp, 20.11.20.13 NMAC, 3/17/08]

20.11.20.14 FUGITIVE DUST CONTROL CONSTRUCTION PERMITS:

A. A person who does not elect to obtain or who does not qualify for a fugitive dust control programmatic permit pursuant to 20.11.20.13 NMAC and who plans to conduct active operations that will disturb three-quarters of an acre or more shall comply with either Subsection A or B of 20.11.20.18 NMAC and obtain a fugitive dust control construction permit. No active operations shall commence until a department manager, supervisor, scientist, field operations officer or health specialist signs the fugitive dust control construction permit (permit) and a copy of the signed permit is available at the site of active operations. A permit shall consist of a complete permit application a fugitive dust control plan, any appended documents, any conditions attached to the

permit by the department, and a signature and effective date affixed by a department manager, supervisor, scientist, field operations officer or health specialist.

B. The permittee shall comply with the terms of the permit unless the department approves a transfer of the permit or issues a new permit for the active or inactive disturbed surface area of operation to a new permittee. If three-quarters of an acre or more of the real property that is subject to the permit is transferred or sold the new owner is responsible for complying with either 20.11.20.13 NMAC or 20.11.20.14 NMAC unless exempt. Upon receipt of an amended permit signed by a department manager, supervisor, scientist, field operations officer or health specialist, the permittee who transferred or sold the real property no longer will be responsible for control of fugitive dust originating from the real property that has been transferred or sold. Permit amendment fees shall be paid as required by 20.11.20.14 NMAC.

C. If a person other than the permittee will be responsible for complying with the permit and

20.11.20 NMAC, then the permittee shall designate the responsible person or persons in the permit application who shall be responsible for active operations and inactive disturbed surface areas to the extent specified in the application. Before a responsible person shall be liable for a violation of the permit or 20.11.20 NMAC, the responsible person shall agree in writing to accept responsibility for compliance with the permit conditions. The responsible person shall

be the first person the department attempts to contact regarding a violation of the permit or 20.11.20 NMAC. In addition, the department may approve, in writing, a permit amendment that adds or changes the responsible person who has agreed in writing to be responsible for complying with the permit and plan, to the extent specified in the permit. If the responsible person and permittee fail to comply with the provisions of 20.11.20 NMAC, the owner or operator, if different from the responsible person or permittee, shall be responsible for compliance with the permit.

D. An approved permit shall be valid for one year from the date of issuance by the department or until the project expiration date provided in the permit application, whichever is longer, but no more than five years from the date of issuance. If the project plan, expiration date, total disturbed surface area, completion date or the proposed control measures change in any manner, an amended or new permit is required. At least 10 business days before the expiration date, a fugitive dust control permit shall be renewed by the then-current permittee, or the permit shall expire as of the expiration date. Permit amendment or renewal fees shall be paid as required by Subsection H of 20.11.20.14 NMAC. Permits may be transferred to legal heirs, successors, and assigns, who shall become the new permittee. Permit transfers may qualify as an administrative amendment if:

(1) the department has received, on a form provided by the department, a written transfer agreement signed by the current and new permittee, and, if different than the new permittee, by the owner of the real property subject to the permit;

(2) a specific date of the transfer of the permit and plan responsibility, coverage, and liability is established in the transfer agreement;

(3) the department has determined that no change to the permit and plan other than the administrative change is necessary;

(4) the new permittee and owner have submitted the application information required by 20.11.20.15 NMAC if changes have been made to the permit and plan as deemed necessary by the department;

(5) no grounds exist for permit termination, as otherwise provided by 20.11.20 NMAC; and

(6) the transfer agreement has been approved in writing by the department.

E. After a permit is issued and before the start of active operations, the permittee shall install and maintain a project sign provided by the department or a project sign that meets the requirement of 20.11.20.14 NMAC. The department will establish uniform design guidelines for the sign to ensure that the sign is reasonably legible to the public. If the required information is provided in an existing project sign that has been established for another purpose, an additional sign shall not be required to comply with 20.11.20 NMAC. At a minimum, the sign shall contain the following:

(1) project name;
(2) permittee name;
(3) phone number of designated responsible person or owner;
(4) subcontractor name (optional);
(5) subcontractor phone number (optional);
(6) air quality division phone number;
(7) fugitive dust control permit number; and
(8) total acres of area to be disturbed.

F. The permittee or responsible person shall make the permit available to all employees, agents, sub- contractors, and other persons performing work in the area of active operations or inactive disturbed surface areas to assist in maintaining compliance with 20.11.20 NMAC. The permittee or responsible person shall explain the requirements of the permit to appropriate employees, contractors and agents working at the site. Upon request, the permittee shall provide information regarding how to obtain a copy of the permit from the

department.

G. It is the responsibility of the permittee or responsible person to ensure that the permit or amended permit contains current contact information and that a copy is maintained at the work site and is provided to the department upon request. Failure to maintain and provide up-to-date contact information shall be a violation of 20.11.20 NMAC.

H. The department may amend or renew the permit if requested to do so by the permittee. No fee shall be charged for amending or renewing a permit, unless there will be an increase in the number of acres subject to surface disturbance. Both the department and the permittee must sign an amended permit before it will be effective. The department is not required to sign a renewed permit unless the renewed permit increases the number of acres subject to surface disturbance. An amended or renewed permit that involves an increase in the number of acres subject to surface disturbance shall require payment of fees as required by 20.11.2 NMAC.

[20.11.20.14 NMAC - Rp, 20.11.20.14 NMAC, 3/17/08]

20.11.20.15 FUGITIVE DUST CONTROL CONSTRUCTION PERMITS; MINIMUM PERMIT

APPLICATION REQUIREMENTS: Proposed fugitive dust control construction permit applications shall be submitted on forms provided by the department. Fugitive dust control plans may be submitted in any format including a copy of a program that complies with any other statute or regulation so long as the plan provides reasonably available control measures whose purpose is to mitigate fugitive dust and the plan meets the objectives of 20.11.20 NMAC. If extraneous information is supplied that does not apply to mitigation of fugitive dust, then the dust control measures shall be clearly identified in the plan or the permit application shall be deemed incomplete and shall be rejected. An incomplete permit application shall be processed as described in Subsection C of 20.11.20.18 NMAC. Proposed fugitive dust control permit applications shall include the following:

A. name, address, telephone number and fax number of permittee;

B. owner's name, address, telephone number and fax number if different from permittee;

C. if different than the permittee, the name, address, telephone number and fax number of the responsible person who is agreeing to, and shall be responsible for activities on the permitted site; the department shall first attempt to contact the responsible person regarding a violation of the permit;

D. anticipated project start date which shall be no fewer than 10 business days from the department's receipt of the permit application for areas containing greater than three quarters of an acre but no greater than 25 acres, and no fewer than 20 business days from the department's receipt of the permit application for areas containing more than 25 acres;

E. anticipated project completion date;

F. project description;

G. project location including, if available, street address, major cross streets or nearby intersection;

H. total area of disturbance in acres or square feet;

I. a check or money order for the fees due, calculated using the tables provided on the permit application form, payable to the 'city of Albuquerque permits program' (fund 242);

J. a description of the sequencing of the active operations, if phasing is used to reduce the total disturbed area at any time;

K. estimated total volume of bulk material being handled in cubic yards, including any bulk material being imported, exported or relocated;

L. location from which bulk material is being imported to the site and a statement regarding whether the site where the imported material originates will have a separate fugitive dust control permit, or provide written information to the department as soon as known;

M. location to which bulk material from the site is being exported and a statement regarding whether the site to which the material is to be exported will have a separate fugitive dust control permit, or provide written information to the department as soon as known;

N. whether an approved drainage plan exists pursuant to city of Albuquerque or Bernalillo county ordinances and, upon request by the department, provide a copy of the drainage plan;

O. site map (e.g. zone atlas page, aerial photograph);

P. type of work being performed and appropriate reasonably available control measures, as described in 20.11.20.23 NMAC, or other effective control measures proposed to be used in the fugitive dust control plan;

Q. a statement that effective contingency fugitive dust control measures shall be taken by the permittee if the control measures required by Subsection P of 20.11.20.15 NMAC are not effective in maintaining compliance with 20.11.20 NMAC;

R. a commitment to comply with provisions of Subsection B of 20.11.20.16 NMAC if the permittee chooses to preserve the ability to qualify for a high wind affirmative defense;

S. high wind contingency measures that will be implemented when high winds occur;

T. a description of the actions the permittee will take to mitigate damage caused by fugitive dust if generated by active operations or an inactive disturbed surface area on the permitted site;

U. other proposed conditions;

V. signature of the permittee, and, if a different person, signature of the owner, operator and/or any responsible person certifying that the information in the fugitive dust control permit application is true, accurate and complete, and certifying that all actions necessary to comply with 20.11.20 NMAC will be taken, including suspending active operations if necessary to comply with the provisions of 20.11.20 NMAC; and

W. a statement regarding whether bulk material will be stockpiled at the project site, the dimension of each stockpile, and the reasonably available control measures or other effective control measures that will be used at the stockpile area to comply with 20.11.20 NMAC.

[20.11.20.15 NMAC - Rp, 20.11.20.15 NMAC, 3/17/08]

20.11.20.16 HIGH WIND EVENT REQUIREMENTS; HIGH WIND EVENT AFFIRMATIVE DEFENSE:

A. General requirements: during a high wind event, all persons responsible for fugitive dust control activities on publicly or privately-owned real property where active operations are occurring or inactive disturbed surface areas exist shall use reasonably available control measures or other effective measures to prevent fugitive dust from leaving the property. All such persons shall implement the control measure required by Paragraph (5) of Subsection C, of 20.11.20.16 NMAC.

B. High wind affirmative defense: if the department initiates an administrative enforcement action against either a permittee or a responsible person, or both (respondent) alleging a violation of a permit or 20.11.20 NMAC during a high wind event, the respondent may assert an affirmative defense in the enforcement action if the respondent establishes by credible evidence that respondent complied with the requirements established in Subsection C of 20.11.20.16 NMAC. In order to successfully assert the affirmative defense, during the entire duration of a permit the respondent shall utilize the applicable controls described in Subsection C of 20.11.20.16 NMAC, regardless of whether or not a high wind event exists, with the exception of Paragraph (5) of Subsection C of 20.11.20.16 NMAC, which shall be required during a high wind event. The affirmative defense shall not be available if respondent has failed to diligently perform the control measures specified in Paragraphs (1) through (5) of Subsection C of 20.11.20.16 NMAC. The availability of the affirmative defense shall not change the respondent's potential liability for any damage caused by fugitive dust leaving the permitted property, and the affirmative defense shall not change the permittee's obligation to remove fugitive dust originating from the permitted source, or otherwise remedy the damage, as required by Subsection D of 20.11.20.12 NMAC. The board, its members, and employees and officials of the city of Albuquerque and the county of Bernalillo shall not incur individual liability for damage to persons or property caused by fugitive dust leaving the permitted property.

C. Mandatory control measures: to assert a high wind event affirmative defense as described in Subsection B of 20.11.20.16 NMAC, a permittee shall utilize the applicable control measures in Paragraphs (1) and (2) of Subsection C of 20.11.20.16 NMAC on an ongoing basis. Without prior notice to the department, the permittee may use the measure in Paragraph (3) of Subsection C of 20.11.20.16 NMAC in place of the measure in Paragraph (1) of Subsection C of 20.11.20.16 NMAC. After receiving written permission from the department, the permittee may substitute the measures in Paragraph (4) for the measures in Paragraphs (1) and (2), or (2) and (3) of Subsection C of 20.11.20.16 NMAC. All permittees, whether or not they intend to assert a high wind affirmative defense, shall implement the measure in Paragraph (5) of Subsection C of 20.11.20.16 NMAC during a high wind event.

(1) Use of wet suppression sufficient to attain and maintain eighty percent of the optimal moisture content of the soil as determined by a proctor analysis performed by a certified public or private materials testing laboratory. For proctor analyses, either the standard proctor (ASTM D-698) or the modified proctor (ASTM D- 1557) may be used. Daily, representative testing of the soil moisture content shall be taken on exposed new surfaces after the top one-half to one inch of the soil is removed at the sampling area. Three times each day, at intervals that are equally spaced throughout the work day, the respondent shall test and record the soil moisture content at three separate representative locations on the permitted property, which will result in a minimum of nine tests each day.

To demonstrate compliance, any set of three tests shall average 80 percent of the optimal moisture content of the soil and no individual test shall be less than 70 percent of the optimal moisture content of the soil. Failure to meet the soil moisture content standards as required by Subsection C of 20.11.20.16 NMAC for any set of three tests shall require that the respondent immediately apply necessary control measures at the portion or portions of the representative area where the soil moisture content tested as insufficient, and re-test the same representative locations, as necessary, until the soil moisture content complies with the standards as required by Subsection C of 20.11.20.16 NMAC. The respondent or the department shall use a reasonably accurate commercially-available instrument to determine soil moisture content. Where possible, methods for determining soil moisture content shall be consistent with ASTM

standards (e.g. ASTM D-1556-90 - sand cone test, ASTM D2922-91 - nuclear density). All tests for soil moisture content shall be documented and retained for the duration of the permit, and shall be made available to the department upon request.

(2) Use of properly-maintained fabric fencing material around the perimeter of the disturbed surface area with openings no wider than necessary to allow vehicles to enter or exit the area. The fencing material shall be anchored approximately six inches below the surface on the bottom edge, and when installed shall be approximately 24 or more inches above the existing natural or man-made surface. The fence shall be installed in a durable manner. For example, one durable installation method involves use of steel T-posts spaced approximately eight to 10 feet apart with steel mesh wire used as a reinforcement backing to the fabric. Use of fabric fencing standards associated with the national pollutant discharge system may be approved by the department if they are consistent with the requirements of Paragraph (2) of Subsection C of 20.11.20.16 NMAC. The department may also approve alternative fencing material if it provides equal or better control of fugitive dust. Alternatives may include solid walls or sturdy fences that effectively control fugitive dust. To maintain effectiveness of the fence, fugitive dust that accumulates on either side of the fencing shall be removed promptly.

(3) Use of chemical dust suppressants applied in amounts, frequency and rates recommended by the manufacturer, and maintained as recommended by the manufacturer sufficient to substantially reduce fugitive dust leaving the fugitive dust source while active operations are idle, usually used when active operations are suspended for more than 48 hours.

(4) A department-approved alternative dust control measure or measures that provide fugitive dust control that is equal to or better than measures in Paragraphs (1) and (2), or (2) and (3) of Subsection C of 20.11.20.16 NMAC. Before a permittee may substitute an alternative control measure, the department must approve the control measure in writing as a permit amendment.

(5) Stopping active operations that are capable of producing fugitive dust.

D. Active operations during an announced high wind event: The department shall use national weather service (NWS) data, recorded at either the Albuquerque international airport (Sunport) or Double Eagle II airport, in order to determine forecasted or actual wind speeds when announcing that a high wind event may or will occur. Wind velocity measurements taken in the field by the department, the responsible person, or permittee shall be taken at a representative active operation area on the permitted property or by the department within 200 feet of the permitted property being evaluated to determine whether active operations can be continued, resumed or initiated. Wind measurement results shall be documented and retained throughout the duration of the permit, and shall be made available to the department and the permittee and/or person responsible for controlling fugitive dust at the permitted property. A continuous one-hour wind velocity measurement with an average wind speed of less than 20 miles per hour, along with on-site stable soil conditions and effective dust control measures, as stated in the fugitive dust control plan, shall be sufficient to allow active operations during an announced high wind event. However, fluctuations in average wind speed and high wind gusts may re-occur and can cause ineffective dust control during active operations, which may result in a violation of 20.11.20 NMAC. Therefore, the responsible person or permittee shall continuously assess wind conditions and on-site soil conditions during an announced high wind event and shall maintain the reasonably available control measures which include stopping active operations as required by Paragraph (5) of Subsection C of 20.11.20.16 NMAC.

E. Limitations on use of affirmative defense: A respondent may not assert the affirmative defense described in 20.11.20.16 NMAC:

(1) against an action for injunctive relief; or

(2) to prohibit the EPA or a citizen's group from taking an enforcement action. [20.11.20.16 NMAC - Rp, 20.11.20.16 NMAC, 3/17/08]

20.11.20.17 FILING, REVIEW AND INSPECTION FEES: The fees required by 20.11.20 NMAC are located in 20.11.2 NMAC, Fees. The filing and review fee portion of the total permit application fee due when a fugitive dust control construction application is filed is non-refundable.

[20.11.20.17 NMAC - Rp, 20.11.20.17 NMAC, 3/17/08]

20.11.20.18 FUGITIVE DUST CONTROL CONSTRUCTION PERMIT APPLICATION PROCESSING:

A. A person who is required to submit a fugitive dust control construction permit (permit) application and plan for active operations that will disturb at least three-quarters of an acre, but no more than 25 acres, shall submit the permit application and plan with the applicable fees to the department no fewer than 10 business days prior to the start of active operations. Within 10 business days of the department receiving the permit application, plan and fees, the department will approve the permit, approve the permit with conditions or deny the permit.

B. A person who is required to submit a permit application and plan for active operations that will disturb more than 25 acres shall submit the permit application and plan with the applicable fees to the department no fewer than 20 business days prior to the start of active operations. Within 20 business days of the department receiving the permit application, plan and fees, the department will approve the permit, approve the permit with conditions or deny the permit.

C. The fugitive dust control plan may be in any form including a copy of a program that complies with any other statute or regulation so long as the plan provides reasonably available control measures whose purpose is to mitigate fugitive dust and the plan meets the objectives of 20.11.20 NMAC. If the plan does not specifically enumerate the control measures proposed to mitigate fugitive dust, the permit application shall be deemed incomplete and shall be rejected. If an incomplete application is rejected, a new or amended application may be filed and the time limits in Subsections A or B of 20.11.20.18 NMAC shall apply as if the initial application had not been filed.

D. If all requirements of 20.11.20 NMAC have been met by the applicant, the department shall issue a permit to the permittee, which shall authorize commencement of active operations. If the department has not approved, denied, or notified the applicant regarding the permit application within 30 business days of the department's receipt of the permit application, plan and fees, then the permit shall be automatically approved and operations may commence if the permittee uses the reasonably available control measures and fugitive dust control plan as submitted in the application. However, if the measures and plan are not effective, the department may initiate an enforcement action for violation of 20.11.20 NMAC.

[20.11.20.18 NMAC - Rp, 20.11.20.18 NMAC, 3/17/08]

20.11.20.19 PUBLIC AND PRIVATE UNPAVED ROADWAYS, SHORT-CUTS AND UNPAVED PARKING AREAS:

A. No unpaved roadway greater than one-quarter mile in length and no unpaved parking areas may be constructed or allowed to be constructed or reconstructed on any

publicly-owned land or privately-owned real property, unless the owner has applied for and received a permit pursuant to 20.11.20.13 NMAC or 20.11.20.14 NMAC. Owners in possession of a valid fugitive dust control permit that wish to construct additional unpaved roadways shall apply for an amendment to their permit which shall include payment of any fees required by 20.11.2 NMAC. In addition, no unpaved short-cut of any length on private or public property may be constructed or be allowed to remain usable when it is evident the short cut is being used by motor vehicle drivers to save time by avoiding use of a dedicated and authorized roadway. A variance from Subsection A of 20.11.20.19 NMAC may be granted by the board in a manner consistent with the variance procedures provided in 20.11.7 NMAC.

B. Owners or operators shall use reasonably available control measures on all unpaved roadways and unpaved parking areas and shall comply with the general provisions established in 20.11.20.12 NMAC.

C. Public unpaved roadway; complaints. If the department receives a fugitive dust complaint regarding an unpaved public roadway, the department will forward the complaint by hand delivery, inter-office mail delivery or certified mail, return receipt requested, to the governmental agency responsible for maintenance of the roadway. Within 45 calendar days from the date the complaint was received by the responsible agency, the responsible agency shall make a reasonable effort to address the complaint, and the governmental agency shall provide the department with a written report of the actions taken to resolve the complaint. Failure of the responsible agency to submit a timely report shall be a violation of 20.11.20 NMAC.

[20.11.20.19 NMAC - Rp, 20.11.20.19 NMAC, 3/17/08]

20.11.20.20 ABRASIVE PRESSURE BLASTING OPERATIONS: A person who performs abrasive pressure blasting operations shall employ reasonably available control measures or other effective control measures at all times to comply with 20.11.20.12 NMAC and shall substantially reduce fugitive dust emissions that are leaving the property where the abrasive pressure blasting operations are taking place. A person who is conducting abrasive pressure blasting operations is not required to obtain a fugitive dust control permit from the department. However, stationary source permitting regulations, such as 20.11.41 NMAC and 20.11.42 NMAC, may apply to pressure blasting operations.

[20.11.20.20 NMAC - Rp, 20.11.20.20 NMAC, 3/17/08]

20.11.20.21 CONTROL OF GREENWASTE MATERIAL: To prevent greenwaste from becoming ground up by the abrasive action of tires, which may then be entrained into the atmosphere as particulate matter, all persons causing, directing or authorizing greenwaste to be deposited on publicly-owned real property shall promptly remove or cause the removal of the greenwaste.

[20.11.20.21 NMAC - Rp, 20.11.20.21 NMAC, 3/17/08]

20.11.20.22 DEMOLITION AND RENOVATION ACTIVITIES; FUGITIVE DUST CONTROL CONSTRUCTION PERMIT AND ASBESTOS NOTIFICATION REQUIREMENTS:

No person shall demolish any building containing over 75,000 cubic feet of space without first delivering to the department a fugitive dust control construction permit application and fugitive dust control plan with the fee required by 20.11.2 NMAC. No active operations shall commence until a department manager, supervisor, scientist, field operations officer or health specialist signs a fugitive dust control construction

permit and a copy of the signed permit is available at the site of active operations. Failure to obtain a fugitive dust control construction permit prior to commencement of demolition activities as described in 20.11.20.22 NMAC shall be a violation of 20.11.20 NMAC. All demolition and renovation activities shall employ reasonably available control measures at all times, and, when removing asbestos containing materials (ACM), shall also comply with the federal standards incorporated in 20.11.64 NMAC, *Emission Standards for Hazardous Air Pollutants for Stationary Sources*. A person who demolishes or renovates any commercial building, residential building containing five or more dwellings, or a residential structure that will be demolished in order to build a nonresidential structure or building shall file an asbestos notification with the department no fewer than 10 calendar days before the start of such activity. Written asbestos notification certifying to the presence of ACM is required even if regulated ACM is not or may not be present in such buildings or structures. Failure to provide proper asbestos notification shall be a violation of the requirements of 20.11.64 NMAC. Knowingly violating provisions of 20.11.64 NMAC is a fourth-degree felony pursuant to the New Mexico Air Quality Control Act, 74-2-14.C.3 NMSA 1978.

[20.11.20.22 NMAC - Rp, 20.11.20.22 NMAC, 3/17/08]

20.11.20.23 REASONABLY AVAILABLE CONTROL MEASURES FOR FUGITIVE DUST:

The permittee may include in the permit application one or more of the reasonably available control measures included in 20.11.20.23 NMAC or one or more alternative fugitive dust control measures, including measures taken to comply with any other statute or regulation if the measures will effectively control fugitive dust during active operations or on inactive disturbed surface areas. At minimum, all projects requiring a fugitive dust control construction permit shall utilize paved or gravel entry/exit aprons, steel grates or other devices capable of removing mud and bulk material from vehicle traffic tires, and erect a properly-maintained fabric fencing material around the perimeter of the disturbed surface area with openings no wider than necessary to allow vehicles to enter or exit the area. The fencing material shall be anchored approximately six inches below the surface on the bottom edge, and when installed shall be approximately 30 or more inches above the existing natural or man-made surface. To maintain effectiveness of the entry/exit apron, steel grate or other similar device (device), accumulated materials shall be removed promptly. To maintain effectiveness of the fence, fugitive dust that accumulates on either side of the fencing shall be removed promptly.

A. Unpaved roadways:

(1) paving using recycled asphalt, routinely-maintained asphalt millings, asphaltic concrete, concrete, or petroleum products legal for such use;

(2) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer and maintained as recommended by the manufacturer;

(3) using wet suppression; or

(4) using traffic controls, including decreased speed limits with appropriate enforcement; other traffic calming methods, vehicle access restrictions and controls; road closures or barricades; and off-road vehicle access controls and closures.

B. Paved roadways:

(1) cleaning up spillage and track out as necessary to prevent pulverized particulates from being entrained into the atmosphere;

(2) using on-site wheel washes; or

(3) performing regularly scheduled vacuum street cleaning or wet sweeping with

a sweeper certified by the manufacturer to be efficient at removing particulate matter having an aerodynamic diameter of less than 10 microns (i.e. PM10).

C. Trucks hauling bulk materials on public and private roadways:

(1) using properly secured tarps or cargo covering that covers the entire surface area of the load;

(2) preventing leakage from the truck bed, sideboards, tailgate, or bottom dump gate;

(3) using wet suppression to increase moisture content of the bulk materials being hauled;

(4) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer; or

(5) maintaining a minimum of six inches of freeboard from the rim of the truck bed; freeboard means the vertical distance from the highest portion of the load abutting the bed and the lowest part of the top rim of the truck bed.

D. Active operations in construction areas and other surface disturbances:

(1) Short term control measures may include:

(a) wet suppression;

(b) dust suppressants applied in amounts, frequency and rates recommended by the manufacturer and maintained as recommended by the manufacturer;

(c) watering the site at the end of each workday sufficiently to stabilize the work area;

(d) applying dust suppressants in amounts, frequency and rates recommended by the manufacturer on the worksite at the end of each workweek if no active operations are going to take place over the weekend or if active operations stop for more than two consecutive days;

(e) starting construction at the location that is upwind from the prevailing wind direction and stabilizing disturbed areas before disturbing additional areas;

(f) stopping active operations during high wind; or

(g) clean up and removal of track-out material.

(2) Long term control measures may include:

(a) site stabilization using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer and maintained as recommended by the manufacturer;

(b) reseeding using native grasses as specified in 20.11.20.24 NMAC;

(c) xeriscaping;

(d) installing parallel rows of fabric fencing or other windbreaks set perpendicular to the prevailing wind direction either onsite or on a nearby property with the permission of the nearby property owner;

(e) surfacing with gravel or other mulch material with a size and density sufficient to prevent surface material from becoming airborne;

(f) mulching and crimping of straw or hay as specified in Subsection D of 20.11.20.24 NMAC;

(g) installing permanent perimeter and interior walls;

(h) using conventional landscaping techniques; or

(i) clean up and removal of track-out material.

E. Bulk material handling:

(1) using spray bars;

(2) applying wetting agents (surfactants) to bulk material;

(3) using wet suppression through manual or mechanical application;

(4) adding dust suppressants to bulk materials in amounts, frequency and rates recommended by the manufacturer and maintained as recommended by the manufacturer;

(5) stopping bulk material handling, processing, loading or unloading during high

wind conditions;

(6) reducing process speeds; or

(7) reducing drop heights.

F. Industrial sites:

(1) paving roadways and parking area with recycled asphalt, asphaltic concrete, concrete, or petroleum products legal for use;

(2) performing regularly scheduled vacuum street cleaning or wet sweeping;

(3) regularly using wet suppression on unpaved areas;

(4) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer, and maintained as recommended by the manufacturer;

(5) installing wind breaks;

(6) installing enclosures;

(7) installing on-site anemometers to measure wind speed; the anemometer should trigger a suitable warning mechanism such as a strobe light or an audible alarm (that will not violate any applicable noise ordinance) to notify on-site personnel of high wind conditions;

(8) increasing wet suppression applications before and during high wind conditions; or

(9) stopping active operations during high wind conditions.

G. Demolition and renovation activities when asbestos-containing materials are not present:

(1) using constant wet suppression on the debris piles during demolition;

(2) using water or dust suppressants on the debris pile, applied in amounts, frequency and rates recommended by the manufacturer;

(3) using enclosures;

(4) using curtains or shrouds;

(5) using negative pressure dust collectors; or

(6) stopping demolition during high wind conditions.

H. Milling, grinding or cutting of paved or concrete surfaces:

(1) constantly using wet suppression;

(2) continuous wet sweeping during milling, grinding, or cutting operations;

(3) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer, and maintained as recommended by the manufacturer;

(4) using enclosures; or

(5) using curtains or shrouds.

I. Pressure blasting operations:

(1) using non-friable abrasive material;

(2) using curtains, enclosures or shrouds;

(3) using negative pressure dust collectors;

(4) using constant wet suppression;

(5) maintaining ongoing clean up of abrasive material; or

(6) stopping active operations during high wind conditions.

J. Spray painting and other coatings:

(1) using enclosures that comply with applicable fire codes; or

(2) using curtains, enclosures or shrouds.

K. High wind contingency measures:

(1) installing and using on-site anemometers to measure wind speed; the anemometer should trigger a suitable warning mechanism such as a strobe light or an audible alarm that will not violate any applicable noise ordinance to notify on-site personnel of high wind conditions;

(2) using constant wet suppression;

(3) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer;

(4) using wetting agents or surfactants on disturbed areas, bulk materials or stockpiles;

(5) slowing down process; or

(6) shutting down active operations.

L. Stockpile Formation:

(1) Active stockpiles:

(a) applying wet suppression on a regular basis;

(b) utilizing wind breaks (fabric fencing or other materials);

(c) reducing vehicle speeds or using other traffic calming measures (e.g. sculpted piles); or

(d) restricting access to stockpile areas during non-work hours.

(2) Inactive stockpiles:

(a) maintaining a stable outer crust over stockpile area;

(b) using dust suppressants applied in amounts, frequency and rates recommended by the manufacturer, and maintained as recommended by manufacturer;

(c) restricting access to stockpile areas; or

(d) utilizing wind breaks (fabric fencing or other materials). [20.11.20.23 NMAC - Rp, 20.11.20.23 NMAC, 3/17/08]

20.11.20.24 NATIVE GRASS SEEDING AND MULCH SPECIFICATIONS:

A. If the fugitive dust control permit includes provisions to revegetate a disturbed area, the permittee may use the specifications described in 20.11.20.24 NMAC. When properly applied and maintained, these specifications have provided reasonably successful results in the past in Bernalillo county. They are included here as a reference for permittees and others who choose to use native revegetation as a long-term reasonably available control measure. However, use of these specifications does not guarantee success. Failure of any revegetation method as a long-term reasonably available control measure requires re-application or other control method approved by the department. The disturbed area shall maintain compliance with 20.11.20 NMAC.

(1) The native seed species used and rate of application should be as provided in Subsection F of 20.11.20.24 NMAC.

(a) If the area to be seeded is along a recreational trail of any type, the seed mixes for either type of soil listed in Subsection F of 20.11.20.24 NMAC should not include four-wing saltbush and the seeding rate should be reduced by one pound per acre.

(b) Seeds may be pre-mixed by a seed dealer. Each pre-mixed bag of seed should be sealed and labeled by the seed dealer in accordance with federal seed laws and New Mexico department of agriculture labeling laws. The label should include: variety, kind of seed, lot number, purity, germination, percent crop, percent inert, percent weed (including noxious weeds), origin, test data and net weight. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state.

(c) 48 hours before seeding, the owner or operator should give written notice to the department by hand delivery or facsimile, requesting inspection of the sealed seed bags to be used. The department may inspect the sealed seed bags and labels.

(2) **Fertilizer and soil amendments:** unless otherwise specified in the fugitive dust control permit, no fertilizer or other soil amendments are required on areas to be reseeded.

(3) **Mulch:** areas to be reseeded should be mulched as described below unless

otherwise specified in the permit.

(a) **Hay mulch:** perennial native or introduced grasses of fine-stemmed varieties should be used unless otherwise specified in the plan. At least 65 percent of the herbage by weight of each bale of hay should be 10 inches in length or longer. Hay with noxious seed or plants should not be used. Rotted, brittle, or moldy hay are not considered acceptable. Marsh grass or prairie hay composed of native grass of species to be seeded is considered acceptable. Tall wheat grass, intermediate wheat grass, switch grass, or orchard hay will be acceptable if cut prior to seed formation. Marsh grass hay should be composed of mid and tall native, usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain region. Hay should be properly cured prior to use. Hay that is brittle, short fibered or improperly cured is not considered acceptable. Hay mulch should be crosshatched crimped to minimum depth of two inches.

(b) **Straw mulch:** small grain plants such as wheat, barley, rye, or oats should not be used. Alfalfa or the stalks of corn, maize or sorghum are not considered acceptable. Material which is brittle, shorter than 10 inches or which breaks or fragments during the crimping operation are not considered acceptable. Straw mulch should be crosshatched crimped to minimum depth of two inches.

(c) **Gravel mulch:** gravel mulch should be a maximum of three-quarter to one inch in diameter and must have been crushed or screened with a minimum of one angular face. Experience has demonstrated that gravel mulch provides very successful results on steep slopes and other areas that may be difficult to stabilize.

(d) **Erosion control mats, fabric or blankets:** the type of erosion control mats, fabric or blankets used should be specified in the fugitive dust control permit.

B. Seed bed preparation:

(1) Prior to starting seed bed preparation, the final grades of all earthwork should be inspected and certified by a New Mexico licensed engineer, and a copy of the certification should be delivered to the department:

(a) no soil preparation should be performed when the surface is wet or muddy or when the soil is so moist that the soil is not fully loosened by the discing operation;

(b) if erosion, crusting or re-compaction occurs in an area before seeding, mulching and crimping are successfully completed, the area should be reworked, beginning with seedbed preparation.

(2) Mechanical preparation: the seedbed should be loosened to a minimum depth of six inches by disc or harrow. Areas of heavy or compacted soil may require additional preparation by chiseling or ripping if discing alone does not result in preparation to the full minimum depth of six inches. The soil should be worked to a smooth surface and should be free of clods, stones four inches in diameter and larger, and debris or foreign material that could interfere with seeding or crimping operations.

(3) Hand preparation: areas which cannot be prepared with mechanized equipment because of small size, irregular shape or slope may be prepared to a minimum depth of two inches using hand tools or a rototiller, as specified in the permit.

C. Seeding:

(1) Should not start until the seed bed preparation has been inspected and certified by a New Mexico licensed engineer, a New Mexico licensed landscape architect, or other professional approved by the department (e.g. a department certified erosion control specialist). Notice in writing or by facsimile providing certification pertaining to the seed bed preparation should be given to the department at least 48 hours prior to beginning seeding

operations so that the department has an opportunity to inspect the site. No seeding operations should be conducted when steady wind speeds exceed 10 miles per hour.

(2) Seed application:

(a) **Drill seeding:** drill seeding is highly recommended. Seed should be applied with a "rangeland" type seed drill equipped with packer wheels. Seed should be drilled to a maximum depth of one-half inch. Direction of seeding should be across slopes and on the contour whenever possible.

(b) **Broadcast seeding:** seed may be applied using the broadcast method when size, irregular shape, or slope exceeding three to one, prevents the use of a seed drill. Seed may be broadcast by hand or by a mechanical seeder provided that the seed is evenly distributed over the seeding area. Areas that are broadcast seeded should be seeded at a rate that is double the rate used for drill seeding. Areas of broadcast seeding should be hand raked to cover seed.

(c) **Seeding with gravel mulch:** areas to be gravel mulched should be seeded at double the standard seed rate with one-half the seed applied prior to application of gravel and one-half of the seed applied on the surface of the gravel. Water should be applied in a quantity sufficient to wash seed from the surface and into the gravel.

(d) **Hydro seeding:** hydro seeding with native grass will normally only be successful on areas that will be irrigated.

D. Hay or straw mulching:

(1) All seeded areas should be mulched unless otherwise specified in the fugitive dust control permit. On seeded areas that are level or have slopes that are a ratio of three to one or less, any of the four types of mulching below may be used. On erosion control areas or slopes steeper than a ratio of three to one, only gravel mulch or erosion control materials should be used.

(2) Hay mulch should be applied at a minimum rate of one and one-half tons per acre of air dry hay.

(3) Straw mulch should be applied at a minimum rate of two and one-half tons per acre of air dry straw. inches.

(4) Hay or straw mulch should be crosshatched crimped into the soil to a minimum depth of two

- The mulch should be spread uniformly over the area either by hand or with a mechanical mulch spreader.
- When spread by hand, the bales of mulch should be torn apart and fluffed before spreading.
- Mulching should stop when wind speeds exceed 15 miles per hour.
- The mulch should be wetted down and allowed to soften for approximately 15 to 20minutes prior to crimping.
- A heavy disc should be used to crimp or anchor the mulch into the soil to a minimum depth of two inches. A mulch-tiller with flat serrated discs at least one-quarter of an inch in thickness, having dull edges with discs spaced six inches to eight inches apart or similar equipment should be used. The discs should be of sufficient diameter to prevent the frame of the equipment from dragging the mulch.
- The crimping operations should be across the slope where practical, but not parallel to prevailing winds. In general, crimping should be in a north-south direction or in tight interlocking "S" curves to avoid straight east-west crimp lines.
- If small grain straw mulch is used, the mulch should be crimped in two directions in a cross-hatch pattern.

(5) **Gravel mulch:** gravel mulch should be laid evenly by hand or by equipment to a thickness of two inches.

(6) **Erosion control mats, fabric or blankets:** the type of erosion control mats, fabric or blankets

used should be as specified in the fugitive dust control permit. Anchoring of the erosion control materials should be consistent with the manufacturer's recommendations.Upon completion of the reseeding project, the permittee should deliver written notice to the department in a timely manner, certifying completion of seeding project.

E. Protection of native grass seeded area: the person, owner or operator who has elected to use native seeding as a control measure shall be responsible for protecting and caring for the seeded area until plants are fully established. After project completion, the owner or operator shall repair any damage to seeded areas caused by pedestrian or vehicular traffic or vandalism. During periods of low rainfall, supplemental watering may be required to successfully establish the native grass seed. Because the owner is responsible for the fugitive emissions leaving the property, failure of the reseeding project shall not be a defense to enforcement of 20.11.20 NMAC. The owner or operator may find it necessary to reseed or use other reasonably available control measures to bring the property into compliance. The department strongly recommends that any area being seeded or mulched be adequately fenced and posted to prevent trespass traffic.

F. Seed specifications and rates should be used as established by the most recent edition of "*city of Albuquerque standard specifications for public works construction - native grass seeding*" section as updated by the city or as approved in writing by the department.

G. Variations in seeding due to special environmental conditions: the owner or operator may use a different seeding mixture in order to address special environmental conditions that make it unlikely for success of the reseeding effort. Use of an annual rye (*Lolium sp*.) or cool season grasses (e.g. barley at 10 pounds per acre) may be added to the seed specification in order to help stabilize soils, especially for disturbed areas comprising 25 acres or more when a significant amount of the publicly-owned land or privately-owned real property is not expected to be built upon within one year.

[20.11.20.24 NMAC - Rp, 20.11.20.24 NMAC, 3/17/08]

20.11.20.25 REVIEW MEETING: TIMELY PETITION FOR HEARING BEFORE THE BOARD:

If a permit applicant or permittee (requestor) asks the department to meet informally to review and reconsider the department's decision regarding the applicant's permit application in the manner provided by 20.11.20.25 NMAC, the process shall not extend the 30-day deadline for filling a timely petition for a hearing before the board as provided by 20.11.81 NMAC. If a requestor is adversely affected by, or disagrees with the department's decision regarding the requestor's permit application, the requestor may request an informal review meeting to discuss the department's decision. The request shall be in writing or on a form provided by the department. Within five business days after the requestor receives the department's decision regarding the permit application, the requestor shall deliver the written request to a division manager. Within five business days after a division manager receives the request, a division manager or designee shall hold an informal review meeting with the requestor and an additional division representative (e.g. the person assigned to the permit application review) in an attempt to resolve disagreements. Within two business days after the informal review meeting, a division representative shall mail, hand deliver or deliver by facsimile a statement to the requestor stating whether the department has changed its decision regarding the permit application, and, if so, specifying the change and the reason for the change. A person who participated in a 20.11.20 NMAC permitting action before the department and who is adversely affected by the decision made by the department, may follow the procedures described in 20.11.81 NMAC to petition for a hearing before the board.

[20.11.20.25 NMAC - Rp, 20.11.20.25 NMAC, 3/17/08]

20.11.20.26 VISUAL DETERMINATION OF FUGITIVE DUST EMISSIONS:
The following method, hereafter called the "visible fugitive dust detection method", is used to visually determine the total amount of time that fugitive dust emissions are visible during a continuous one-hour observation period. If a trained department observer records visible fugitive dust crossing a property line of the property being investigated, for a total of 15 minutes or more during a continuous one-hour period, a violation of 20.11.20 NMAC has occurred. The observer does not have to be certified in procedures found in 40 CFR 60, Method 9, *Visual Determination of the Opacity of Emissions from Stationary Sources* (EPA Method 9). However, the observer shall receive training regarding how to identify a violation of 20.11.20 NMAC that is caused by anthropogenic activities and to distinguish fugitive dust that emanates from a source that is not required by a board regulation other than 20.11.20 NMAC to obtain a permit.

Training shall consist of attendance at and completion of the lecture portion of a Method 9 certification course and familiarity with the written materials provided during the course. The method described in Subsections A through D of 20.11.20.26 NMAC does not require the opacity of emissions to be determined during the observation period.

A. To correctly perform this method, the observer shall use two stopwatches. One stopwatch shall be used to record the continuous one-hour time period during which the observation is conducted. This period shall be known as the "observation period." The second stopwatch shall be used to record the total accumulated amount of time that visible fugitive dust is crossing a property line during the observation period. The second stopwatch shall establish the "visible fugitive dust emission time".

B. Prior to the observation, the observer shall:

(1) determine the location of potential fugitive dust source(s) and the location of the downwind property line for the source;

(2) sketch the location of the fugitive dust source(s), and, when available during the observation, record the observer's location on a copy of the fugitive dust control permit map or aerial photograph;

(3) sketch or photograph the location of the downwind property line and physical features that help define the property line;

(4) sketch or photograph the observer's location during the observations;

(5) sketch the position of the sun relative to the observer;

(6) document that the visible fugitive dust is not originating from an upwind source other than the source being evaluated; and

(7) maintain a minimum distance of at least 15 feet from the visible fugitive dust being observed, and a maximum distance of no more than one-quarter mile away.

C. The observer shall record:

(1) observer's name and affiliation;

(2) date of observation;

(3) company name, property owner or operators, if known;

(4) description of the fugitive dust sources;

(5) wind speed and direction (explain method of determining the wind speed, i.e., hand-held anemometer); and

(6) sky conditions.

D. The observer shall record the time of day when the observation begins. The observer shall start the first stopwatch to begin recording the observation period and shall observe along the property line. With the second stopwatch, the observer shall record the length of time visible fugitive dust is crossing the property line. The observer shall stop the second stopwatch when the visible fugitive dust is no longer detected crossing the property line. The observer shall continue this procedure during the continuous one-hour observation period or until the visible fugitive dust emission time totals 15 minutes or greater during the continuous one-hour observation period, which is a violation of 20.11.20 NMAC. The

observer shall record the time of day when the observation ends. If the observer determines that the visible fugitive dust being observed is of an intensity that may cause immediate danger to human health or safety, then, before the observation period is completed, the observer shall attempt to immediately contact the responsible person, permittee or owner. [20.11.20.26 NMAC - Rp, 20.11.20.26 NMAC, 3/17/08]

20.11.20.27 ENFORCEMENT:

A. All persons shall use control measures that are effective in maintaining compliance with 20.11.20 NMAC. Violation of a fugitive dust control permit or fugitive dust control plan approved by the department is a violation of 20.11.20 NMAC. If a violation occurs or is occurring, the department may issue a verbal warning, issue a written warning, initiate an administrative enforcement action and assess an administrative civil penalty, and take all other actions authorized by law and equity, including issuing a stop work order as authorized by 20.11.20.27 NMAC.

B. If the department determines a person has violated or is violating a requirement or prohibition of 20.11.20 NMAC, the department may initiate an administrative enforcement action and assess an administrative civil penalty for a past or current violation, or both, as authorized by 74-2-12.A.(1) NMSA. As also authorized by 74-2-12.A.(2) NMSA and 74-2-12.1 NMSA, the department may commence a civil action in New Mexico district court for appropriate relief, including a temporary or permanent injunction. In addition, as authorized by 74-2-14 NMSA, the department also may commence or cause a criminal action to be commenced.

C. As authorized by 74-2-12.H NMSA, in connection with an administrative enforcement action, the director may issue subpoenas for attendance and testimony of witnesses and the production of relevant papers, books and documents and may adopt rules for discovery procedures.

D. If a person (requestor) asks the department for an informal review meeting to consider the department's decision regarding an administrative compliance order in the manner provided by 20.11.20.27 NMAC, the process shall not extend the 30-day deadline for submitting a written request to the department director requesting a public hearing as provided by 74-2-12.C NMSA. If a person receives an administrative compliance order from the department, that person ("requestor") may request an informal review meeting to discuss the administrative compliance order. The request shall be in writing or on a form provided by the department. The requestor shall deliver the written request for an informal review meeting to the director and a division manager within five business days after the requestor has received the administrative compliance order. Within five business days of receiving the request, a division manager or designee shall hold an informal review meeting with the requestor and a division representative (e.g. division manager, compliance officer, or person issuing the order) in an attempt to resolve the administrative compliance order. Within two business days after the informal review meeting, a division representative shall mail, hand deliver or deliver by facsimile a statement to the requestor with the department's final decision regarding the administrative compliance order and the reasons for the decision. If the requestor is adversely affected by the final decision made by the department, the requestor may follow the procedures described in Subsection E of 20.11.20.27 NMAC.

E. A person who receives an administrative compliance order and chooses not to sign the compliance order or similar document as requested by the department, and comply with its terms, may request a hearing consistent with 74-2-12.C NMSA. The decision

following the hearing may be appealed consistent with 74-2-9.A NMSA.

F. Payment of an administrative civil penalty shall not prevent the department from taking additional enforcement actions, if the violation is repeated or an additional violation occurs. Payment of an administrative civil penalty for a prior or additional violation shall not be a defense to a subsequent action taken by the department to resolve an additional violation. Actions by the department may include suspension or revocation of a permit, as provided by 74-2-12.B NMSA, and issuance of a stop work order.

G. The permittee or responsible person as identified in the permit shall take all actions required by the permit to prevent a violation of 20.11.20 NMAC, including stopping active operations, if necessary. If the permittee or responsible person as identified in the permit fails to take all required actions, the owner or operator, if different, shall take all actions required to prevent or satisfactorily resolve a violation of 20.11.20 NMAC, including stopping active operations, if necessary.

H. The department may issue a stop work order, which shall suspend all active operations except for the required application of reasonably available control measures. The department also may revoke a permit issued by the department if the permittee fails to implement the reasonably available control measures required by the fugitive dust control permit.

I. If a person fails to obtain a permit as required by 20.11.20 NMAC, the department may issue a stop work order which shall require all active operations at a site to stop except for application of reasonably available control measures.

J. The stop work order, which shall be effective 24 hours after the person, permittee, owner, operator, or responsible person named in a permit receives the stop work order, unless an earlier deadline for stopping work or other activities is imposed by the department for good reason. The stop work order shall remain in effect until the person, permittee, owner, operator, or responsible person named in the permit demonstrates to the satisfaction of the department that the activities of the person, permittee, owner, operator or responsible person named in the permit comply with the provisions of 20.11.20 NMAC.

[20.11.20.27 NMAC - Rp, 20.11.20.27 NMAC, 3/17/08]

20.11.20.28 PUBLIC OUTREACH AND TRAINING:

A. The department shall provide or approve public education regarding reducing fugitive dust. The department shall maintain an electronic information system using the Internet in order to provide access to the general public and regulated business community regarding fugitive dust control programs, activities, regulations, regulatory requirements, forms and information.

B. The department shall implement a program to provide training at no cost to individuals who are or may be required to comply with provisions of 20.11.20 NMAC. Approximately twice per year, the department shall provide or approve training workshops on fugitive dust and its control to persons who conduct or participate in projects involving active operations and to other interested persons. When a person attends the training and successfully passes a test, the department or approved trainer shall issue a certificate stating that the person has successfully completed the training.

[20.11.20.28 NMAC - Rp, 20.11.20.28 NMAC, 3/17/08]

20.11.20.29 COMPLAINTS: The department shall respond to complaints from residents, businesses and others in a timely manner, but in no case shall the initial response take longer than three business days. [20.11.20.29 NMAC - Rp, 20.11.20.29 NMAC, 3/17/08]

HISTORY OF 20.11.20 NMAC:

Pre-NMAC History: The material in this part was derived from that previously filed with the commission of public records - state records center and archives.
Regulation No. 8, Airborne Particulate Matter,
filed 3/24/82. Regulation No. 8, Airborne
Particulate Matter, filed 2/17/83.

History of Repealed Material:

20 NMAC 11.20, Airborne Particulate Matter (filed 5/29/96); repealed 3/1/04.
20.11.20 NMAC, Fugitive Dust Control (filed 1/28/04) repealed 3/17/08.

Other History: Regulation No. 8, Airborne Particulate Matter (filed 2/17/83) was renumbered and reformatted into first version of the New Mexico Administrative Code as 20 NMAC 11.20, Airborne Particulate Matter, effective 12/01/95.
20 NMAC 11.20, Airborne Particulate Matter (filed 10/27/95) replaced by 20 NMAC 11.20, Airborne Particulate Matter, effective 07/01/96.
20 NMAC 11.20, Airborne Particulate Matter (filed 5/29/96) renumbered, reformatted and replaced by 20.11.20 NMAC, Fugitive Dust Control, effective 3/1/04.
20.11.20 NMAC, Fugitive Dust Control (filed 1/28/04) replaced by 20.11.20 NMAC, Fugitive Dust Control, effective 3/17/08.

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Appendix B – AMP300 - Violation Day Count Report

User ID: DNQ

VIOLATION DAY COUNT REPORT

Report Request ID: 1599999 Report Code: AMP300 Nov. 8, 2017

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	35	001	0029	81102							
	35	001	0026	81102							

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA			

SELECTED OPTIONS

Option Type	Option Value
SINGLE EVENT PROCESSING	INCLUDE EVENTS
MERGE PDF FILES	YES
AGENCY ROLE	PQAO

SORT ORDER

Order	Column
1	PARAMETER_CODE
2	DURATION_CODE
3	YEAR
4	STATE_CODE
5	AQS_SITE_ID

SCR GROUP SELECTIONS

City of Albuquerque

DATE CRITERIA

Start Date	End Date
2016 03 01	2016 05 30

APPLICABLE STANDARDS

Standard Description

CO 8-hour 1971
Lead 3-Month 2009
Lead 3-Month PM10 Surrogate 2009
NO2 Annual 1971
Ozone 8-hour 2015
PM10 24-hour 2006
PM25 24-hour 2012
SO2 1-hour 2010

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

EXCEPTIONAL DATA TYPES

EDT	DESCRIPTION
0	NO EVENTS
1	EVENTS EXCLUDED
2	EVENTS INCLUDED
5	EVENTS WITH CONCURRENCE EXCLUDED

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

PM10 Total 0-10um STP (81102)

Micrograms/cubic meter (25 C) (001)

24 HOUR (7)

2016

New Mexico

CBSA: (10740) Albuquerque, NM

SITE ID	POC	COUNTY NAME	DATE OF VIOLATION	MAXIMUM VIOLATION VALUE	EXCEPT DATA?	NUMBER OF PRIMARY VIOLATIONS	NUMBER OF SECONDARY VIOLATIONS
35-001-0026	1	Bernalillo	2016/03/22	191	2	1	1
			2016/05/06	159	2	1	1

SUMMARY FOR SITE 35-001-0026 POC 1 YEAR 2016 MAXIMUM VIOLATION VALUE 191

VIOLATION DAYS	2
PRIMARY VIOLATIONS	2
SECONDARY VIOLATIONS	2
VALID DAYS MONITORED	87

< THIS REPORT CONTAINS EXCEPTIONAL EVENT DATA >

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

PM10 Total 0-10um STP (81102)

Micrograms/cubic meter (25 C) (001)

24-HR BLK AVG (X)

2016

New Mexico

CBSA: (10740) Albuquerque, NM

SITE ID	POC	COUNTY NAME	DATE OF VIOLATION	MAXIMUM VIOLATION VALUE	EXCEPT DATA?	NUMBER OF PRIMARY VIOLATIONS	NUMBER OF SECONDARY VIOLATIONS
35-001-0026	3	Bernalillo	2016/03/22	225	2	1	1
			2016/05/06	205	2	1	1

SUMMARY FOR SITE 35-001-0026 POC 3 YEAR 2016 MAXIMUM VIOLATION VALUE 225

VIOLATION DAYS	2
PRIMARY VIOLATIONS	2
SECONDARY VIOLATIONS	2
VALID DAYS MONITORED	89

< THIS REPORT CONTAINS EXCEPTIONAL EVENT DATA >

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

PM10 Total 0-10um STP (81102)

Micrograms/cubic meter (25 C) (001)

24-HR BLK AVG (X)

2016

New Mexico

CBSA: (10740) Albuquerque, NM

SITE ID	POC	COUNTY NAME	DATE OF VIOLATION	MAXIMUM VIOLATION VALUE	EXCEPT DATA?	NUMBER OF PRIMARY VIOLATIONS	NUMBER OF SECONDARY VIOLATIONS
35-001-0029	3	Bernalillo	2016/03/22	240	2	1	1
			2016/03/29	187	2	1	1
			2016/05/06	161	2	1	1

SUMMARY FOR SITE 35-001-0029 POC 3 YEAR 2016 MAXIMUM VIOLATION VALUE 240

VIOLATION DAYS	3
PRIMARY VIOLATIONS	3
SECONDARY VIOLATIONS	3
VALID DAYS MONITORED	84

< THIS REPORT CONTAINS EXCEPTIONAL EVENT DATA >

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

PM10 Total 0-10um STP (81102)

Micrograms/cubic meter (25 C) (001)

24 HOUR (7)

2016

New Mexico

DATE OF VIOLATION	HIGHEST VIOLATION SITE	COUNTY NAME	NUMBER OF VIOLATION SITES	MAXIMUM VIOLATION VALUE	EXCEPT DATA?
2016/03/22	35-001-0026	Bernalillo	1	191	2
2016/05/06	35-001-0026	Bernalillo	1	159	2

VIOLATION DAYS 2

< THIS REPORT CONTAINS EXCEPTIONAL EVENT DATA >

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

VIOLATION DAY COUNT REPORT

Nov. 8, 2017

PM10 Total 0-10um STP (81102)

Micrograms/cubic meter (25 C) (001)

24-HR BLK AVG (X)

2016

New Mexico

DATE OF VIOLATION	HIGHEST VIOLATION SITE	COUNTY NAME	NUMBER OF VIOLATION SITES	MAXIMUM VIOLATION VALUE	EXCEPT DATA?
2016/03/22	35-001-0029	Bernalillo	2	240	2
2016/03/29	35-001-0029	Bernalillo	1	187	2
2016/05/06	35-001-0026	Bernalillo	2	205	2

VIOLATION DAYS 3

< THIS REPORT CONTAINS EXCEPTIONAL EVENT DATA >

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Appendix C – A Climatology of High Wind Warning Events for Northern and Central New Mexico: 1976-2005

Characteristics of High Wind Events across Northern and Central New Mexico

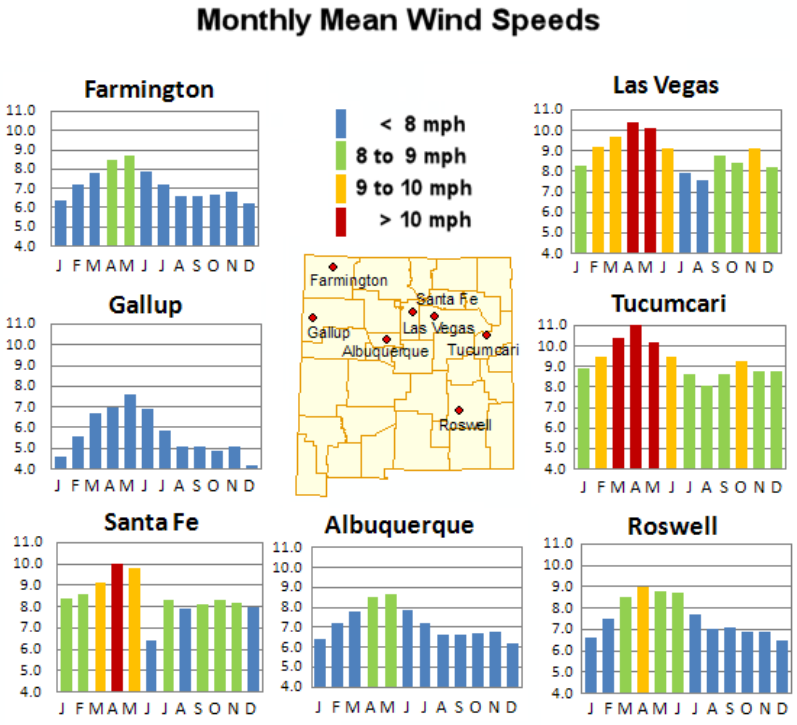
Anyone who is familiar with the climate in New Mexico knows the windiest time of the year is during the Spring months of April and May, with March and June often times not far behind. The graphs below depict mean monthly wind speeds at seven locations across the state - the Spring wind maximum is evident at all sites.

High wind events are relatively common across New Mexico, and these strong winds can have a significant impact to lives and property. Strong winds can damage buildings and uproot trees, but can also produce areas of blowing dust that can reduce visibilities making road travel hazardous.

NWS Albuquerque issues high wind warnings when winds are expected to have sustained speeds of 40 mph or greater and/or instantaneous gusts of 58 mph or higher. A study was recently completed to determine the frequency of high wind events across New Mexico, and to evaluate the synoptic regime associated with these events. This study showed that high wind events are also most common in the Spring.

High wind events often have a westerly component. During the Spring months two factors work in tandem to create strong winds. By March or April, the polar jet stream has started migrating northward but can still often influence the southwest U.S., such that wind speeds increase dramatically with height. Meanwhile, the sun angle is getting higher in the sky and creating greater heating near the surface of the earth. The heated surface air rises to a greater depth of the atmosphere during these spring months, often to a height between 7,500 and 10,000 feet above the surface. The rising air mixes with stronger winds aloft, resulting in stronger and turbulent winds mixing down to the surface. Strong surface pressure gradients can enhance surface winds. High wind events across New Mexico can also occur with strong surface fronts, especially those that race through the eastern plains.

Archived wind data can be difficult to obtain. This study was completed using data from eight airport sites across northern and central New Mexico - the seven sites listed in the figure below, and also Clayton in the northeast corner of the state. Some sites had more available data than others, resulting in more robust statistics. It is also important to note that there are locations in New Mexico that experience stronger winds, but have no record of observations available.



A Climatology of High Wind Warning Events for Northern and Central New Mexico: 1976-2005

Todd Shoemake
NWS WFO Albuquerque
May 2010

Introduction

High wind events frequently plague northern and central New Mexico due to synoptic, seasonal, and diurnal processes. These high wind events pose significant challenges to forecasters, and they can often have significant effects to life and property within New Mexico. High wind warnings are issued for northern and central New Mexico by the Albuquerque forecast office for non-convective wind events reaching standardized thresholds for speed. These thresholds are defined as winds having sustained speeds of 40 mph or greater and/or instantaneous gusts of 58 mph or higher. Thus, a thorough assessment of climatological wind data across northern and central New Mexico would benefit forecasters by providing supplemental knowledge of the synoptic regimes and frequency of high wind events.

Therefore, the first objective of this wind study will be to determine a climatology of high wind events for Albuquerque and seven additional sites across northern and central New Mexico. As this first objective is completed, any preconceived forecaster assumptions may be confirmed or refuted, ultimately aiding the overall forecast and warning decision-making processes. A few generalized hypotheses will be discussed in anticipation of results of the study, along with the methodology of both acquiring the data set as well as the statistical analyses performed to generate this climatology. Documented high wind events will then be partitioned into subsets, and will be interrogated before a classification of synoptic settings is applied in order to equip forecasters with conceptual models for recognizing such events.

Data and Methodology

Surface observations from the National Climatic Data Center were first obtained for a 30-year climatological record for the Albuquerque International Sunport, with data sets for additional sites added after preliminary analyses of the Albuquerque data. This complete data set spanned a timeframe from 1976 to 2005 and included both hourly surface observations and any special interim surface observations. More than two million total observations for Albuquerque and other sites were tallied, sorted, and parsed using *Excel*© software. As previously defined, all individual observations meeting the 40 mph (35 kt) sustained wind speed threshold and/or the instantaneous 58 mph (50 kt) gust threshold were considered for a preliminary high wind event. By definition, high wind warnings require only one observation to verify a non-convective high wind event, however rigorous quality assurance was performed to eliminate contamination of shorter duration high wind events that were induced by convection. Any preliminary event that did not contain at least three consecutive hourly observations of sustained wind speeds of at least 31 mph (including the initial observation meeting high wind criteria) was deemed as a short duration convective event, and thus was irrelevant to the study. This lower bound wind speed threshold of 31 mph for preceding and trailing observations was chosen based on the premise of another local office policy, which defines sustained wind speeds of 31 mph (27 kt) as hazardous,

yet not life-threatening and thus worthy of an advisory product. In addition, reports of thunder as well as precipitation groups within individual observations were examined to aid in determining if events were induced from nearby convection.

It should also be noted that the Automated Surface Observing System (ASOS) was commissioned at Albuquerque circa 1994, and for the purposes of this study it is assumed that no quality degradation occurred during this transition from fully manned surface observations to occasional human augmentation of the ASOS wind data.

Results are first presented for Albuquerque, and are followed by similar results for seven additional sites in northern and central New Mexico.

Albuquerque

After parsing and quality checking the complete data set, a total of 55 high wind days or events were found at Albuquerque during the 1976 to 2005 time frame. This gives a yearly distribution as depicted in Fig. 1 with less than two non-convective wind events occurring per year on the average. Further analysis of temporal distributions will be elaborated upon in following sections, but first wind direction will be investigated in order to classify additional event characteristics.

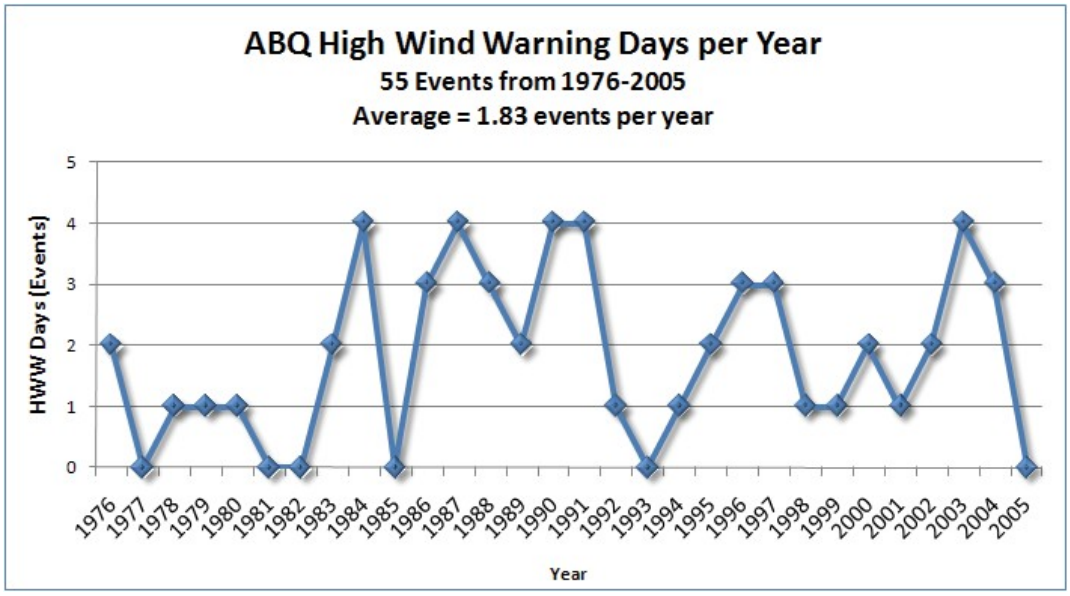


Figure 1. The frequency of high wind events at the Albuquerque Sunport from 1976 to 2005

Two Subsets for Albuquerque

An initial hypothesis was considered before analyzing the directional tendencies of high wind events at Albuquerque. Although strong east wind events are common in Albuquerque, it was hypothesized that high wind events would be predominantly from a westerly and southwesterly direction. Qualitative analysis of each of the 55 high wind days (events) quickly revealed a sharp distinction between two different types of high wind events for Albuquerque. With wind direction as the sole deterministic variable, a sharp contrast was defined between easterly high

wind events versus westerly high wind events. Figure 2 depicts the partition of the frequency of high wind observations by wind direction.

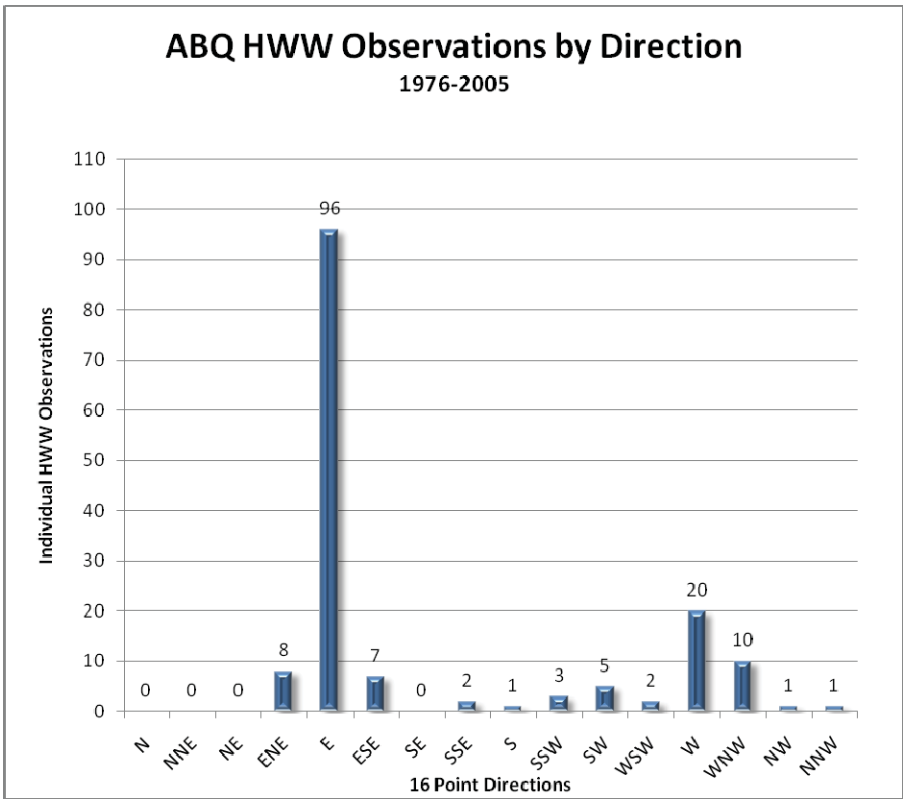


Figure 2. Frequency of high wind observations by wind direction at the Albuquerque Sunport.

Contrary to the initial hypothesis, the dominant type of high wind event was clearly the easterly event (Fig. 2). Of all the individual high wind observations, 96 (61.15%) were composed of an easterly wind direction (090°). Common forecaster knowledge from the local area associates these easterly high wind events with the local gap effect, or increased wind speeds associated with local topographical channeling from the Tijeras Canyon east of the city of Albuquerque.

Noted in Fig. 2, a second cluster is evident among events occurring with a westerly directional component. From other recurring trends known to forecasters, these westerly events are generally associated with the more dynamic weather events that affect New Mexico, most frequently in the winter and spring months as deep upper level troughs of low pressure sweep across the southwestern states. Because the two distinct maxima from both easterly events and westerly events are each artifacts of two sharply different weather mechanisms, a decision was made to divide the data into two subsets of westerly and easterly events which could then be independently analyzed. With easterly events centered about a directional mode of 090°, this first easterly subset was broadly defined by any observations hosting wind direction from an azimuthal range of 000° to 179° on the compass rose. Those deemed as westerly high wind events were centered on a directional mode of 270°, and thus were defined by observations hosting wind directions from an azimuthal range of 180° to 359° on the compass rose. After partitioning the events into two subsets, easterly events outnumbered westerly events 36 (65.45%) to 19 (34.55%).

Additional surface data for the Albuquerque Metro area came into existence when an Automated Weather Observation Site (AWOS) was installed at the Double Eagle Regional Airport (AEG) on the western side of Albuquerque. Unfortunately, archived data is sparse and intermittent through the last quarter of 2001, and only became consistent by late January 2002. This left only a small window of less than 4 years available for comparison with Albuquerque Sunport data.
Between January 2002 and December 2005, only 2 westerly high wind events were recorded at the Albuquerque Sunport, and high westerly winds were observed on both of these days at the Double Eagle airport. Although other high wind events were recorded at each airport site, these were the only two dates that coincided. Details are listed in the table below.

ABQ vs. AEG High Wind Correlation			
Date	**ABQ**	**AEG**	**Orientation**
4/27/2002		YES	WESTERLY
6/20/2002	YES		EASTERLY
8/1/2002	YES		EASTERLY
1/6/2003	YES		EASTERLY
2/2/2003		YES	WESTERLY
4/15/2003	YES	YES	WESTERLY
5/20/2003	YES		EASTERLY
11/22/2003	YES	YES	WESTERLY
3/11/2004	YES		EASTERLY
4/3/2004	YES		EASTERLY
5/11/2004		YES	WESTERLY
6/3/2004	YES		EASTERLY

Temporal Distribution for Albuquerque

As was expected, Fig. 3 illustrates that easterly high wind events were less frequent through the summer months (July, August, and September). This will be investigated from a more in-depth standpoint later, but a lack of synoptic cold fronts in the eastern to northeastern parts of the state is assumed to be the sole culprit for this result. Substantial easterly gap or canyon wind events are documented frequently during the summer months, however these wind events are typically induced by remnant summertime convection and associated mesoscale boundaries propagating westward through the Tijeras Canyon. In addition, data suggest these convectively induced easterly events are predominantly weaker than their synoptically driven counterparts, rarely exceeding high wind criteria. Recall that the focus toward non-convective wind events will be retained for the purposes of this study.

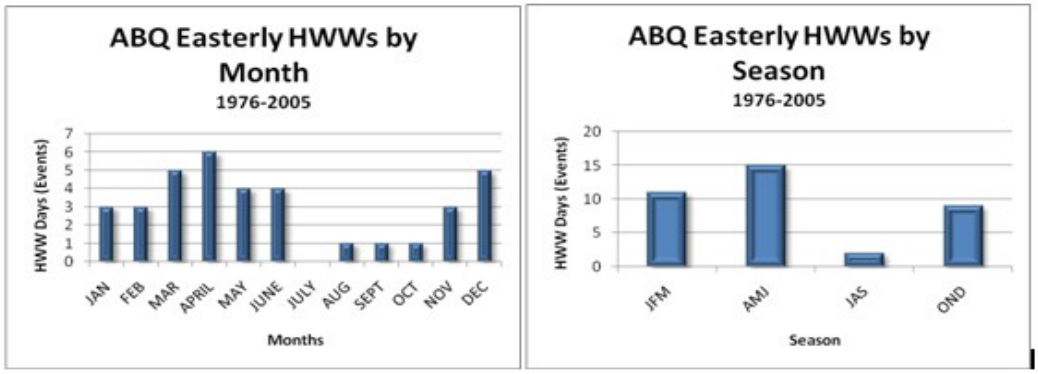


Figure 3. Frequency of easterly high wind events by month (left panel) and by season (right panel) at the Albuquerque Sunport.

Westerly high wind events (Fig. 4) favored the winter to spring months with slightly fewer events noted in the fall season. No westerly events were recorded during the summer months (JAS), as can be expected due to the seasonal lack of westerlies aloft.

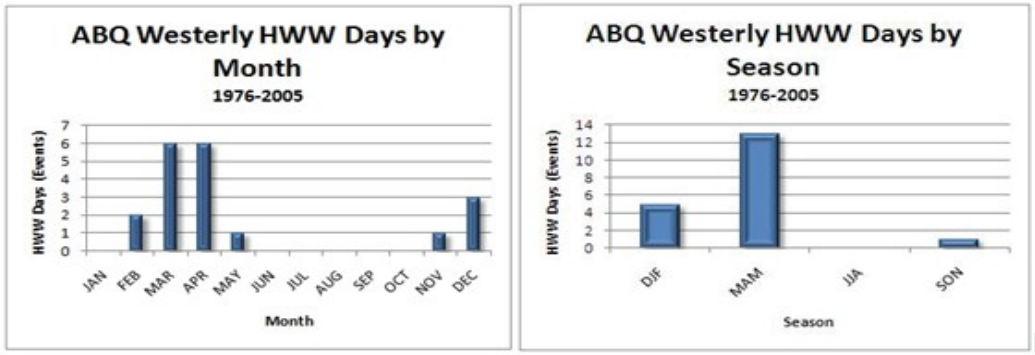


Figure 4. Frequency of westerly high wind events by month (left panel) and by season (right panel) at the Albuquerque Sunport.

Data were also analyzed to develop trends regarding the time of day in which high wind events occur. Easterly high winds have been observed at all hours of the day, but these events seem to undergo a lull or weakening near the hours surrounding both dawn and dusk, as evidenced by the two minima occurring at 0700 MST and 1600 MST in Fig. 5. The wide variability in the timing of these easterly high wind events corresponds fittingly to the high variability in the timing of frontal passages in the eastern to northeastern sections of New Mexico.

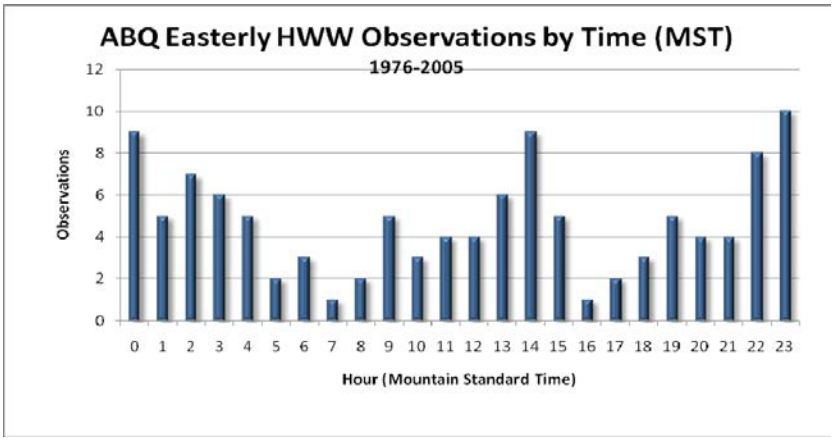


Figure 5. Frequency of easterly high wind observations by hour for the Albuquerque Sunport.

In contrast, westerly events are confined to a much narrower spectrum regarding time of day with events favoring the mid to late afternoon hours, as shown in Fig. 6.

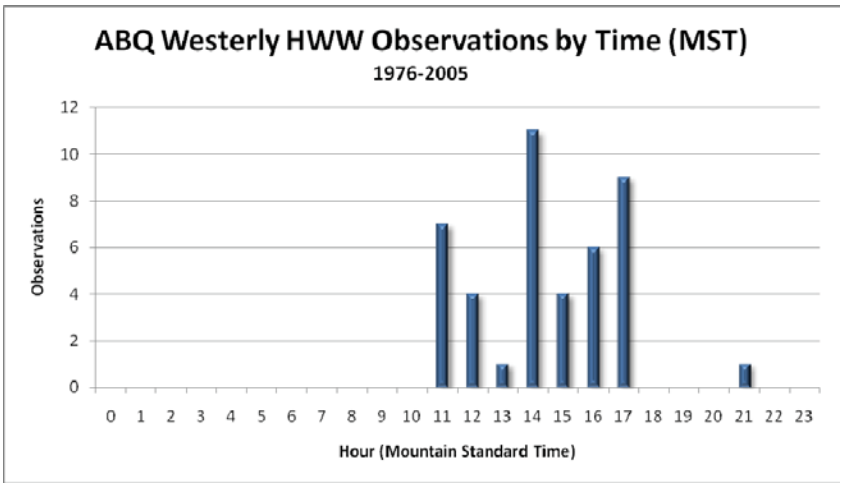


Figure 6. Frequency of westerly high wind observations by hour for the Albuquerque Sunport.

There is an initial assumption or hypothesis that these westerly high wind events are diurnally driven, due to a dependence upon vertical atmospheric mixing at peak heating hours. This hypothesis was explored further by interrogating temperature lapse rates from atmospheric soundings recorded on these westerly high wind event days. This was acomplished by recreating individual soundings from the University of Wyoming web site at: http://weather.uwyo.edu/upperair/sounding.html.

Because soundings are recorded twice a day at 0000 UTC and 1200 UTC, the data closest to the high wind observations were chosen, all of which turned out to be 0000UTC soundings recorded in the afternoon. Temperature lapse rates within the boundary layer were then individually scrutinized for the presence of an adiabatic to superadiabatic lapse rate rate (-9.8°C/km) off of the ground surface. All analyzed soundings revealed such lapse rates, indicative of a well-mixed atmospheric boundary layer (see Fig. 7). Variability was found in the depth of the boundary layer for different events with mixing heights ranging from 750 hPa (approximately 900 m AGL) to 475 hPa (approximately 4,500 m AGL), along with a mean mixing height of 599 hPa (approximately 2,700 m AGL) for all 19 westerly events. Therefore, the conclusion is made that sufficient surface heating and a well-mixed boundary layer is indeed a requirement for stronger momentum aloft to be mixed to the surface for any westerly high wind event at Albuquerque.

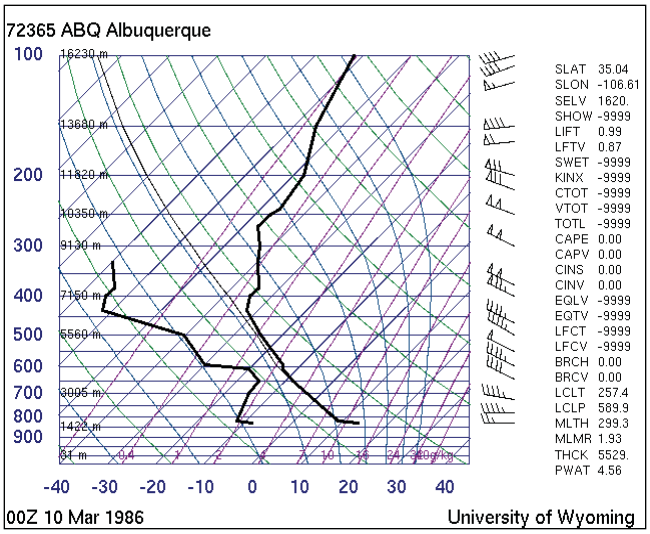


Figure 7. Atmospheric sounding example for March 10, 1986 at 0000UTC indicating a superadiabatic lapse rate within the first several meters above the surface and a subsequent dry adiabatic lapse rate to approximately 610 hPa. Winds in excess of 40 kt are evident within the boundary layer.

Synoptic Regimes for Albuquerque

Synoptic weather analyses were also performed in order to gain a perspective on distinct weather patterns responsible for generating these high wind events at Albuquerque. Conceptual models can then be extracted and applied for future guidance in forecasting and warning descision- making. These analyses will be broad encompassing composite reanalysis charts of pressure at mean sea level along with charts of geopotential height on 500 hPa pressure surfaces. These charts were created using NOAA's Earth System Research Laboratory website. Individual dates for both easterly and westerly events were tallied separately, and then used to construct the composite maps of the mean pressure or geopotential height for all high wind days.

For easterly events, it has been mentioned that the progression of synoptic surface fronts across northern and eastern portions of the state of New Mexico play a pivotal role in the genesis of the easterly gap wind at Albuquerque. This theory is supported by a mean composite sea level pressure using NCEP/NCAR reanalyses. As depicted in Fig. 8, a strong signal of higher sea level pressure values is evident to the north and east of both Albuquerque and the broader state as a whole, indicating a mean placement and progression of southeast to northwest oriented cold fronts just west of this region of greater sea level pressure. More specifically, the 1023 hPa contour is noted just on the northeast corner of the state.

Continuing with the analysis of easterly events, well-defined signals also existed within the 500 hPa geopotential height composite map. The dominant feature appears in the form of a deep upper level trough across the intermountain west. The objective analysis suggests a 575 decameter contour that is evolving to or from a state of closing off into an upper low. This particular synoptic scenario leaves a south to southwesterly flow aloft across New Mexico. This upper "troughing" plays a major, yet seemingly indirect role in the formation of lee side surface cyclones and associated frontal boundaries which often propagate westward and hence drive most of the Albuqueruque easterly gap wind events. Pressure falls aloft are induced by slower moving short wave troughs across the intermountain west, and these pressure falls are coupled to

the steering and placement of areas of surface high pressure farther east. As previously noted, the lack of easterly events during the summer months coincides with a lack of synoptic cold fronts affecting areas north and east of the Albuquerque area, which in turn also correlates with the lack of a favorable upper flow regime.

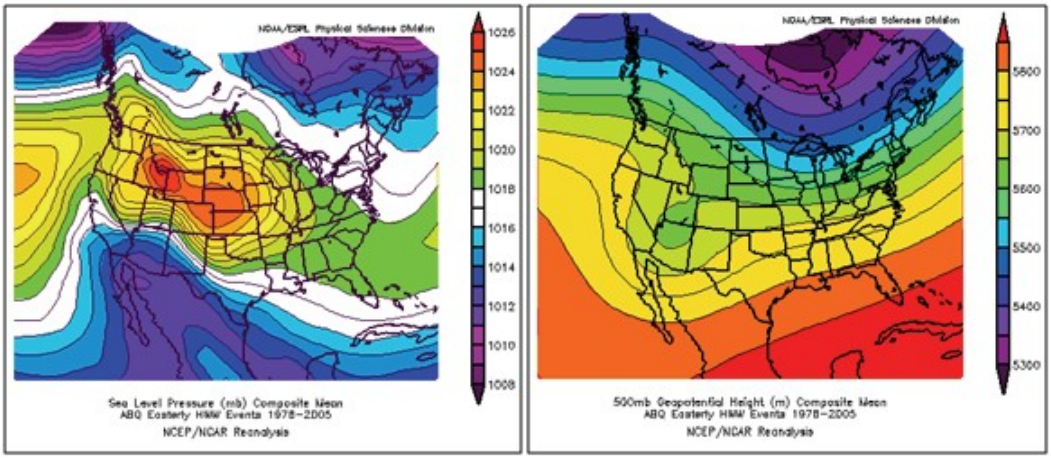


Figure 8. Composite charts of all easterly high wind events at the Albuquerque Sunport with Mean Sea Level Pressure (left) and 500 hPa Heights (right).

After examining hourly distributions and corresponding sounding data of westerly high wind events, it was clearly evident that these events are dependent upon vertical mixing at peak heating hours during the daytime. To elaborate on this regime, the mean composite analyses of all westerly event dates indicated clear synoptic scale features, beginning with the sea level pressure analysis which located a significant lee side surface cyclone centered near the southeastern Wyoming and northeastern Colorado border (mean sea level pressure at 1006 hPa). The pressure falls extend southward into the Texas panhandle and northeastern New Mexico outlining a familiar lee side trough recognized by many local and regional forecasters.

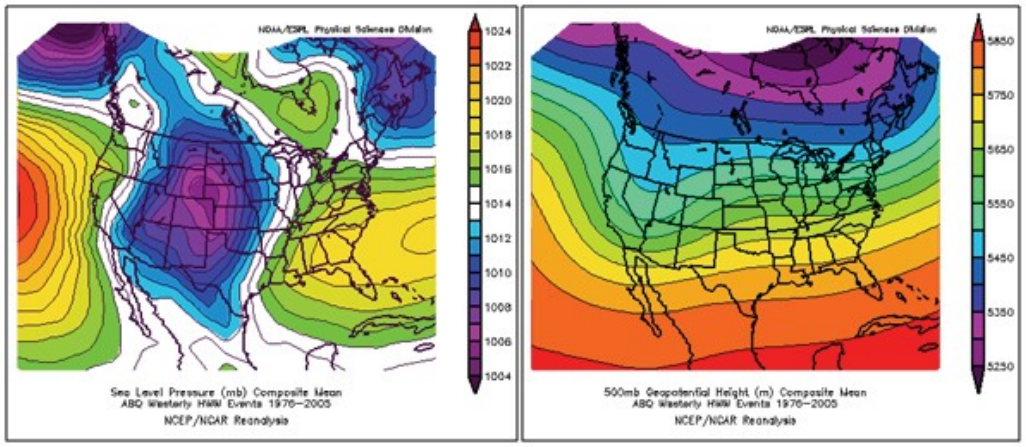


Figure 9. Composite charts of all westerly high wind events at the Albuquerque Sunport with Mean Sea Level Pressure (left) and 500 hPa Heights (right).

For westerly events, the mean flow aloft supplements the aforementioned lee side cyclone/trough at the surface. Mean composite height analysis at 500 hPa suggests gentle longwave troughing in the flow aloft with 555 decameter contours tracing the southern tip of the state of Nevada, also where the trough axis is juxtaposed.

Further analysis of individual 500 hPa height reanalysis data from the National Center for Environmental Prediction suggests that most westerly high wind events occurred within the presence of a deep 500 hPa trough exhibiting heights of two to three standard deviations lower than climatological averages. These troughs were generally located over the southwestern United State (specifically AZ and NM), however some geographical variability was noted with extreme cases involving upper level trough/low placement as far north as the Minnesota-Ontario border. Of the 19 westerly events, six were associated with closed upper level lows with placement ranging from northern Minnesota southward to the Baja peninsula of Mexico. Three of the six closed low events exhibited the feature within a southern Nevada and Utah vicinity, each deepening to two standard deviations below the mean height field for each specific date. One such example is displayed below for a westerly event that occurred on April 11, 1991.

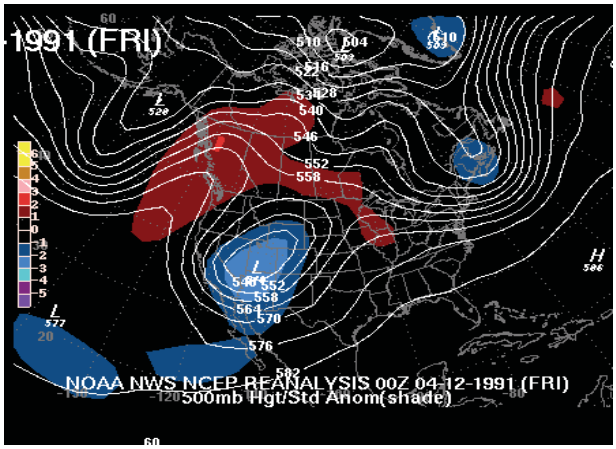


Figure 10. 500 hPa Heights and Standard Anomalies for a westerly high wind event on April 11, 1991.

Upper trough orientation, defined by the slope of the horizontal axis of the 500 hPa trough, was determined for each event. Only 3 westerly events were classified as having a negatively tilted trough axis, and two of these events exhibited only a slight negative tilt. This left a fairly even distribution of both positive and nuetrally tilted axes for remaining events. Jet streak orientation also correlates to trough orientation for individual events, and most events were found to host strongest jet cores to the east southeast of the trough axis, often placing them out of the continental United States and into Mexico. Speed maxima observed at 250 hPa ranged from 70 to 130 kt with spatial variability limiting the recognition of conspicuous jet streak patterns or signals.

Strong pressure gradients over New Mexico are thus inferred from all of these analyses, providing a source region for downward transport of increased momentum and high surface wind speeds and gusts. Again, this vertical mixing is highly reliant on sufficient surface heating and increased lapse rates at the low to mid levels of the atmosphere.

Conclusions for Albuquerque

Hourly surface data from Albuquerque were reviewed for a 30 year record (1976-2005), and a parsed climatological record of high wind events was constructed. This record indicated two subsets of high wind events at Albuquerque: the dominant easterly events generated by the gap wind and the less frequent westerly events caused by strong pressure gradients and momentum aloft mixed to the surface. The temporal distribution of these two subsets were analyzed with easterly events occurring at all hours of the day, favoring the fall to spring months. Westerly events were strictly observed in the late afternoon to early evening hours, and also ommited the summer months. The synoptic setting for easterly events was reviewed and defined by an anomalous signal of higher surface pressures to the north and east of Albuquerque. This signal was predominantly linked to synoptic cold fronts which spill westward through the Tijeras Canyon. In contrast, the westerly events were defined by a lee side surface trough/cyclone in the eastern high plains of New Mexico and Colorado coupled with a short wave trough over the southwestern states. The dependence on daytime heating for vertical atmospheric mixing was linked to this westerly process as well.

Surrounding Sites across Northern and Central New Mexico

Seven additional observation sites were used to expand the climatological record of high wind events across northern and central New Mexico, including Farmington, Gallup, Santa Fe, Las Vegas, Tucumcari, Roswell, and Clayton. A similar methodology was applied for each site, to gain a sense of the seasonal and diurnal distributions of high wind events, as well as other specific characteristics of the events over a thirty year timeframe. An overview of the preliminary findings is shown in Fig. 11.

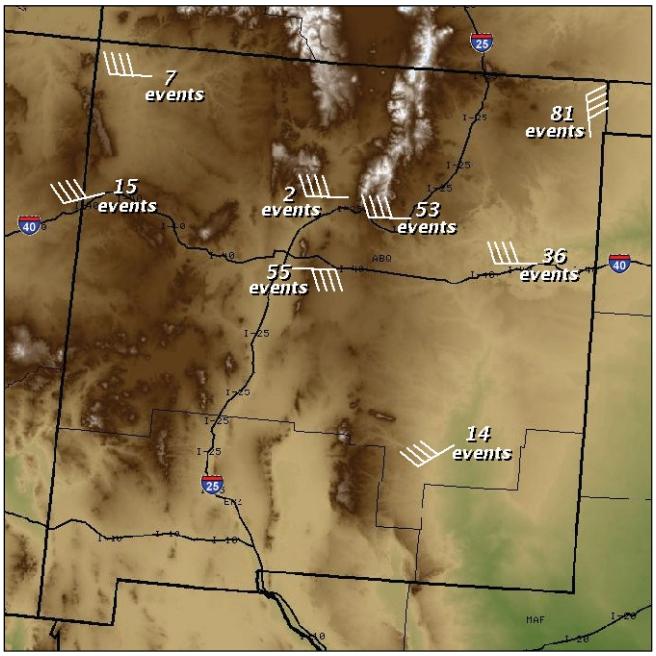


Figure 11. High Wind Events Recorded across the Albuquerque County Warning Area: 1976-2005

In addition to depicting the number of high wind days or events recorded for each site during the 1976 to 2005 timeframe, the following table also displays the primary wind direction, the months and the hours that these events occurred under. A brief synopsis of the findings for each site will then follow.

SITE	# EVENTS	DIRECTIONAL MODE	OCCUR IN XX MONTHS	OCCUR IN XX HOUR OF DAY (MST)
FMN	7	WEST	J **F M** A **M J** J A S O	0 1 2 3 4 5 6 7 8 9 10 11 **12** 13 **14 15** 16
GUP	15	WEST SOUTHWEST	J **F M A M** J J A S O	0 1 2 3 4 5 6 7 8 9 10 **11 12 13 14 15 16**
ABQ	55	EAST	**J F M A M J** J **A S O**	**0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16**
SAF	2	WEST	J **F M** A M J J A S O	**0** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
LVS	53	WEST	**J F M A M J** J A **S O**	0 **1 2 3 4 5 6** 7 **8 9 10 11 12 13 14 15 16**
TCC	36	WEST	**J F M A M** J J A S O	0 1 2 **3** 4 5 6 **7 8 9 10 11 12 13 14 15 16**
ROW	14	WEST SOUTHWEST	**J F M A M** J J A S O	**0** 1 2 3 4 5 6 7 8 9 **10 11 12 13 14 15 16**
CAO	81	NORTH	**J F M A M J** J A **S O**	**0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16**

Farmington (FMN - Northwest New Mexico)

A fairly consistent record of 24 hour observations was obtained from the National Climatic Data Center (NCDC) for Farmington. Although, the station site was apparently moved a couple of times within the selected 1976-2005 period, one of which was in 1981 where overnight observations were missing from August 4, 1981 through September 19, 1981. Only seven non- convective high wind events were recorded between 1976 and 2005 (average 0.23 events per year) as shown in the table above and in Fig. 12a. Winds were predominantly westerly during these seven high wind events with some high wind observations exhibiting a southerly to southwesterly direction (Fig. 12b).

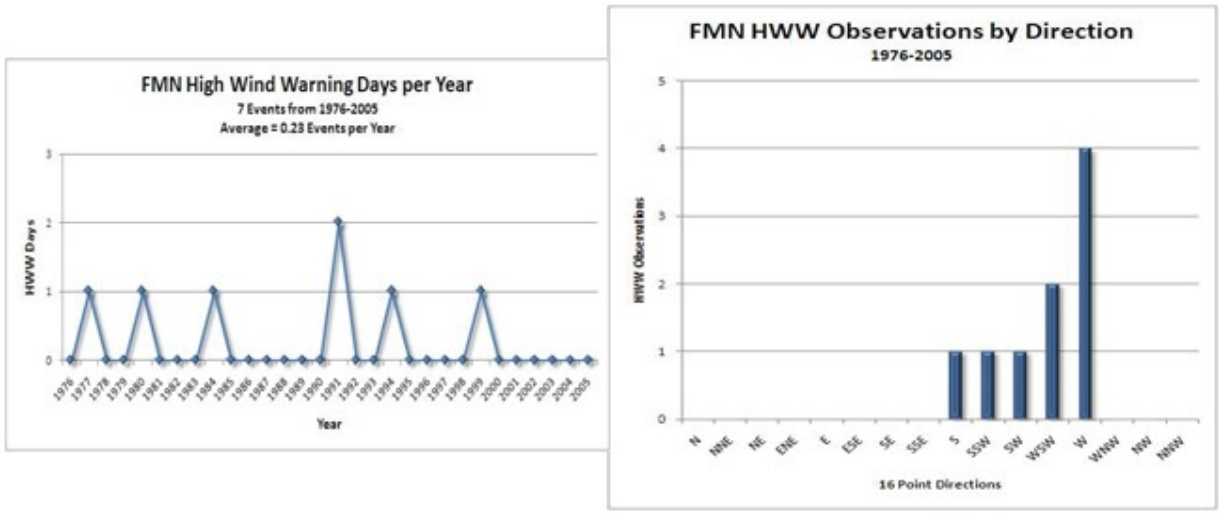


Figure 12. Number of high wind events per year at Farmington (FMN) Airport (left) and high wind events partitioned by direction (right).

Similar to other sites, the majority of these events occurred in the spring months of March, April, and May (Fig. 13a). No matter the time of year, all high wind events at Farmington were recorded during the afternoon and early evening hours when strong winds aloft were juxtaposed with peak heating and sufficient vertical mixing (Fig. 13b).

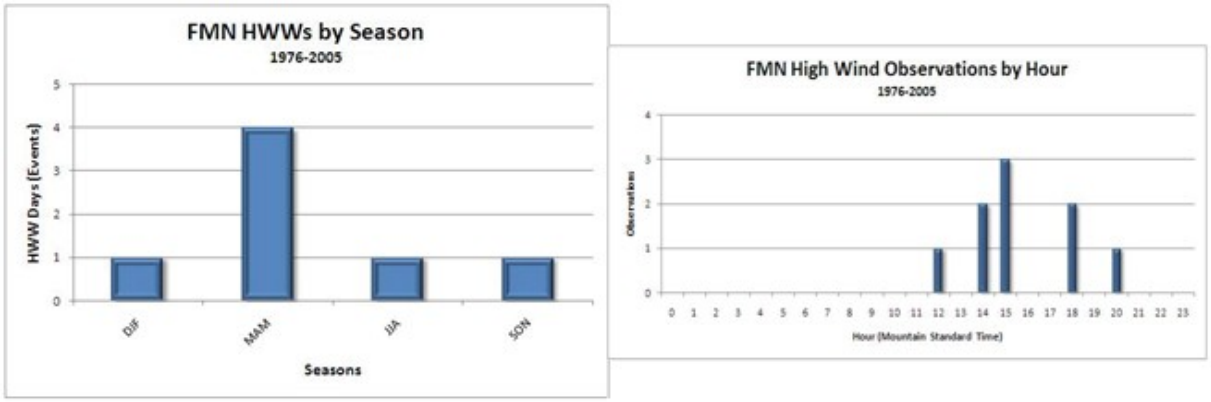


Figure 13. Frequency of high wind events by season (left) and by hour (right) at Farmington Airport

Of the seven high wind events recorded at Farmington, four events were driven by closed upper level lows evident in geopotential height fields at 500 hPa. Three of these closed low events displayed heights of 3 standard deviations lower than average. The remaining events that displayed open wave troughs rather than closed lows were shown to have strong jet cores present at 250 hPa which perhaps overcame the lack of a stronger mid tropospheric perturbation. An example of such an event occurred on March 11, 1991, and standard height fields were reconstructed of this event utilizing reanalysis data from NCEP (National Center for Environmental Prediction).

Gallup (GUP – West Central New Mexico)

A thorough dataset was available for Gallup, with 24 hour observations recorded throughout the full 30 year record. During this period, a total of 19 events were recorded, with no more than two in a year. High wind events occurred primarily with west southwest winds.

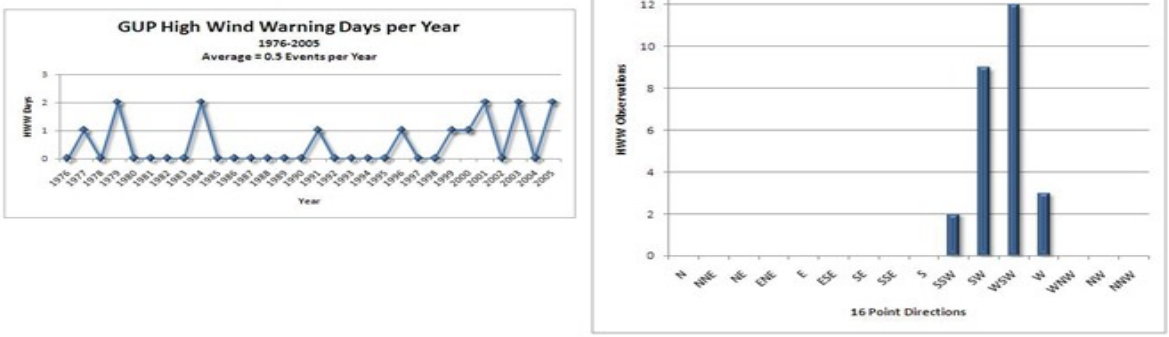


Figure 14. Number of high wind events per year at Gallup (GUP) Airport (left) and high wind events partitioned by direction (right).

The overwhelming majority of events took place within the spring months at Gallup, and no events were recorded in the summer months that follow. All events recorded at Gallup occurred in the daytime with most events distributed in the afternoon hours.

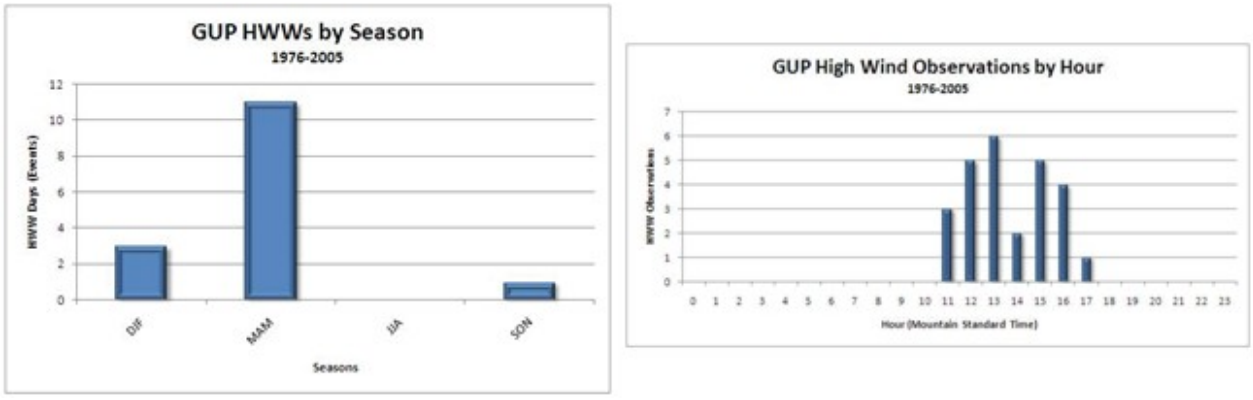


Figure 15. Frequency of high wind events by season (left) and by hour (right) at Gallup Airport.

Similar to the trend of other sites recording westerly high wind events, the presence of a mid tropospheric perturbation was present for all events recorded at Gallup between 1976 and 2005. The characteristics of these perturbations displayed wide variance for different events from closed lows to open short wave troughs. Interestingly, almost every event displayed a neutrally tilted trough or closed low. Reanalysis data for a sample event on April 19, 2001 can be seen in Appendix 2.

Santa Fe (SAF – North Central New Mexico)

During the 30 years of data analyzed, only three events were recorded at Santa Fe, however one caveat should be mentioned. It was found that from June 16, 1977 overnight observations were not recorded through the next 20 years leading up to October 3, 1997 when full 24 hour observations were reinstated. All three events recorded at Santa Fe were comprised of westerly winds favoring the late afternoon and evening hours in the months of February and March. An example is listed in Appendix 3.

Las Vegas (LVS – Northeast New Mexico)

Surface data during the overnight hours was repeatedly missing for many segments of the Las Vegas climatological record. Most of the surface data was observed manually, and there was likely no justification for employing observers for all hours of the day at an airport with relatively undemanding aviation traffic. The table below summarizes these periods when overnight observations were unavailable.

24 hour Observations	Missing Overnight
1/1/1976 through	6/16/1977 until
1/1/1981 through	6/19/1983 until
10/30/1983 through	6/1/1984 until
10/12/2000 through	

Figure 16a below reveals that nocturnal high wind observations were recorded at Las Vegas, despite the many segments of missing data during the overnight hours. Thus, it is assumed that the total count of high wind events at Las Vegas, as well as the details of the distribution of these events, are likely unrepresentative. This could also account for the erratic year to year distribution of events as indicated in Figure 16a.

Fifty-three events were recorded at Las Vegas from 1976 to 2005, however overnight observations were missing from large partitions of the dataset. In particular, from late May in 1984 to October 2000, no overnight observations were recorded, and this could likely account for an inaccurate reflection of the distribution of these high wind events from year to year, as well as the diurnal distribution of high wind events at Las Vegas. Most high wind events at Las Vegas were westerly, but a small number of observations meeting high wind criteria were recorded from the north and north northeast.

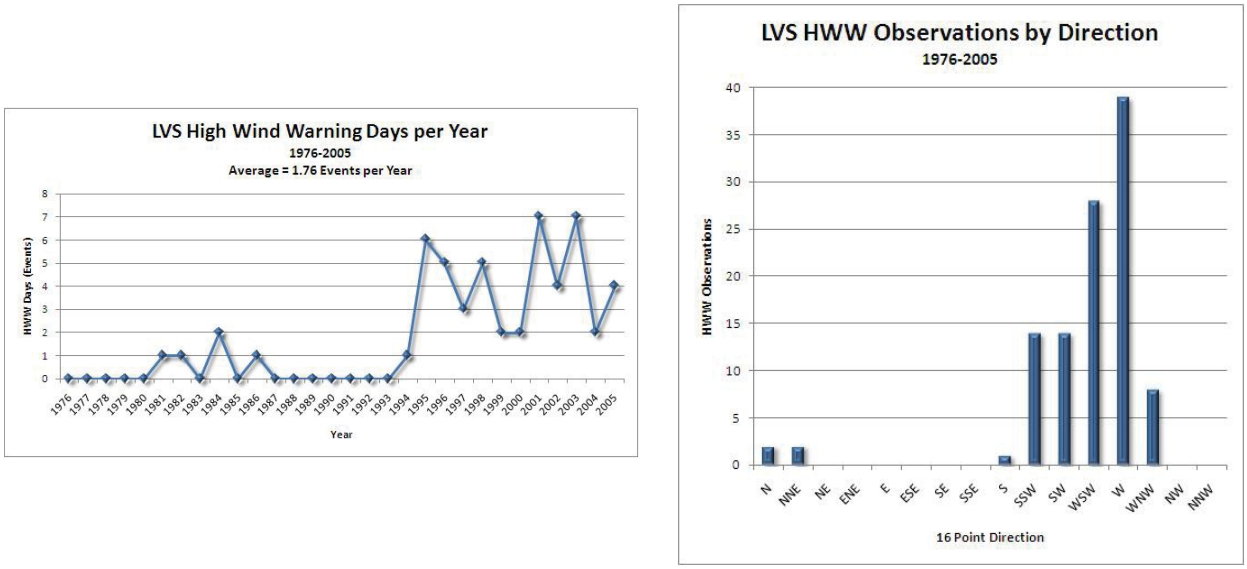
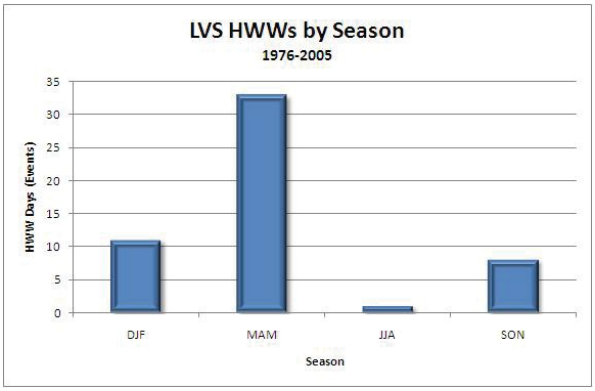


Figure 16. Number of high wind events per year at Las Vegas (LVS) Airport (left) and high wind events partitioned by direction (right).

Trends were noted in the seasonal distribution of high wind events at Las Vegas, similar to those of other previously discussed observation sites, with a maximum noted in the spring months and a minimum during the summer months.

One distinction of the data analyzed at Las Vegas versus other sites is the temporal distribution throughout a 24 hour day period. At Las Vegas high wind observations were recorded in the late night and early morning hours leading to a hypothesis that diurnal heating is not necessarily a lone requirement of all high wind events at this location. With so many observations missing during the overnight hours of the data set, it is also suspected that a significant count of undocumented events occurred during these data-void times.



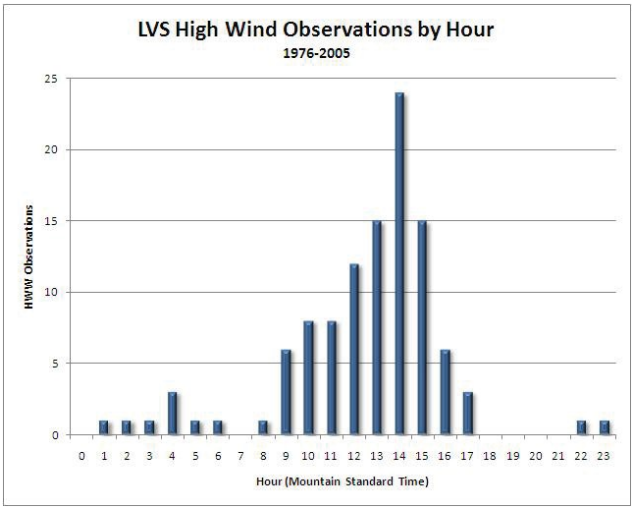


Figure 17. Frequency of high wind events by season (left) and by hour (right) at Las Vegas Airport.

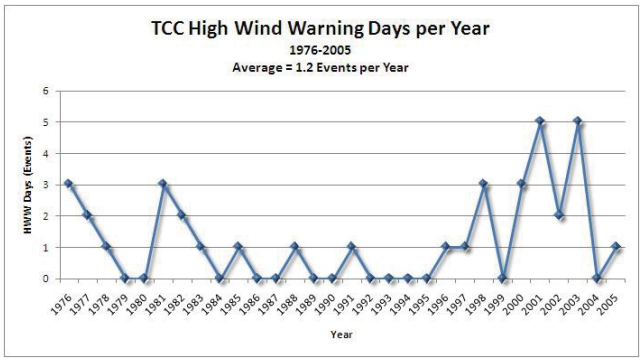
Appendix 4 reveals a typical westerly high wind event at Las Vegas where a substantial upper level low pattern is present with heights of 2 standard deviations below average. Most events at Las Vegas were characterized by this type of regime with an open trough or upper low remaining neutrally tilted with a strong jet streak present on the southern and eastern periphery of the feature in most cases. A significant surface trough or cyclone was also present to the lee of the Rocky Mountains for the entire domain of high wind events for Las Vegas.

Tucumcari (TCC – East Central New Mexico)

Similar to other sites in northeast New Mexico, many segments of data were missing overnight observations at Tucumcari, yet observations were still recorded every day within the selected 30 year period, making it a worthy site to evaluate. The table below summarizes the missing data segments at Tucumcari, and could account for some of the findings listed in figures 18 and 19.

24 hour Observations	Missing Overnight
1/1/1976 through	6/29/1980 until
10/5/1980 through	10/5/1982 until
9/7/2000 through	

An average of 1.23 events per year was recorded at Tucumcari with a total of 37 events. Note that data at Tucumcari was not recorded during overnight hours from October 1982 through September 2000, leaving some void and potentially unrepresentative areas in the data. Similar to Las Vegas, data at Tucumcari reveals high wind events primarily were of a westerly direction with a few observations reported from the north and north northeast as seen in Figure 18b.



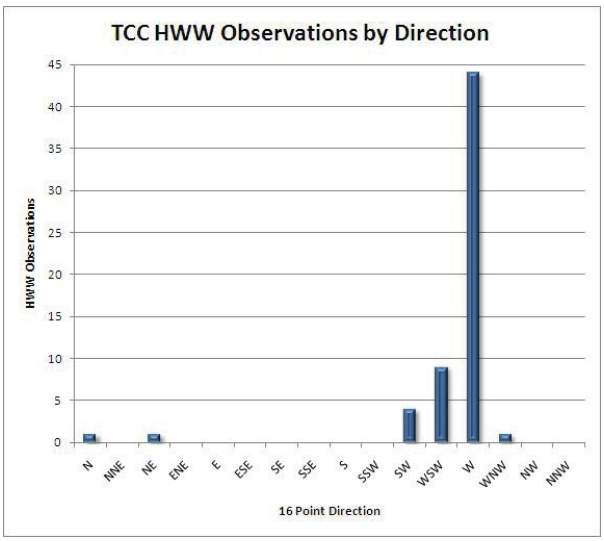
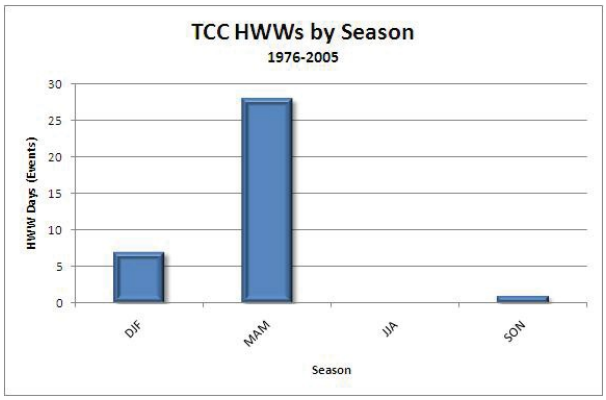


Figure 18. Number of high wind events per year at Tucumcari (TCC) Airport (left) and high wind events partitioned by direction (right).

The majority of high wind events occurred during the spring months at Tucumcari with no high wind events documented during the summer. A small quantity of high wind observations were recorded in the early morning and late night hours, however the early to mid afternoon hours were the more common time frame.



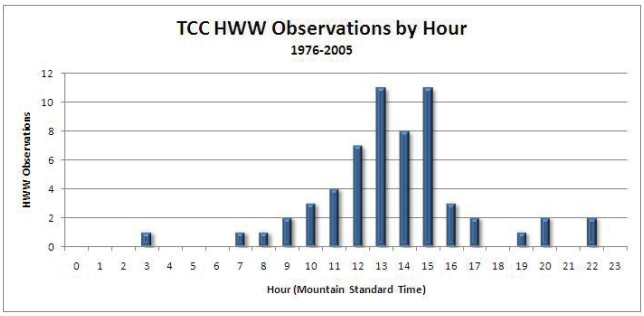


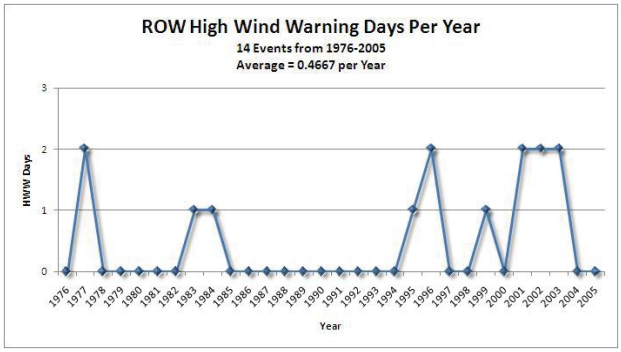
Figure 19. Frequency of high wind events by season (left) and by hour (right) at Tucumcari Airport.

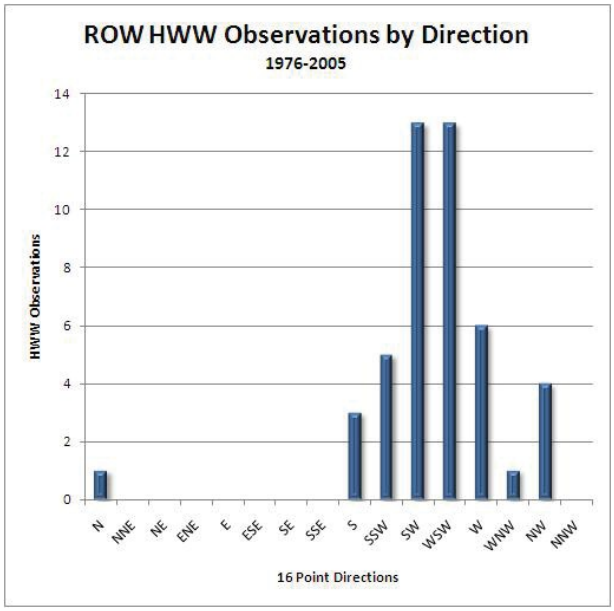
Synoptic regimes for high wind events at Tucumcari displayed similar characteristics to those analyzed for Las Vegas events. Most events were driven by an upper level trough or closed upper low where a strong mid to upper level pressure gradient was present. While analyses of most events also revealed a surface low or trough, the placement and orientation of these surface features varied considerably for many events. See Appendix 5 for the synoptic regime of one such example at Tucumcari.

Roswell (ROW – Southeast New Mexico)

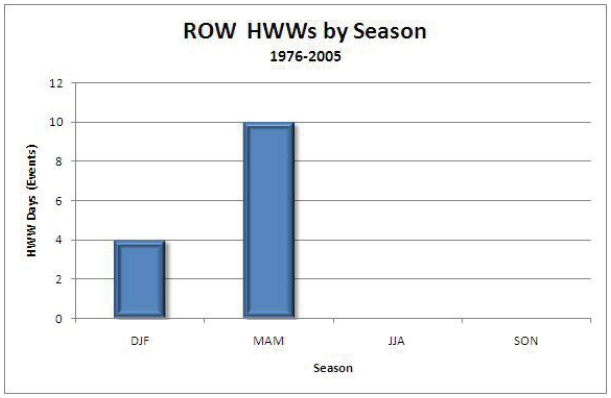
Data from Roswell was consistent for all but one year from June 4, 1994 until June 2, 1995 when overnight observations were not recorded. Only 14 high wind events were recorded at Roswell during this time frame. These events were predominantly from the southwest and west southwest with a few events hosting northerly wind observations.

Figure 20. Number of high wind events per year at Roswell (ROW) Airport (left) and high wind events partitioned by direction (right).





All events at Roswell were confined to the winter and spring months with the spring months accounting for the majority of events, similar to most other sites in the study. Also, most events were found to have occurred in the late morning to early afternoon hours.



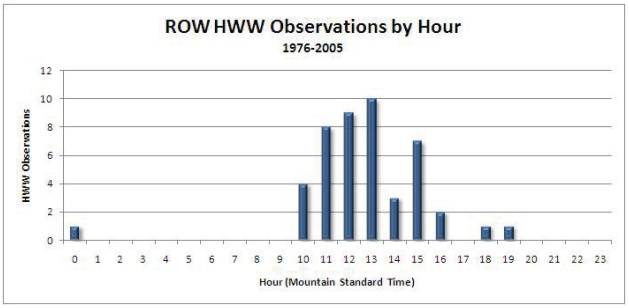


Figure 21. Frequency of high wind events by season (left) and by hour (right) at Roswell Airport.

A view of the synoptic settings for a particular high wind event recorded at Roswell can be seen in Appendix 6. Similar to other sites across New Mexico a jet streak aloft, a strong mid troposhperic perturbation and a lee side surface low were analyzed during this event and most others within the dataset.

Clayton (CAO – Far Northeast New Mexico)

The data from Clayton, New Mexico did not encompass 24 hour observations for two relatively short durations as depicted below.

24 hour Observations	Missing Overnight
1/1/1976 through	8/3/1977 until
8/27/1977 through	9/25/1986 until
7/9/1987 through	

Of all 8 sites analyzed, Clayton recorded the most high wind days throughout the analyzed 30 year timeframe with 81 total events. Contrary to other sites across northern and central New Mexico, the most common direction observed was from the north, yet a substantial amount of observations encompassed westerly and southwesterly directions.

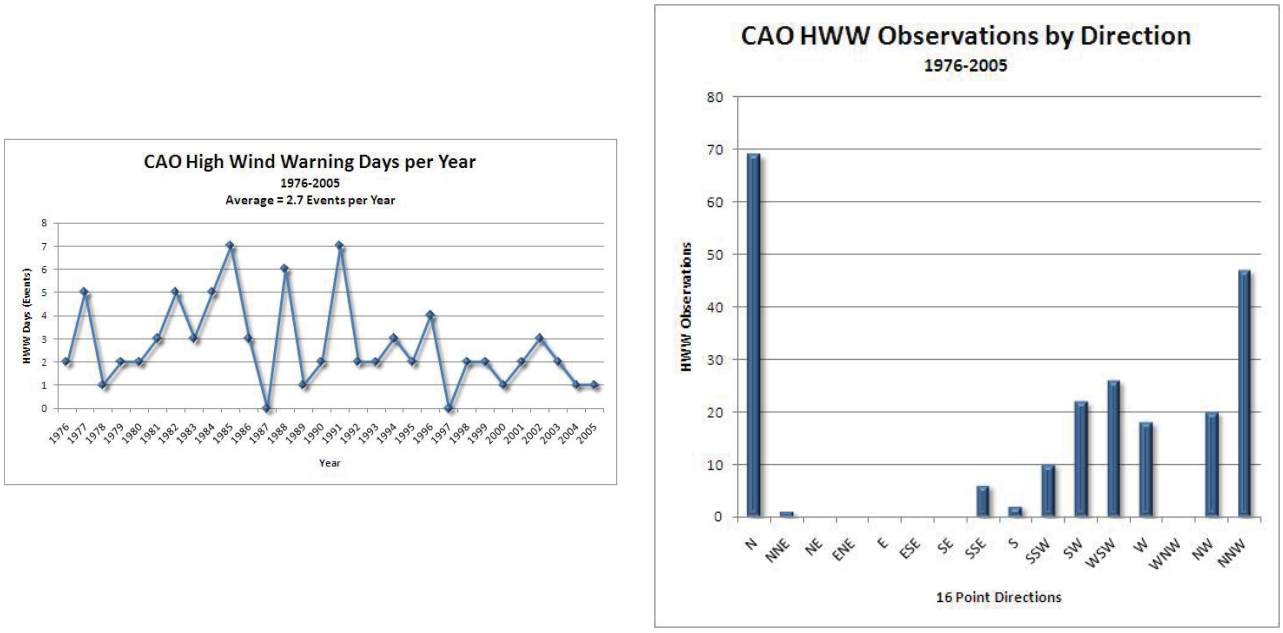


Figure 22. Number of high wind events per year at Clayton (CAO) Airport (left) and high wind events partitioned by direction (right).

High wind data from Clayton demonstrated two arrays of directional orientation, much in the same way that high wind data from the Albuquerque site did. As with the Albuquerque data, it was determined that separate synoptic mechanisms were responsible for events occurring from different directions. Fast moving synoptic cold fronts with a pronounced surface pressure gradient were linked to northerly high wind events at Clayton while the process of boundary layer mixing of strong winds aloft was generally associated with southerly to westerly high wind events. Therefore, high wind events were segregated according to directional orientation. As seen from Figure 22 there were no west northwest high wind events within the dataset (just northwest and west), and this offered an intuitive place to divide the dataset. Thus, those events defined as northerly high wind events fell within a 300° to 040° azimuthal range leaving the remaining southerly and westerly events within a 150° to 299° azimuthal range.

Events were still found to favor the spring months at Clayton, for both northerly and westerly events, and northerly events are more common in the fall than westerly events.

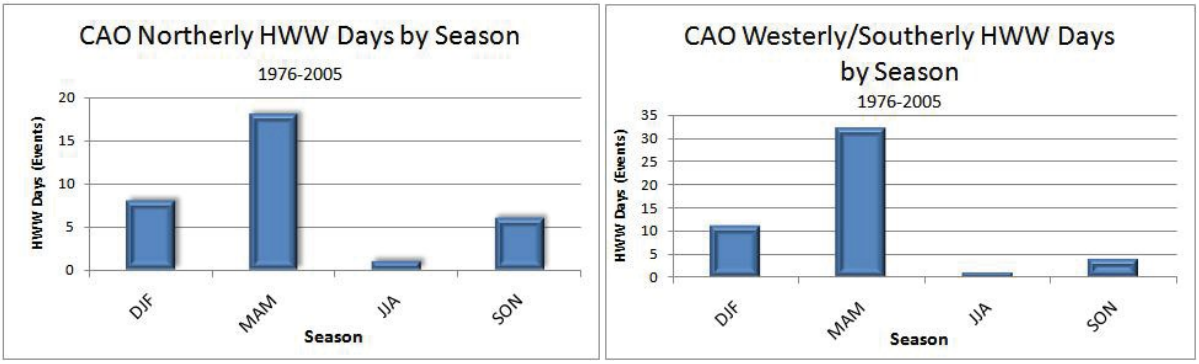


Figure 23. Frequency of high wind days by season for northerly events (left) and westerly/southerly events (right) at Clayton Airport.

Northerly events were distributed throughout all times of day with a maximum recorded in the late morning as seen by Figure 24a. The occurrence of these northerly events at all times of day corresponds to the variable arrival times of synoptic cold fronts generating high winds. The remaining events correspond with westerly events from other sites across northern and central New Mexico with most events occurring in the mid afternoon during peak heating and mixing.

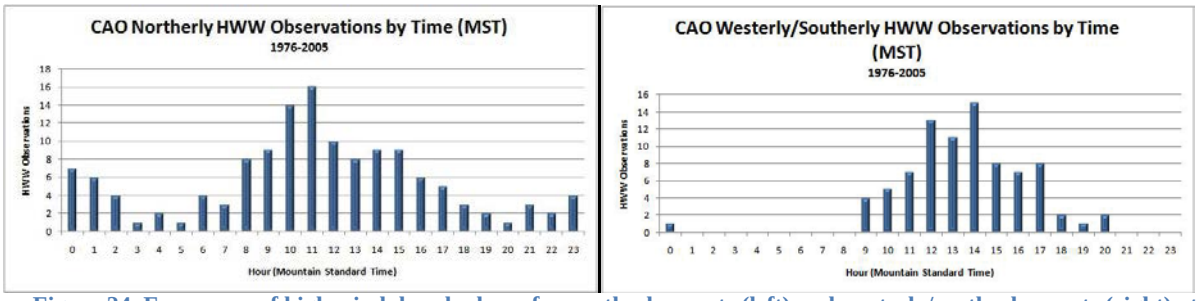


Figure 24. Frequency of high wind days by hour for northerly events (left) and westerly/southerly events (right) at Clayton Airport.

A sample northerly high wind event from April 21, 1984 can be seen in Appendix 7. Similar to other northerly high wind events at Clayton the mid tropospheric perturbation is displaced east of the site as is the surface low. This placement and orientation induces pressure rises over the site, indicative of the passage of a cold front with a pronounced surface pressure gradient also visible.

Appendix 8 includes a sample and fairly representative westerly high wind event showing an upper level short wave trough (with trough axis remaining west of site CAO) and an associated surface low (to the north of site CAO). The height fields surrounding the trough fall one standard deviation below average for this particular sample date.

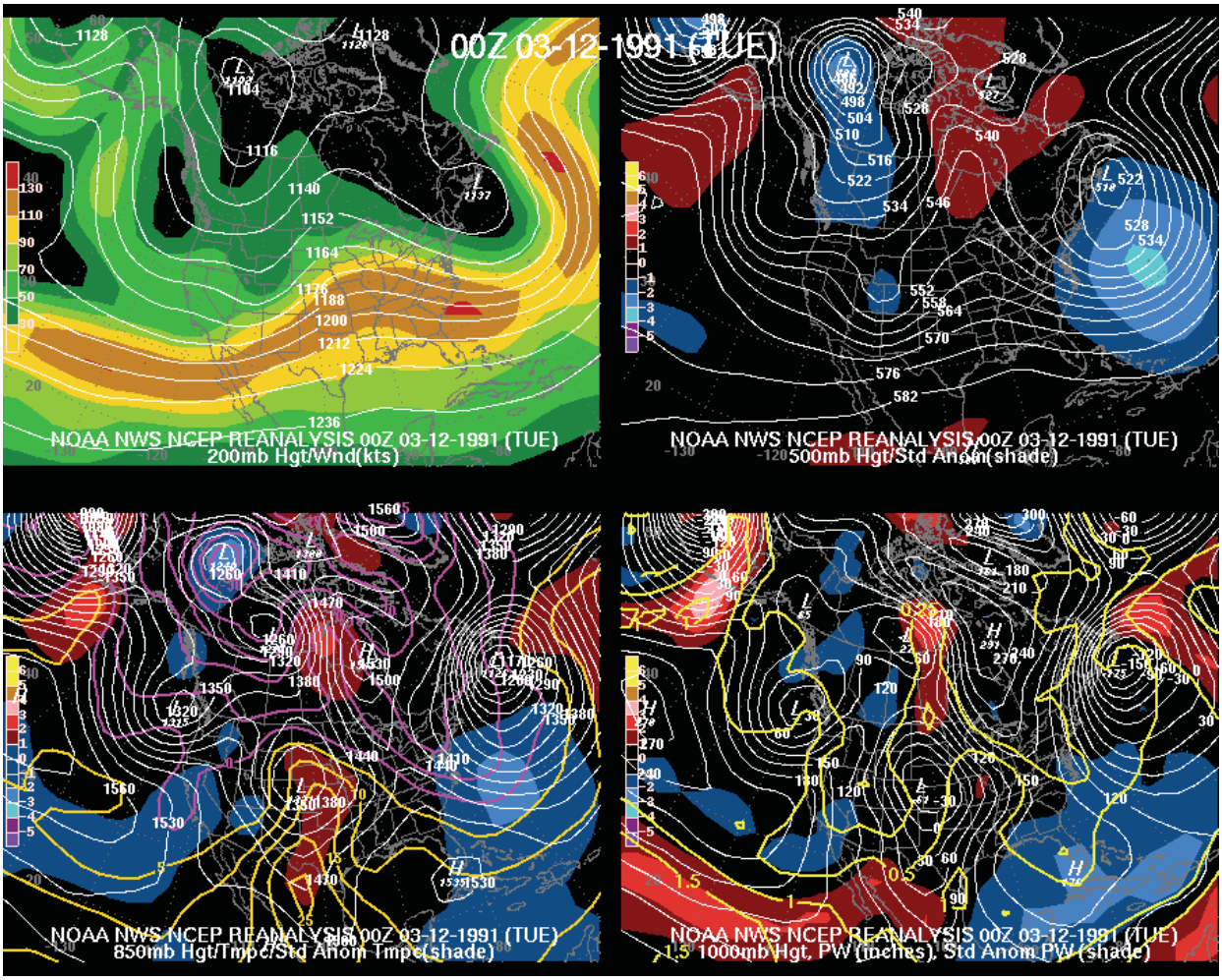
Conclusion

A climatological record of high wind events was built for eight observational sites across New Mexico utilizing a 30 year period of record from 1976 to 2005. Hourly and interim surface observations from these eight sites were reviewed to determine the frequency of high wind

events. Among this climatological record, the temporal distributions of high wind events were extracted on hourly, monthly, seasonal, and yearly intervals. Directional distributions were also attained, and reanalysis was performed where it was deemed necessary, such as at Albuquerque where differing and distinct mechanisms triggered high wind events. Synoptic analyses were also performed to obtain conceptual models that will hopefully aid in forecasting and warning decision making. This included a look at composite analyses of mean sea level pressure and geopotential height fields, as well as the synoptic settings responsible for high wind events on a case-by-case basis. Future work will hopefully include the construction of a database that will allow improved methods for inter-site comparisons of events on an individual and collective basis.

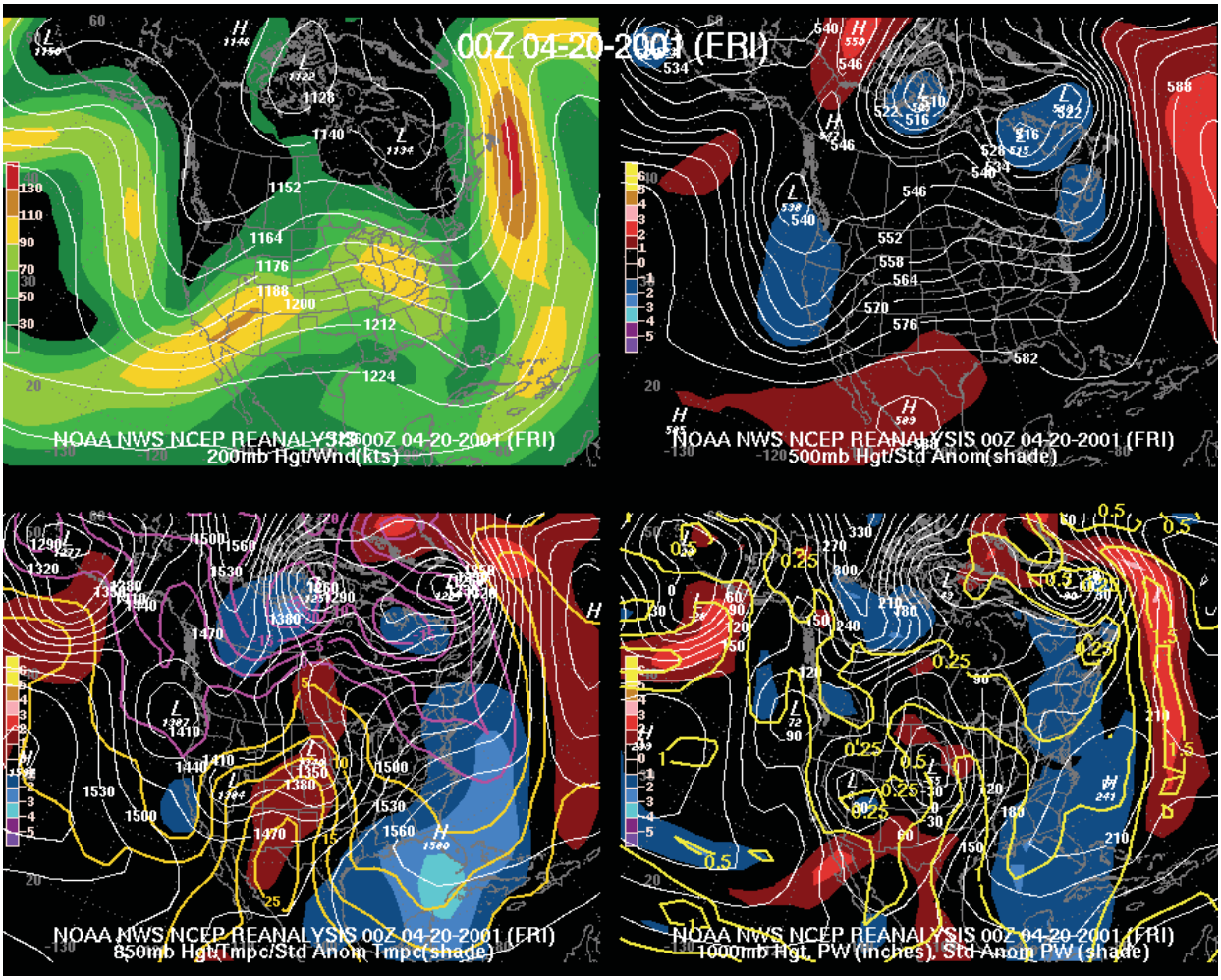
Appendix 1

Farmington Synoptic Example:



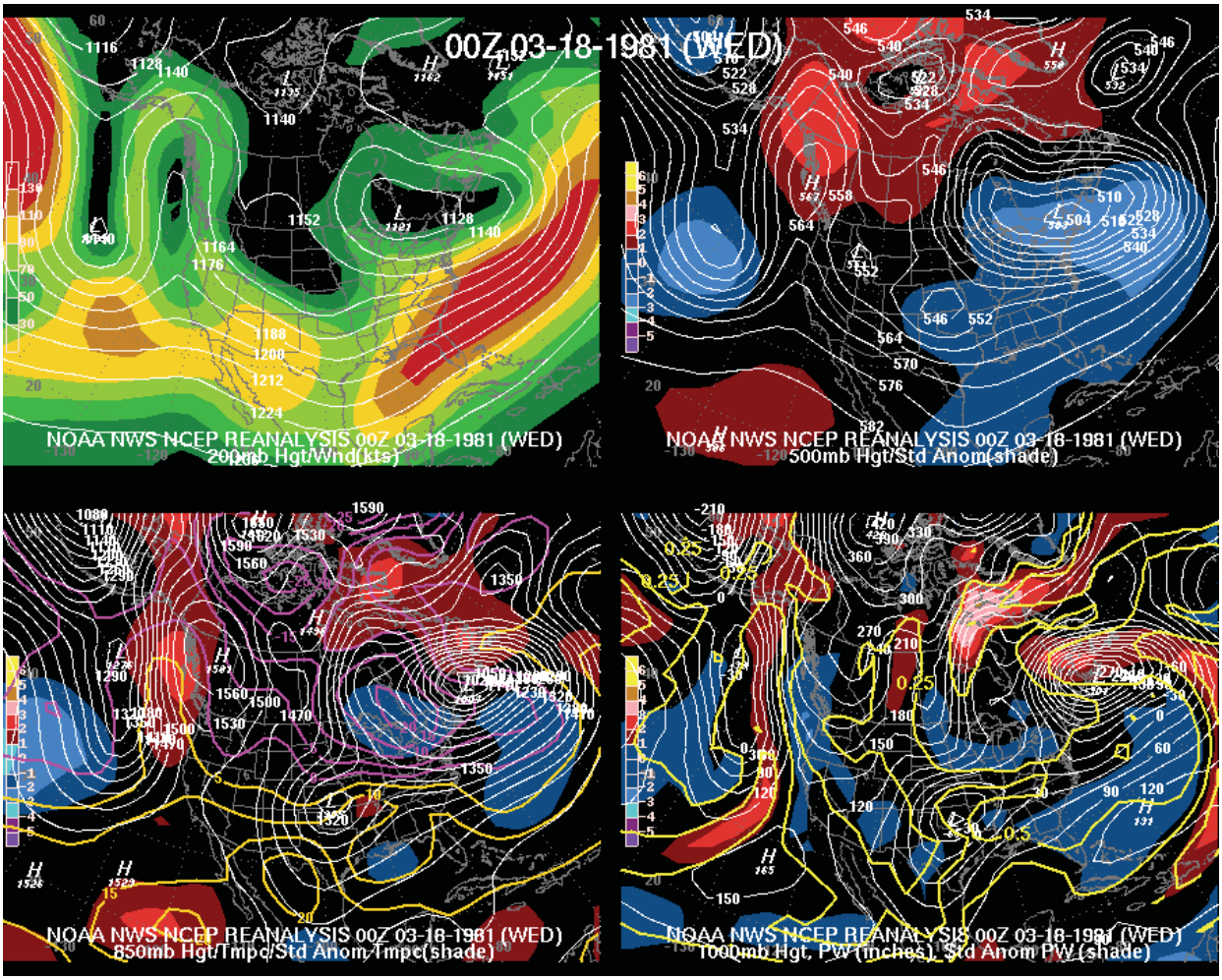
Appendix 2

Gallup Synoptic Example:



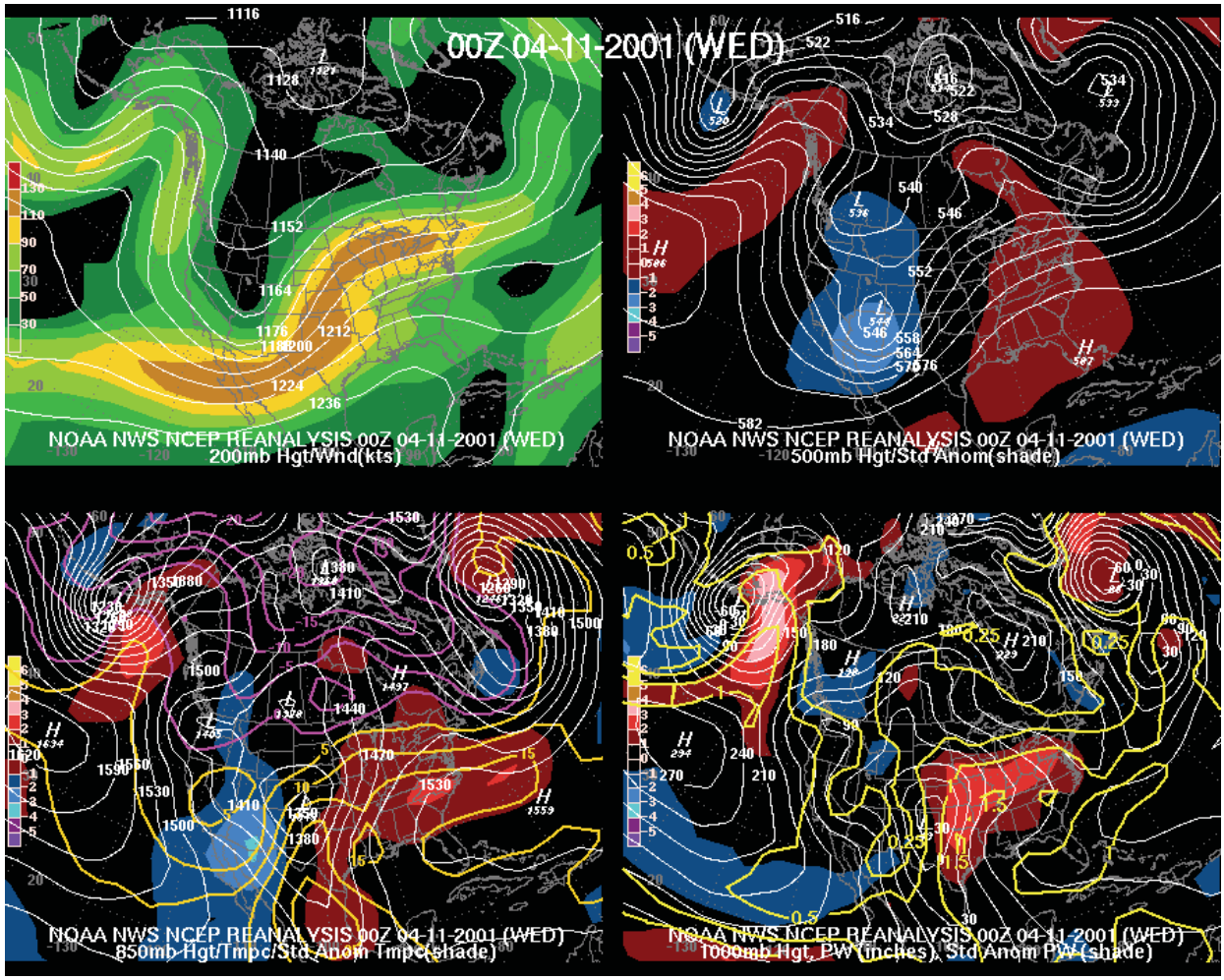
Appendix 3

Santa Fe Synoptic Example:



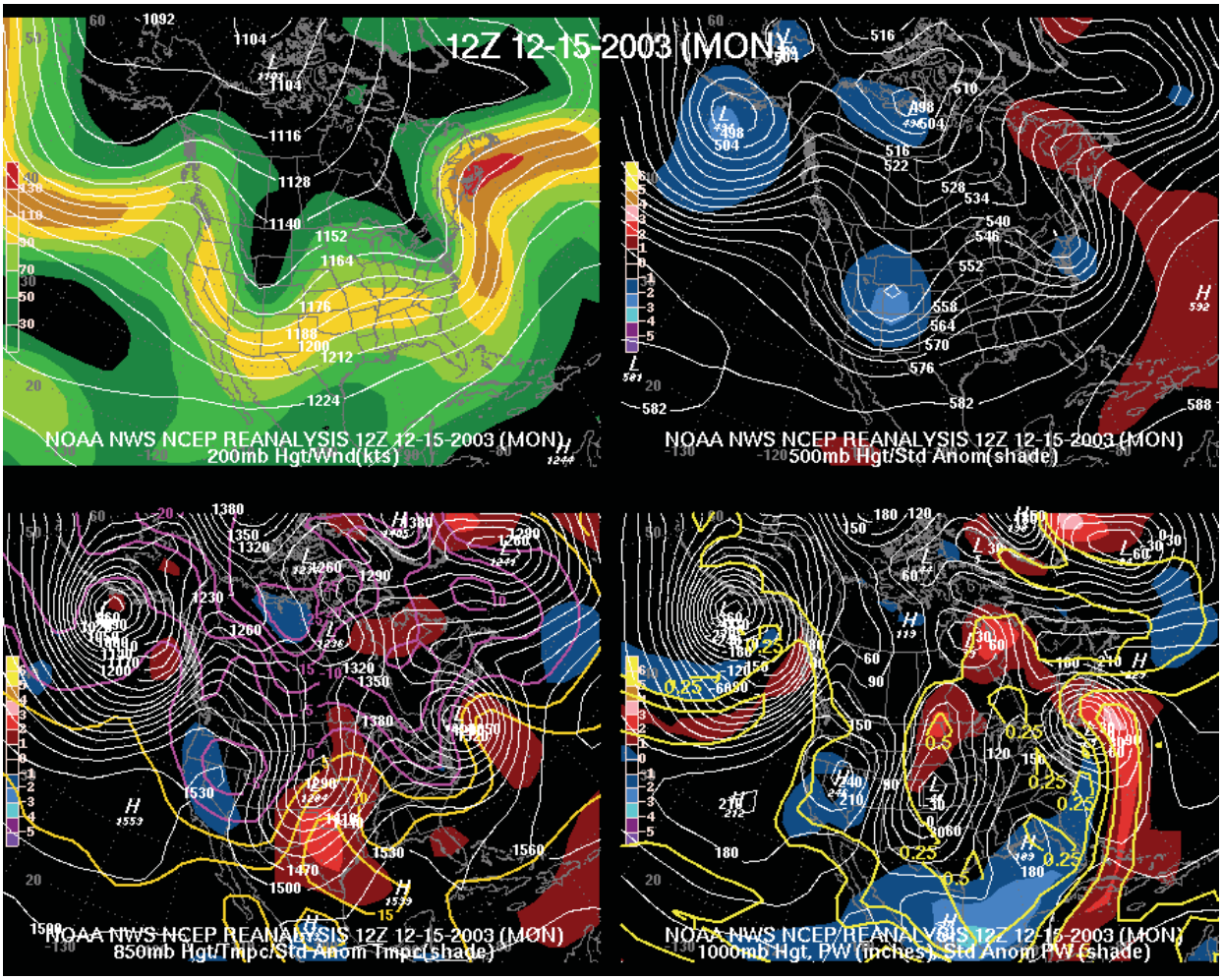
Appendix 4

Las Vegas Synoptic Example:



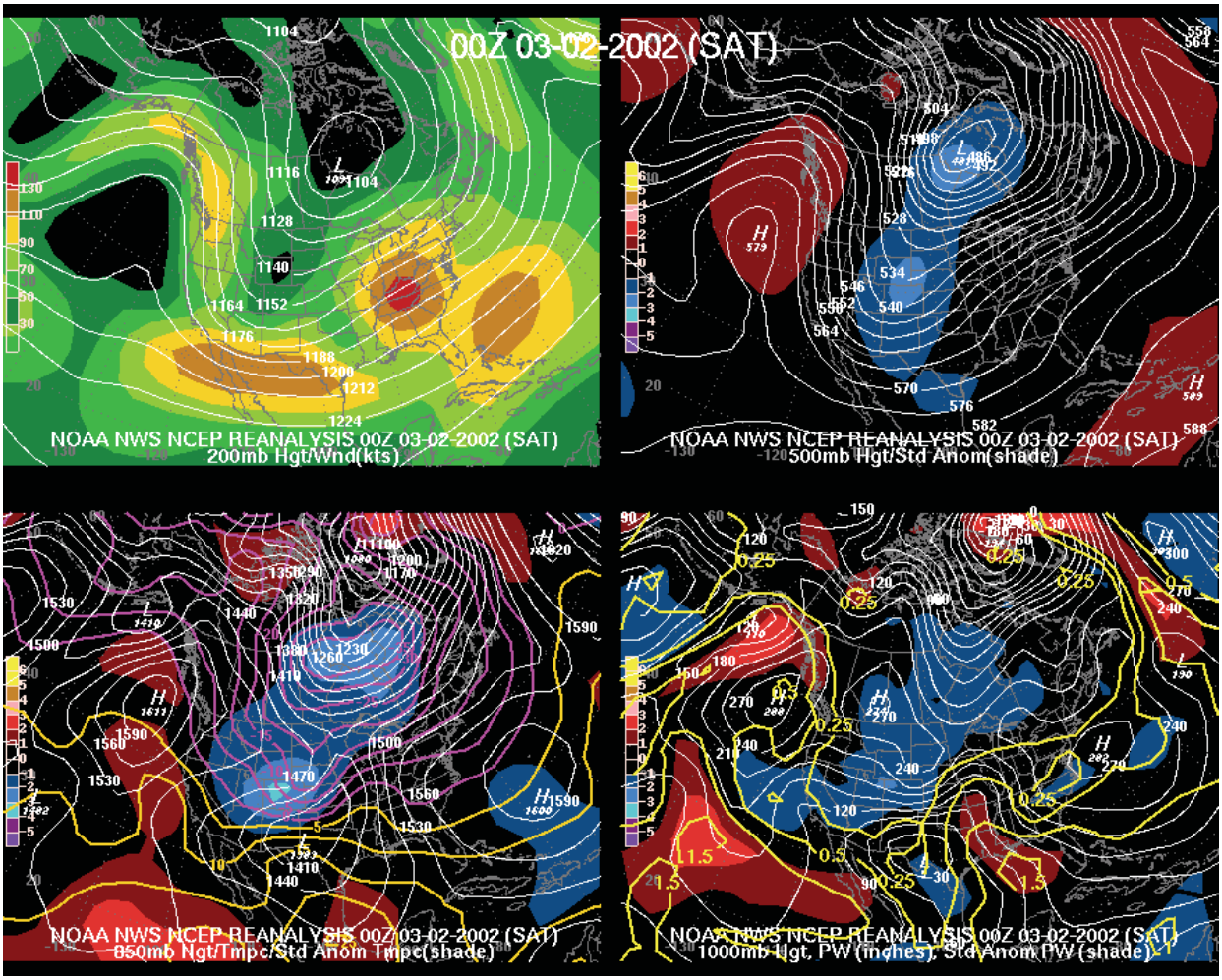
Appendix 5

Tucumcari Synoptic Example:



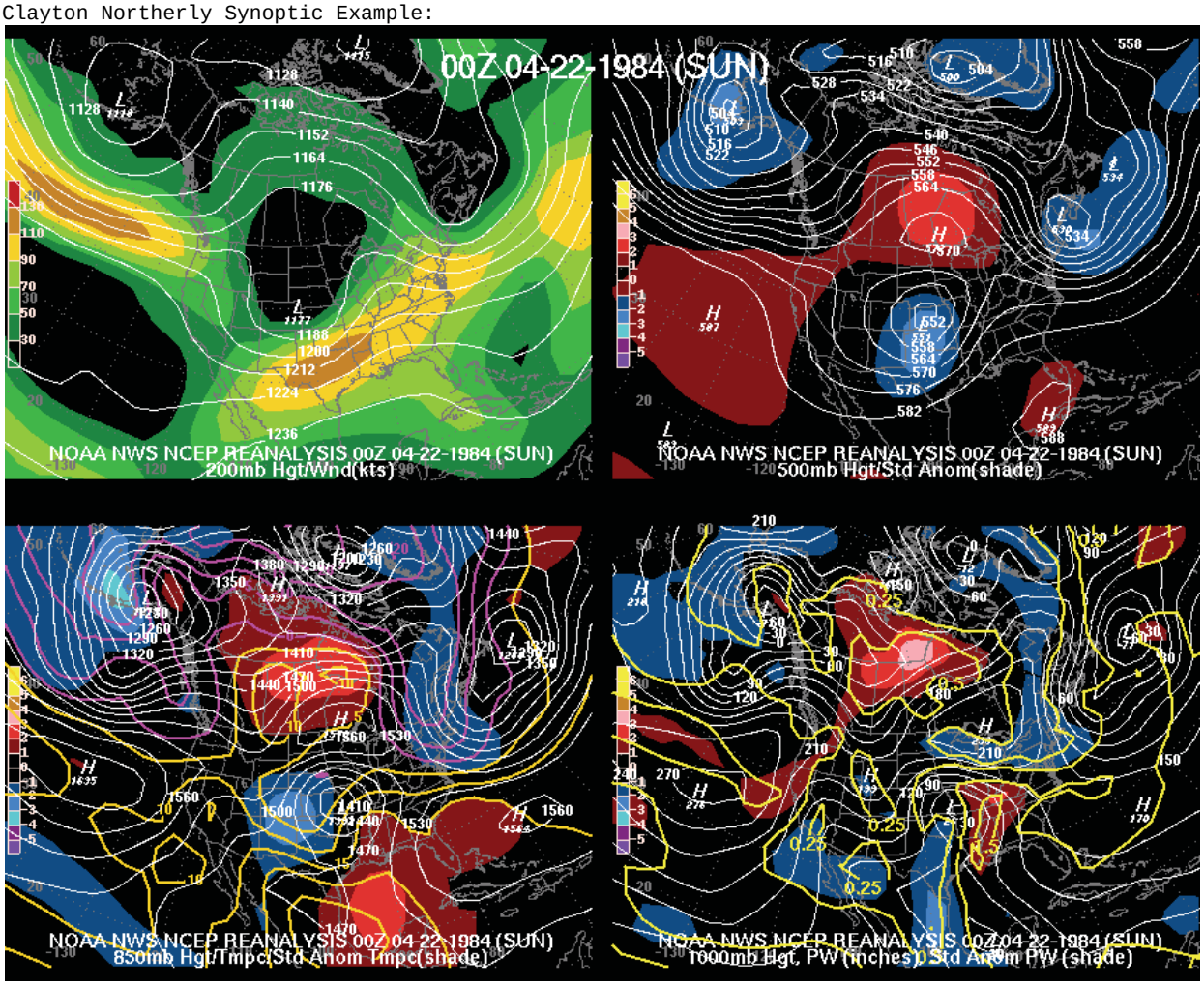
Appendix 6

Roswell Synoptic Example:



Appendix 7

Clayton Northerly Synoptic Example:



Appendix 8

Clayton Westerly Synoptic Example: