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Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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Assessment of Qualification for Treatment under the Arizona Natural and Exceptional Events Policy for the High Particulate (PM₁₀) Concentration Events in the Yuma Area on August 31, 2007

Background

The Arizona Department of Environmental Quality (ADEQ) issues Dust Control Action Forecasts for the Yuma and Phoenix areas as part of the Natural Events Action Plan for these areas. On Thursday, August 30, 2007, ADEQ air quality forecasters issued the Yuma and Vicinity Dust Control Action Forecast which called for a low risk of wind-blown dust for Friday August 31st. While the risk for wind blown dust was determined to be low, the forecast discussion did state that thunderstorm activity may increase over the next several days and “during active monsoon episodes, outflows from even distant thunderstorms have the potential to cause periods of gusty winds and dense blowing dust.” The forecasts/advisories satisfy the requirement in 40 CFR 51.920(a)(1).

During the early morning hours of August 31st, a thunderstorm complex developed just east of Yuma and advanced westward. While the core of the storm passed just south of the Yuma area, the outflow generated from this storm caused a two-hour period of very strong southerly winds. The initialization of the wind-blown dust event is evident in the National Weather Service (NWS) and Arizona Meteorological Network (AzMET) monitors. Wind gusts recorded by the Yuma AzMET and NWS stations went from nearly calm conditions during the 12:00 am and 1:00 a.m. hours to over 30 and 40 mph during the 2:00 a.m. hour. In addition, observational reports of haze

and reduced visibility were noted at the Yuma Marine Corp Air Station (MCAS) beginning at 2:26 a.m. and lasted past 3:00 a.m. Thunderstorms in the area were also reported during this time. The absence of precipitation at MCAS suggests that the Yuma area may have been affected only by the outflow generated from this storm, as the core of the storm likely remained south of Yuma. Shortly after Yuma began reporting the effects of the thunderstorm, NWS monitors in southeastern California at El Centro and Imperial recorded strong southerly winds due to the outflow that was caused by the thunderstorm. All appropriate State Implementation Plan (SIP) control measures were in place during the event demonstrating, per 40 CFR 50.1(j), that the event “is not reasonably controllable or preventable.”

The significant wind event in the Yuma area brought elevated ambient concentrations of PM₁₀ that exceeded the National Ambient Air Quality Standards (NAAQS) at the Yuma Courthouse monitor operated by ADEQ. The fact that ambient concentrations exceed the NAAQS satisfies the criteria in 40 CFR 50.1(j) that the event “affects air quality.”

The following are the key PM₁₀ monitor readings for the monitors examined in this report:

Monitor (Operator/Type)	AQS ID*	24-hr Avg PM ₁₀	1-hr Max PM ₁₀	Time of Max 1-hr	Flag(A)***
YUMA AREA					
Yuma Courthouse (ADEQ/BAM)	04-027-0004	197	995**	0200	A or RJ

* EPA Air Quality System Identification Number

** Upper range of instrument. Actual PM₁₀ concentrations likely exceeded recorded value

*** 24-hr PM₁₀ concentration influenced by natural or exceptional event to be flagged

Type Abbreviations: BAM – Beta-Attenuation Mass Monitor (Continuous monitor)

The preliminary findings from this analysis were presented at a stakeholders meeting on November 13, 2007, and were made available for public review during a comment period that ended November 30, 2007. During that time, no comments were received from the public. ADEQ presented and discussed this final demonstration at a stakeholder

meeting on May 28, 2008. ADEQ has finalized this demonstration, which was made available for public comment from August 11, 2008 through September 10, 2008. Any comments that were received were forwarded to EPA with this demonstration pursuant to 40 CFR 51.14(c)(3)(i).

NWS-EI Centro, CA							
Hr	T(F)	VR	Dust	Spd	Gust	Dir	
1	91	10			6	NE	
2	90	10			6	SE	
3	92	8		17	17	SE	
4	89	3	8	24	34	S	
5	90	10		14	21	SW	
6	90	10		17	17	SW	
7	90	8		11	11	N	
8	92	8		13	13	N	
9	97	8		8	8	NE	
10	102	6	8	9	9	N	
11	104	10		0	0	N	
12	106	10		6	6	VR	
1	108	10		7	7	S	
2	108	10		3	3	VR	
3	109	10		7	7	S	
4	109	10		5	5	S	
5	109	10		7	7	SW	
6	107	10		6	6	S	
7	104	10		0	0	N	
8	98	10		0	0	N	
9	98	10		6	6	SE	
10	97	10		3	3	S	
11	94	10		0	0	N	
12	93	10		0	0	N	

NWS-Imperial, CA							
Hr	T(F)	VR	Dust	Spd	Gust	Dir	
1	92	10			8	NE	
2	92	10			7	SE	
3	93	4	8	18	18	SE	
4	90	8	8	22	29	S	
5	90	3	8	21	29	S	
6	88	10		11	11	S	
7	92	10		8	8	N	
8	94	6	8	8	8	NE	
9	99	6	8	8	8	NE	
10	102	6	8	8	8	NW	
11	104	7		3	3	VR	
12	107	10		5	5	SW	
1	108	10		8	8	SW	
2	108	10		8	8	SW	
3	109	10		7	7	SW	
4	109	10		8	8	S	
5	108	10		7	7	SW	
6	107	10		5	5	W	
7	104	10		0	0	N	
8	103	10		3	3	E	
9	97	10		0	0	N	
10	99	10		0	0	N	
11	93	10		5	5	W	
12	93	10		0	0	N	

NWS-Yuma MCAS							
Hr	T(F)	VR	Dust	Spd	Gust	Dir	
1	95	10			3	S	
2	94	10			0	N	
3	90	2	8	22	41	S	
4	86	4	8	20	20	S	
5	84	10	8	11	11	S	
6	87	10		6	6	SE	
7	86	10		0	0	N	
8	90	3	8	6	6	NE	
9	94	10		10	10	E	
10	98	6	8	7	7	NE	
11	102	8		5	5	NE	
12	106	10		7	7	NE	
1	108	10		8	8	NE	
2	107	10		0	0	N	
3	108	10		6	6	S	
4	108	10		9	9	SW	
5	109	10		13	13	SW	
6	108	10		10	10	SW	
7	106	10		9	9	SW	
8	104	10		5	5	W	
9	101	10		6	6	W	
10	101	10		0	0	N	
11	99	10		6	6	SW	
12	97	10		3	3	SW	

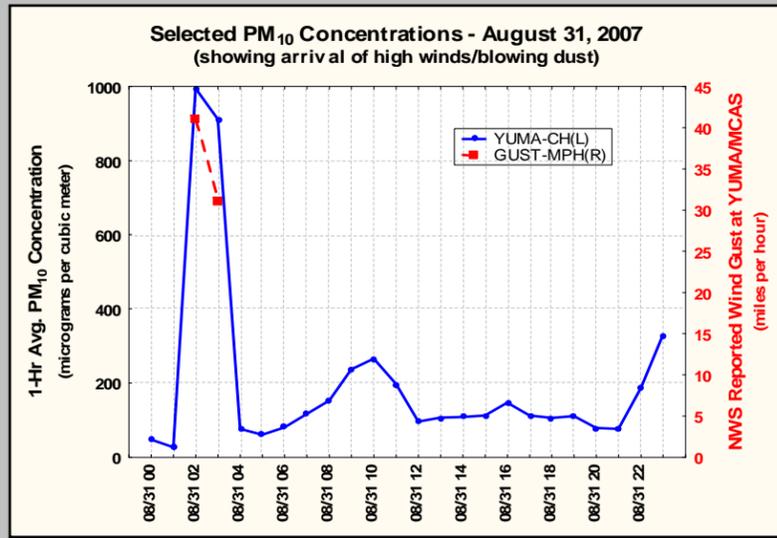
Event Contrib. Analysis		
Hourly PM ₁₀ Conc. (µg/m ³)		
MONITORS:	Hr	1
1-YUMA CH	1	28
	2	47
	3	995
	4	912
	5	77
24-Hr. Avg PM ₁₀	with	w/o
Monitor:	Event	Event
1-YUMA CH	197	129
	9	153
	10	237
	11	266
> NAAQS	< NAAQS	
		198
Pink=Event Contrib.		
Conclusion: As shown above, the PM ₁₀ concentration would have been below the NAAQS "BUT FOR" the event contribution (hours highlighted in pink).		



Figure 1. Key Data for Event of August 31, 2007

MISC DATA	KEY	PM10 PLOT
CEN. AZ WINDS		SAT IMAGES
SO AZ WINDS		YUMA MAP & FORECAST

SUMMARY OF EVENT
A major thunderstorm cell developed in the Yuma area which produced a major dust storm just after midnight. Wind gusts over 40 mph with blowing dust and visibility less than 2 miles were observed at the YUMA MCAS.

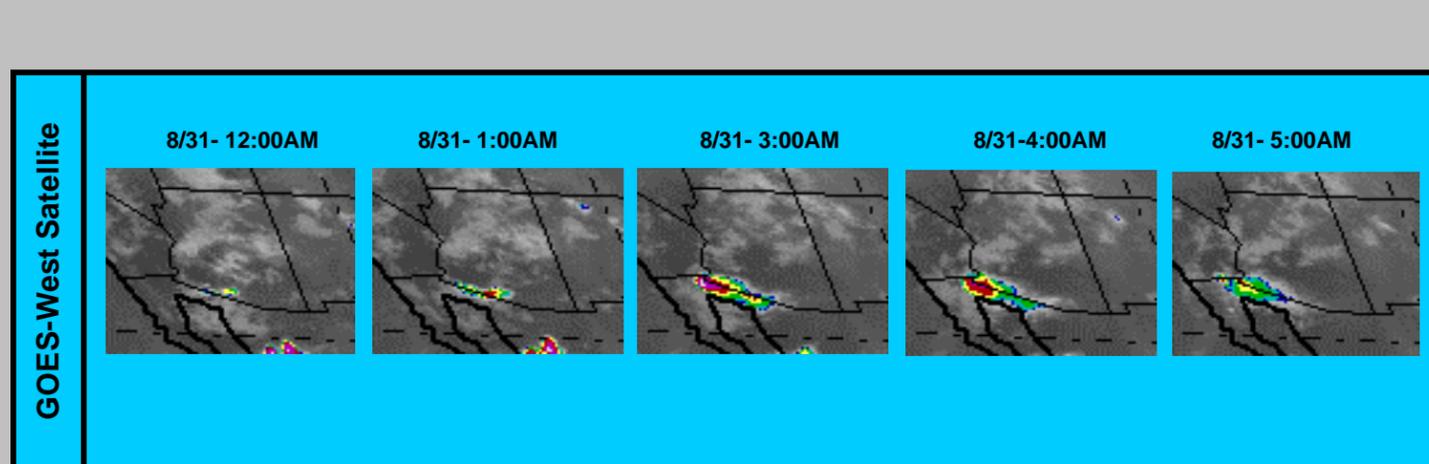


PARKER						
Hr	T(F)	RH	Rn	Spd	Max	Dir
1	87	54	-	2	5	SW
2	87	55	-	2	6	E
3	87	57	-	2	4	E
4	87	54	-	1	4	NW
5	87	53	-	1	3	S
6	85	61	-	1	4	E
7	83	66	-	1	4	S
8	84	64	-	2	6	NE
9	89	56	-	2	5	E
10	97	35	-	2	6	NE
11	99	31	-	4	7	NE
12	103	25	-	3	6	N
1	105	22	-	3	7	NW
2	107	20	-	4	7	NW
3	109	18	-	4	8	NW
4	110	18	-	4	7	NW
5	111	16	-	5	6	N
6	110	17	-	4	6	SW
7	108	18	-	2	4	NW
8	97	37	-	4	7	S
9	92	44	-	6	10	S
10	90	47	-	7	10	S
11	91	44	-	7	13	S
12	98	27	-	13	19	E

BUCKEYE						
Hr	T(F)	RH	Rn	Spd	Max	Dir
1	92	34	-	3	7	E
2	88	40	-	3	6	E
3	86	44	-	4	7	E
4	86	42	-	4	7	SE
5	87	40	-	4	10	E
6	83	51	-	4	6	SE
7	83	51	-	3	5	SE
8	88	50	-	2	4	SE
9	92	52	-	4	7	SE
10	94	46	-	4	7	SE
11	99	34	-	2	4	SE
12	101	31	-	3	6	SE
1	103	27	-	3	6	SE
2	105	23	-	2	5	SE
3	107	20	-	2	7	W
4	107	18	-	2	10	SW
5	107	20	-	2	6	SE
6	104	31	-	3	6	SE
7	98	35	-	4	6	SE
8	95	32	-	5	9	E
9	94	31	-	6	9	E
10	99	22	-	4	10	NE
11	98	22	-	6	10	NE
12	96	25	-	7	14	N

MARICOPA						
Hr	T(F)	RH	Rn	Spd	Max	Dir
1	87	43	-	1	4	E
2	85	48	-	1	3	S
3	84	51	-	2	4	SE
4	83	52	-	0	0	SW
5	82	52	-	1	4	SW
6	79	64	-	1	4	NE
7	81	58	-	2	5	SW
8	87	48	-	2	5	SW
9	92	39	-	2	5	SW
10	96	33	-	4	6	S
11	100	26	-	3	9	S
12	103	22	-	4	9	S
1	105	19	-	3	8	S
2	105	18	-	3	8	NE
3	106	17	-	3	11	E
4	108	16	-	3	8	W
5	108	16	-	4	10	W
6	105	20	-	3	6	NE
7	101	23	-	7	18	NE
8	96	28	-	7	13	NE
9	94	31	-	4	7	NE
10	92	33	-	4	6	NE
11	92	33	-	3	6	N
12	90	34	-	3	6	N

Historical Distribution		
5-Yr. Dist. of Values (µg/m ³)		
MONITORS:	Column Index	
1-YUMA CH	Yr - All Data (5-Yrs)	
	Sea - Data for Summer season only (5-Yrs)	
Cum. Freq.	Mon 1	
Min	8	13
0.5%	12	16
1.0%	14	16
2.5%	16	20
5%	19	20
10%	23	25
25%	31	34
50%	42	43
75%	57	62
90%	77	85
95%	96	102
97.5%	127	132
99.0%	186	165
99.5%	211	193
Max	349	224
Flagged Value	197	
Conclusion: Flagged Value is exceptional in nature (eg. greater than 95% of all data)		



YUMA						
Hr	T(F)	RH	Rn	Spd	Max	Dir
1	90	57	-	2	5	SE
2	90	59	-	1	4	NW
3	88	58	0.07	12	32	S
4	83	66	-	12	21	SW
5	83	63	-	5	13	SW
6	82	69	-	2	5	NE
7	81	72	-	3	6	N
8	85	64	-	5	8	NE
9	92	45	-	4	9	NE
10	98	33	-	2	7	S
11	101	28	-	2	6	NW
12	103	26	-	3	8	NW
1	106	22	-	3	9	SE
2	107	21	-	4	10	S
3	109	20	-	4	13	W
4	109	20	-	6	12	W
5	109	22	-	9	15	SW
6	108	23	-	9	14	SW
7	105	24	-	9	13	SW
8	100	29	-	4	8	W
9	98	31	-	2	4	W
10	96	33	-	1	3	SW
11	95	35	-	1	4	SW
12	92	40	-	2	4	SW

PALOMA						
Hr	T(F)	RH	Rn	Spd	Max	Dir
1	84	57	-	4	6	N
2	86	50	-	2	4	S
3	84	55	-	2	5	S
4	83	62	-	4	6	SW
5	81	72	-	3	6	SW
6	81	71	-	3	5	SW
7	82	69	-	3	5	SW
8	87	62	-	2	5	S
9	92	45	-	1	2	W
10	94	43	-	2	5	N
11	99	34	-	2	5	N
12	99	34	-	3	5	NW
1	101	34	-	3	7	NW
2	103	32	-	4	9	NW
3	105	28	-	3	7	N
4	104	34	-	4	6	N
5	102	38	-	4	7	NW
6	101	41	-	3	5	NW
7	96	50	-	4	6	NW
8	91	52	-	4	5	N
9	90	50	-	4	5	NE

Assessment under the Technical Criteria Document (TCD)

1. Properly qualify and validate the air quality measurement to be flagged. As this was not a filter sampling date (1-in-6 run day), only data from the continuous analyzers were examined. The air quality monitoring data were reviewed by the agency responsible for operation of the monitor. All hourly PM₁₀ readings from the Yuma Courthouse were valid for August 31st. There was, however, one hour in which PM₁₀ concentrations likely exceeded the upper range of the BAM instrument. This measurement was recorded as 995 µg/m³, but it is likely that actual PM₁₀ concentrations were greater than this recorded value. Audits of the analyzers revealed operations were within acceptable tolerance. No local sources were reported as significantly contributing to the event.

2. Review suspected contributing sources. The NWS and AzMET surface data from the Yuma area, as well as the NWS surface data in SE California, provide a good explanation as to what meteorological conditions were on August 31st. As seen in the satellite imagery in Figure 1, a strong thunderstorm began to form east of Yuma at approximately midnight on August 31st. Thereafter, the storm intensified and rapidly spread towards the Yuma area. Yuma radar images were sought out for this analysis, but unfortunately, radar data were not available from August 28th through September 1st. While radar data would have been helpful in identifying the thunderstorm and its associated outflow boundary, the surface data coupled with the GOES satellite imagery provide a clear picture of the event. Haze and reduced visibility of less than two miles were reported in Yuma during the initial peak wind gusts which occurred during the 2:00 a.m. hour. This timing is coincident with the arrival of the thunderstorm outflow boundary and the first spike in PM₁₀ concentrations. The plot of hourly PM₁₀ concentration data in the upper right corner of Figure 1 confirms the identical timing of elevated PM₁₀ concentrations at the Yuma Courthouse with the high wind gusts reported by the NWS Yuma Marine Corps Air Station. Finally, haze, high winds, and reduced visibilities were later reported at the Imperial County Airport and El Centro NWS monitors located in southeastern California as the outflow boundary moved to the north and west.

3. Examine all air quality monitoring information. Data from all monitors in the network were reviewed. Monitors from the affected areas are summarized in the table in the Background section of this assessment. Pursuant to 40 CFR 50.14(c)(3)(iii)(C), the “Historical Distribution” Table in Figure 1 has been included to demonstrate that the event is associated with a measured concentration in excess of normal historical fluctuations, including background (i.e., concentrations greater than the 95th percentile). Monitors

with readings greater than that of the NAAQS on August 31, 2007, which should be flagged, include the Yuma Courthouse.

4. Examine the meteorological conditions before and during the event. The AzMET and NWS meteorological data are summarized in Figure 1. The wind data are highlighted yellow if the max wind speed in the hour exceeds 15 mph and orange if it exceeds 25 mph. Strong southerly wind gusts occurred in the Yuma area during the early morning hours of August 31st, but only lasted for a short period of time. The wind-blown dust event can be attributed to strong winds generated as outflow from a thunderstorm passing to the south of the Yuma area. As this outflow boundary propagated across the Yuma area, PM₁₀ levels increased abruptly. As the thunderstorm passed and winds died down, PM₁₀ concentrations quickly decreased to nearly normal levels.

5. Perform a qualitative attribution to emission source(s). All evidence indicates the elevated PM₁₀ concentrations in the Yuma area can be attributed to soil emissions that were transported over a broad area in the Yuma area. No source specific emission allocation is possible based on the data available for analysis. The hourly concentration data do not show any significant sources other than the wind-blown dust event. Observational reports of haze from trained officials in Yuma are further proof that the elevated PM₁₀ concentrations were attributed to soil emissions.

6. Estimation of Contribution from Source or Event. The primary source appears to be wind-blown dust over southeastern California and the Yuma area in southwestern Arizona for which there is not an effective or efficient method to estimate the relative contributions from specific sources. The demonstration analysis contained in this report establishes the linkage between the measurements to be flagged and the event, thus satisfying the requirement in 40 CFR 50.14(c)(3)(iii)(B). Pursuant to 40 CFR 50.14(c)(3)(iii)(D), the “Event Contrib. Analysis” Table in Figure 1 has been included to demonstrate that there would have been no exceedance or violation but for the event (i.e., the contribution during the event overwhelmed the 24-hour average).

7. Determination that a Natural or Exceptional Event Contributed To an Exceedance. Based on this analysis, the event satisfies the requirement in 40 CFR 50.1(j) that the elevated concentrations at Yuma Courthouse were attributed to a natural event.

Conclusion

Long-range transport of dust from soils. The elevated PM₁₀ event on August 31st, 2007 in Yuma was the result of the transport of dust and soils from high winds caused by a thunderstorm that suspended natural soils and soils from areas where Best Available Control Measures are in place

and should be flagged for air quality planning purposes. The “high wind” flag (A or RJ) should be applied to the monitor reading indicated in the table at the beginning of this report, as the monitor would have been below the NAAQS but for the contribution of the event.



**YUMA AND VICINITY
DUST CONTROL ACTION FORECAST
ISSUED THURSDAY, AUGUST 30, 2007**

Three-day weather outlook:

NOTE: During active summer monsoon episodes, outflows from even distant thunderstorms have the potential to cause periods of gusty winds and dense blowing dust.

High pressure over the region will continue to keep afternoon desert temperatures very warm. Mostly light winds are expected the next few days with a slight increase in thunderstorm potential. The risk of wind-blown dust in Yuma will be "Low" through Sunday.

	<u>WINDS</u>	<u>WIND BLOWN DUST RISK</u>
Day #1: Fri 08/31/2007	No significant winds are expected.	LOW
Day #2: Sat 09/01/2007	No significant winds are expected.	LOW
Day #3: Sun 09/02/2007	No significant winds are expected.	LOW

PM-10 & PM-2.5 (PARTICLES)

Description – The term “particulate matter” (PM) includes both solid particles and liquid droplets found in air. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as “fine” particles and are responsible for many visibility degradations (brown cloud). Particles with diameters between 2.5 and 10 micrometers are referred to as “coarse”.

Sources – Fine = All types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Coarse = crushing or grinding operations and dust from paved or unpaved roads.

Potential health impacts – PM can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis.

Units of measurement – Micrograms per cubic meter (ug/m3)

Averaging interval – 24 hours (midnight to midnight).

Reduction tips – Stabilize loose soils, minimize travel on dirt roads, utilize tarps on haul trucks, limit use of leaf-blowers, and on high-wind days reduce outdoor activities.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration

**QUALITY CONTROLLED LOCAL
CLIMATOLOGICAL DATA**
(may be updated)
HOURLY OBSERVATIONS TABLE
YUMA MCAS (03145)
YUMA , AZ
(08/2007)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: 213 ft. above sea level
Latitude: 32.650
Longitude: -114.617
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(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
31	0051	5	CLR	10.00		95	35.0	78	25.5	71	21.7	46	3	170		29.58			29.80	AA		29.81
31	0151	5	CLR	10.00		94	34.4	78	25.7	72	22.2	49	0	000		29.57	8	001	29.79	AA		29.80
31	0226	5	FEW001 SCT110	2.50	HZ	91	33.0	74	23.3	66	19.0	44	32s	170	41	29.62			M	SP		29.85
31	0232	5	BKN001 BKN110	1.75	HZ	90	32.0	74	23.2	66	19.0	45	22	170	41	29.61			M	SP		29.84
31	0242	5	BKN001 OVC110	2.50	HZ	88	31.0	73	22.8	66	19.0	48	25	190	32	29.60			M	SP		29.83
31	0249	5	OVC001	2.50	TS HZ	86	30.0	74	23.2	68	20.0	55	21	190	32	29.59			M	SP		29.82
31	0251	5	OVC001	2.50	TS HZ	86	30.0	74	23.2	68	20.0	55	22	190	31	29.59			M	AA		29.82
31	0301	5	OVC001	4.00	TS HZ	86	30.0	74	23.2	68	20.0	55	20	200		29.59			M	SP		29.82
31	0321	5	SCT001	6.00	TS HZ	88	31.0	73	22.8	66	19.0	48	11	200		29.60			M	SP		29.83
31	0351	5	CLR	8.00	TS	86	30.0	74	23.5	69	20.6	57	14	250		29.61			M	AA		29.84
31	0408	5	CLR	10.00		84	29.0	74	23.5	70	21.0	63	10	200		29.62			M	SP		29.85
31	0423	5	CLR	10.00	TS	84	29.0	74	23.5	70	21.0	63	11	180		29.62			M	SP		29.85
31	0438	5	CLR	10.00		86	30.0	74	23.2	68	20.0	55	8	180		29.61			M	SP		29.84
31	0451	5	CLR	10.00		86	30.0	74	23.2	68	20.0	55	5	160		29.59	0	007	M	AA		29.82
31	0551	5	CLR	10.00		87	30.6	74	23.0	67	19.4	52	6	120		29.59			M	AA		29.82
31	0651	5	SCT100 BKN200	10.00		86	30.0	74	23.2	68	20.0	55	0	000		29.62			M	AA		29.85
31	0724	5	SCT100 BKN200	0.50s	HZs	90	32.0	75	23.8	68	20.0	48	6	020		29.61			M	SP		29.84
31	0727	5	SCT100 BKN200	3.00	HZ	90	32.0	75	23.8	68	20.0	48	6	030		29.61			M	SP		29.84
31	0751	5	SCT100 BKN200	10.00		90	32.2	75	23.8	68	20.0	48	7	020		29.60	0	002	M	AA		29.83
31	0851	5	SCT100 SCT200	10.00		94	34.4	75	24.1	67	19.4	41	10	090		29.61			M	AA		29.84
31	0951	5	FEW100 SCT200	6.00	HZ	98	36.7	76	24.4	66	18.9	35	7	060		29.61			M	AA		29.84
31	1051	5	SCT200	8.00		102	38.9	76	24.3	64	17.8	29	5	060		29.61	0	002	M	AA		29.84
31	1151	5	SCT200	10.00		106	41.1	76	24.3	62	16.7	24	7	050		29.59			M	AA		29.82
31	1251	5	FEW200	10.00		108	42.2	75	24.1	60	15.6	21	8	050		29.56			M	AA		29.79
31	1351	5	FEW200	10.00		107	41.7	75	23.9	60	15.6	22	0	000		29.54	8	023	M	AA		29.77
31	1451	5	FEW200	10.00		108	42.2	76	24.3	61	16.1	22	6	180		29.51			M	AA		29.74
31	1551	5	FEW050TCU FEW120 SCT200	10.00		108	42.2	77	24.9	63	17.2	23	9	210		29.48			M	AA		29.71
31	1651	5	FEW050CB FEW120 SCT200	10.00		109	42.8	77	24.7	62	16.7	22	13	230		29.47	6	024	M	AA		29.70
31	1751	5	FEW050CB SCT120 SCT200	10.00		108	42.2	76	24.6	62	16.7	22	10	230		29.47			M	AA		29.70
31	1851	5	FEW050CB SCT120 BKN200	10.00		106	41.1	75	24.1	61	16.1	23	9	240		29.48			M	AA		29.71
31	1951	5	FEW050 SCT120 BKN200	10.00		104	40.0	75	24.0	62	16.7	25	5	280		29.48	3	005	M	AA		29.71
31	2051	5	FEW050 SCT120 BKN200	10.00		101	38.3	74	23.4	61	16.1	27	6	280		29.50			M	AA		29.73
31	2151	5	FEW050 SCT120 BKN200	10.00		101	38.3	73	22.8	59	15.0	25	0	000		29.50			M	AA		29.73
31	2251	5	CLR	10.00		99	37.2	73	22.8	60	15.6	28	6	240		29.51	1	008	M	AA		29.74
31	2351	5	CLR	10.00		97	36.1	73	22.8	61	16.1	30	3	240		29.51			M	AA		29.74

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration

**QUALITY CONTROLLED LOCAL
CLIMATOLOGICAL DATA**
(may be updated)
HOURLY OBSERVATIONS TABLE
NAF (23199)
EL CENTRO , CA
(08/2007)

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

Elevation: -43 ft. below sea level
Latitude: 32.817
Longitude: -115.667
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(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
31	0056	5	CLR	10.00		91	32.8	77	24.9	71	21.7	52	6	050		29.82	6	000	29.82	AA		29.78
31	0156	5	CLR	10.00		90	32.2	79	26.2	75	23.9	61	6	120		29.80			29.81	AA		29.76
31	0256	5	CLR	8.00		92	33.3	78	25.4	72	22.2	52	17	150		29.84			29.85	AA		29.80
31	0356	5	FEW018 SCT023	3.00	HZ	89	31.7	76	24.3	70	21.1	54	24	190	34	29.84	3	009	29.85	AA		29.80
31	0411	5	FEW007	4.00	HZ	88	31.0	77	24.8	72	22.0	59	23	190	29	29.84			M	SP		29.80
31	0456	5	SCT060CB BKN200	10.00		90	32.2	73	22.9	65	18.3	44	14	210	21	29.84			29.84	AA		29.80
31	0556	5	SCT060CB BKN200	10.00		90	32.2	76	24.1	69	20.6	50	17	210		29.84			29.85	AA		29.80
31	0656	5	SCT060CB BKN200	8.00		90	32.2	76	24.1	69	20.6	50	11	010		29.86	3	005	29.86	AA		29.82
31	0756	5	SCT060CB BKN200	8.00		92	33.3	77	25.1	71	21.7	50	13	010		29.85			29.85	AA		29.81
31	0856	5	SCT060 SCT200	8.00		97	36.1	78	25.5	70	21.1	42	8	030		29.86			29.87	AA		29.82
31	0956	5	SCT060 SCT200	6.00	HZ	102	38.9	79	25.8	69	20.6	34	9	350		29.86	6	001	29.86	AA		29.82
31	1056	5	FEW060 SCT200	10.00		104	40.0	79	25.8	68	20.0	31	0	000		29.84			29.85	AA		29.80
31	1156	5	FEW060 SCT200	10.00		106	41.1	78	25.8	67	19.4	28	6	VR		29.82			29.82	AA		29.78
31	1256	5	SCT060 SCT200	10.00		108	42.2	78	25.7	66	18.9	26	7	180		29.79	8	022	29.80	AA		29.75
31	1356	5	SCT060 SCT200	10.00		108	42.2	78	25.4	65	18.3	25	3	VR		29.76			29.76	AA		29.72
31	1456	5	SCT060 SCT200	10.00		109	42.8	76	24.5	61	16.1	21	7	180		29.73			29.74	AA		29.69
31	1556	5	SCT060CB BKN200	10.00		109	42.8	76	24.3	60	15.6	20	5	170		29.72	6	023	29.73	AA		29.68
31	1656	5	SCT060CB BKN200	10.00		109	42.8	76	24.3	60	15.6	20	7	210		29.72			29.72	AA		29.68
31	1756	5	CLR	10.00		107	41.7	77	24.8	63	17.2	24	6	190		29.72			29.72	AA		29.68
31	1856	5	CLR	10.00		104	40.0	76	24.4	63	17.2	26	0	000		29.72	3	000	29.73	AA		29.68
31	1956	5	CLR	10.00		98	36.7	74	23.2	62	16.7	31	0	000		29.74			29.75	AA		29.70
31	2056	5	CLR	10.00		98	36.7	75	24.1	65	18.3	34	6	140		29.75			29.76	AA		29.71
31	2156	5	CLR	10.00		97	36.1	74	23.4	63	17.2	33	3	170		29.76	1	011	29.76	AA		29.72
31	2256	5	CLR	10.00		94	34.4	74	23.5	65	18.3	38	0	000		29.75			29.76	AA		29.71
31	2356	5	CLR	10.00		93	33.9	74	23.3	65	18.3	40	0	000		29.75			29.75	AA		29.71

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration

**QUALITY CONTROLLED LOCAL
CLIMATOLOGICAL DATA**

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801

(final)

**HOURLY OBSERVATIONS TABLE
IMPERIAL COUNTY AIRPORT (03144)
IMPERIAL , CA
(08/2007)**

Elevation: -59 ft. below sea level
Latitude: 32.834
Longitude: -115.579
Data Version: VER2

Date	Time (LST)	Station Type	Sky Conditions	Visibility (SM)	Weather Type	Dry Bulb Temp		Wet Bulb Temp		Dew Point Temp		Rel Humd %	Wind Speed (MPH)	Wind Dir	Wind Gusts (MPH)	Station Pressure (in. hg)	Press Tend	Net 3-hr Chg (mb)	Sea Level Pressure (in. hg)	Report Type	Precip. Total (in)	Alti-meter (in. hg)
						(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
31	0053	12	CLR	10.00		92	33.3	80	26.5	75	23.9	58	8	060		29.84	0	000	29.78	AA		29.78
31	0153	12	CLR	10.00		92	33.3	79	26.1	74	23.3	56	7	130		29.82			29.77	AA		29.76
31	0253	12	CLR	4.00	HZ	93	33.9	77	24.9	70	21.1	47	18	150		29.86			29.80	AA	T	29.80
31	0353	12	CLR	8.00	VCTS	90	32.2	76	24.1	69	20.6	50	22	200	29	29.86	3	010	29.80	AA	T	29.80
31	0400	12	FEW005	3.00	HZ	91	33.0	76	24.6	70	21.0	50	23	200	29	29.86			M	SP		29.80
31	0407	12	FEW005	2.50	HZ	90	32.0	76	24.5	70	21.0	52	21	190	29	29.86			M	SP		29.80
31	0415	12	CLR	4.00	HZ	90	32.0	76	24.5	70	21.0	52	17	200	26	29.86			M	SP		29.80
31	0453	12	CLR	10.00		88	31.1	74	23.5	68	20.0	52	18	210	25	29.84				AA		29.78
31	0553	12	CLR	10.00		88	31.1	76	24.2	70	21.1	55	11	200		29.86				AA		29.80
31	0653	12	CLR	10.00		92	33.3	76	24.4	69	20.6	47	8	020		29.88	3	005		AA		29.82
31	0753	12	CLR	6.00	HZ	94	34.4	77	25.1	70	21.1	46	M	M		29.87				AA		29.81
31	0853	12	CLR	6.00	HZ	99	37.2	78	25.4	69	20.6	38	8	040		29.88				AA		29.82
31	0953	12	CLR	6.00	HZ	102	38.9	79	25.8	69	20.6	34	8	330		29.87	6	001		AA		29.81
31	1053	12	FEW090	7.00		104	40.0	78	25.5	67	19.4	30	3	VR		29.86				AA		29.80
31	1153	12	CLR	10.00		107	41.7	78	25.6	66	18.9	27	5	220		29.83				AA		29.77
31	1253	12	FEW080	10.00		108	42.2	79	26.0	67	19.4	27	8	220		29.81	8	022		AA		29.75
31	1353	12	FEW090	10.00		M	M	M	M	M	M	M	8	240		29.77			M	AA		29.71
31	1453	12	CLR	10.00		M	M	M	M	M	M	M	7	220		29.75			M	AA		29.69
31	1553	12	CLR	10.00		M	M	M	M	M	M	M	8	200		29.74			M	AA		29.68
31	1653	12	FEW090	10.00		108	42.2	77	24.9	63	17.2	23	7	230		29.73				AA		29.67
31	1753	12	CLR	10.00		107	41.7	78	25.3	65	18.3	26	5	250		29.73				AA		29.67
31	1853	12	CLR	10.00		104	40.0	77	24.9	65	18.3	28	0	000		29.74				AA		29.68
31	1953	12	CLR	10.00		103	39.4	77	24.8	65	18.3	29	3	110		29.76				AA		29.70
31	2053	12	CLR	10.00		97	36.1	77	24.8	68	20.0	39	0	000		29.77				AA		29.71
31	2153	12	CLR	10.00		99	37.2	76	24.5	66	18.9	34	0	000		29.77	1	010		AA		29.71
31	2253	12	CLR	10.00		93	33.9	75	23.6	66	18.9	41	5	290		29.77				AA		29.71
31	2353	12	CLR	10.00		93	33.9	74	23.0	64	17.8	38	0	000		29.77				AA		29.71

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