



MONTHLY AIR QUALITY REPORT FOR
DECEMBER 2008

AOI COLOR SCALE

GOOD	MODERATE	UNHEALTHY FOR SENSITIVE GROUPS	UNHEALTHY
0-50	51-100	101-150	151-200

Calendar of maximum AQI values & their corresponding color for December 2008*

*Preliminary data

SAMPLE POLLUTANT REPORTING BOX

1 (day of month)	O3	CO
	PM10	PM2.5

	SUN	MON	TUES	WED	THU	FRI	SAT
		1	26 20 44 69	2	26 24 51 69	3	30 23 54 81
					4	36 24 55 76	5
						36 25 58 74	6
7	28 34 43 78	8	31 16 37 72	9	32 09 34 12	10	30 15 50 47
					11	28 23 62 61	12
14	33 11 41 32	15	33 13 39 51	16	29 08 12 21	17	29 07 11 16
					18	31 11 14 20	19
21	26 20 28 116	22	30 17 37 88	23	30 13 23 54	24	31 15 32 65
					25	31 14 16 57	26
28	32 26 32 84	29	35 27 54 82	30	31 27 53 73	31	29 31 57 115

Calendar of High Pollution Advisories and Health Watches issued during December 2008

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
					E	E
7	8	9	10	11	12	13
E				E		
14	15	16	17	18	19	20
21	22	23	24	25	26	27
E	E	E				E
28	29	30	31			
B	E	B	E			

LEGEND

HIGH POLLUTION ADVISORIES

- A** = PM-10 High Pollution Advisory
- B** = PM-2.5 High Pollution Advisory
- C** = Ozone High Pollution Advisory

HEALTH WATCHES

- D** = PM-10 Health Watch
- E** = PM-2.5 Health Watch
- F** = Ozone Health Watch

Calendar of Meteorological Conditions observed in Metro Phoenix during December 2008

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
	E	E	E		E	E
7	8	9	10	11	12	13
B	A					B
E	E					D
14	15	16	17	18	19	20
A	B	B	B	B	E	
B	C	C	C	C	C	
21	22	23	24	25	26	27
	B	B	B	B	B	
E	E				C	
F	F					
28	29	30	31			
	E	E	E	F		

LEGEND

ELECTROMETEORS

- A** = Thunderstorm

HYDROMETEORS

- B** = Rain/Drizzle/Hail/Snow
- C** = Fog

LITHOMETEORS

- D** = Blowing Dust
- E** = Haze (vsby <10SM)
- F** = Smoke

Exceedance days during DEC 2008-

<u>Total=</u>	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
2	12/21	116	PM-2.5	Phoenix Supersite (neph)
		115	PM-2.5	Phoenix Supersite (teom)
		101	PM-2.5	West Phoenix
	12/31	115	PM-2.5	South Phoenix
		102	PM-2.5	West Phoenix

Health Watches issued during DEC 2008-

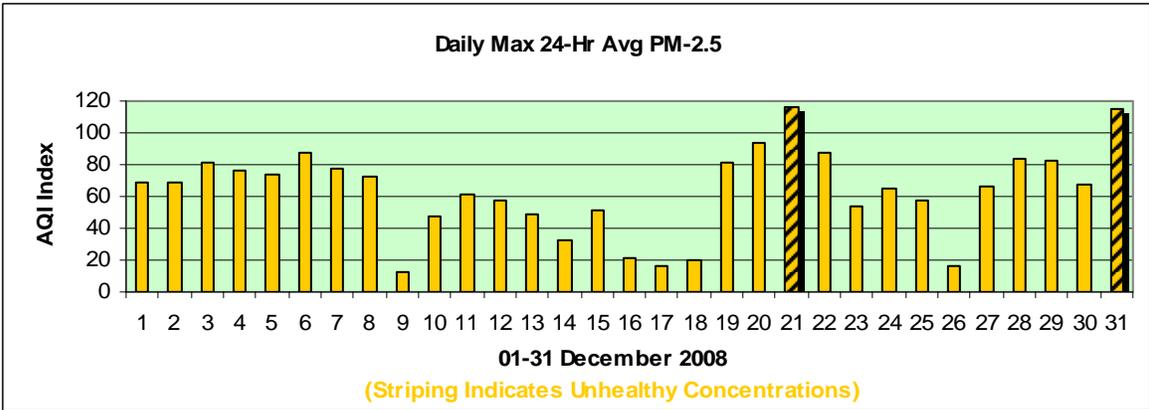
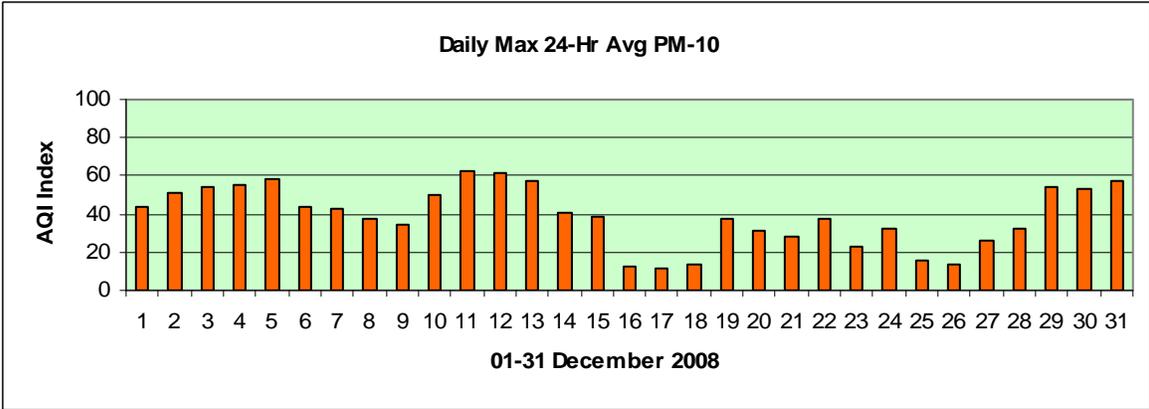
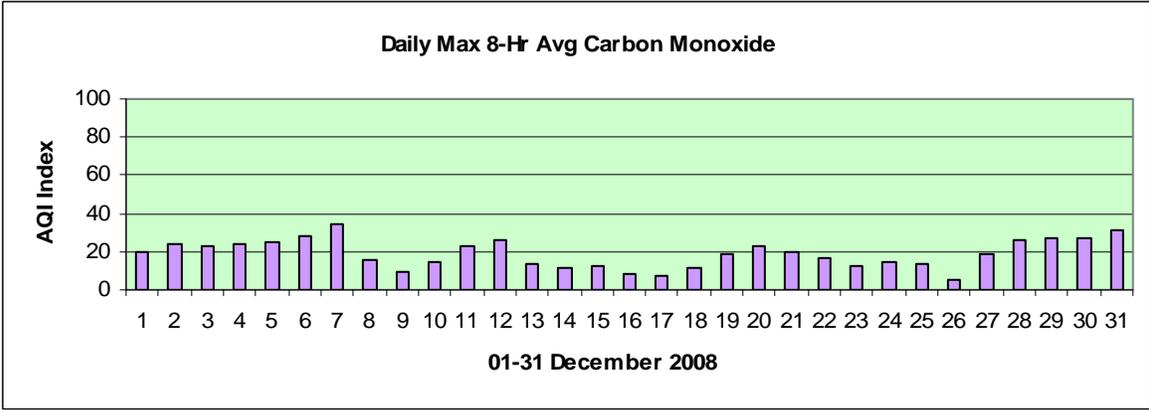
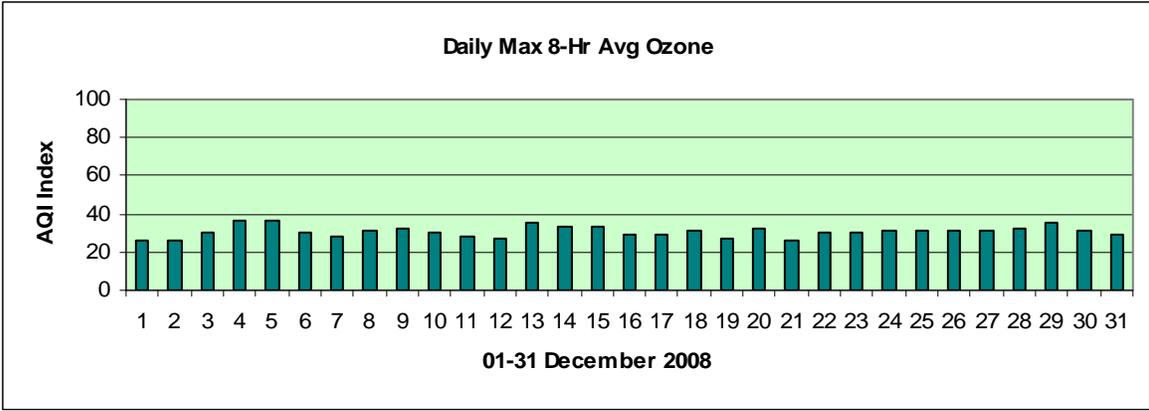
<u>Total=</u>	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
10	12/05	74	PM-2.5	West Phoenix
	12/06	87	PM-2.5	Phoenix Supersite
	12/07	78	PM-2.5	Phoenix Supersite
	12/11	61	PM-2.5	Durango
	12/22	88	PM-2.5	West Phoenix
	12/23	54	PM-2.5	Phoenix Supersite
	12/24	65	PM-2.5	South Phoenix
	12/27	66	PM-2.5	South Phoenix
	12/29	82	PM-2.5	Durango
	12/31	115	PM-2.5	South Phoenix

High Pollution Advisories issued during DEC 2008-

<u>Total=</u>	<u>Date</u>	<u>Max AQI</u>	<u>Pollutant</u>	<u>Site/s</u>
2	12/28	84	PM-2.5	Phoenix Supersite
	12/30	73	PM-2.5	West Phoenix

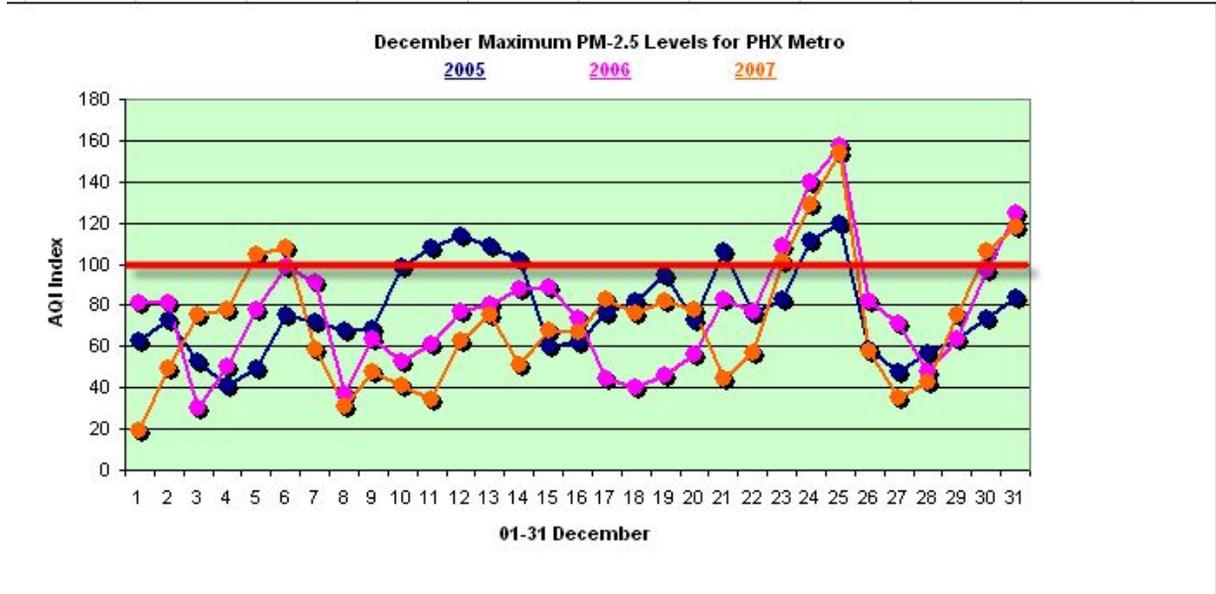
Concentration Recap:

Days in the Good category:	7
Days in the Moderate category:	22
Days in the Unhealthy for Sensitive Groups category:	2
Days in the Unhealthy category:	0
Total Forecast Days:	31

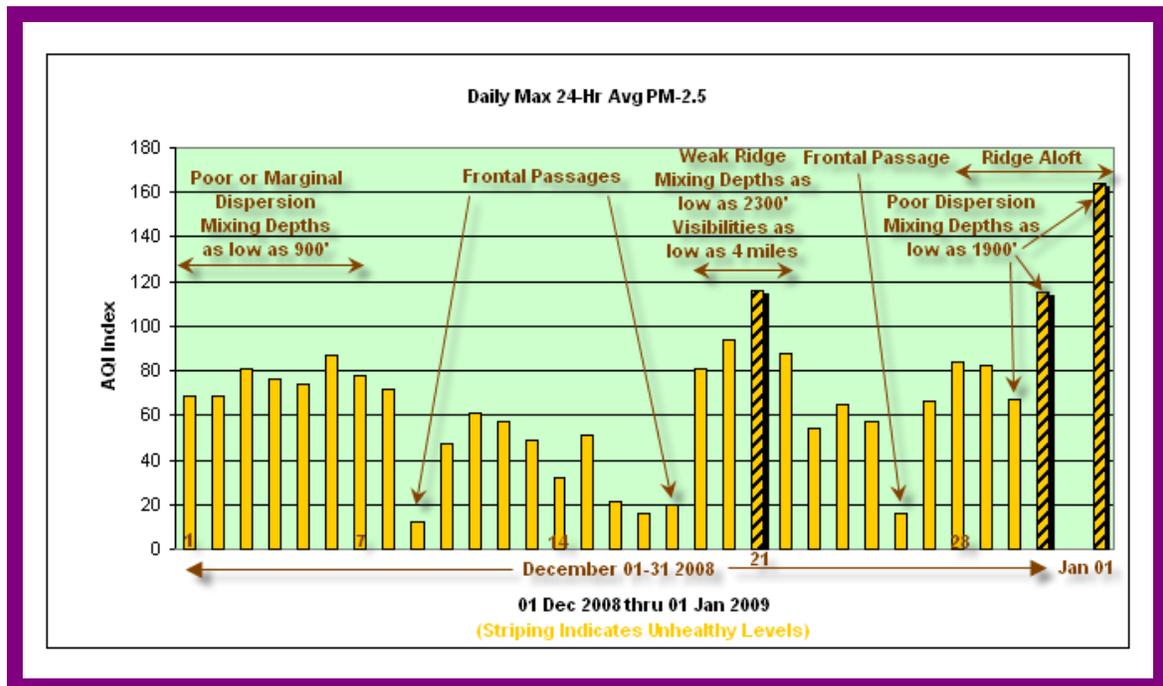


Narrative:

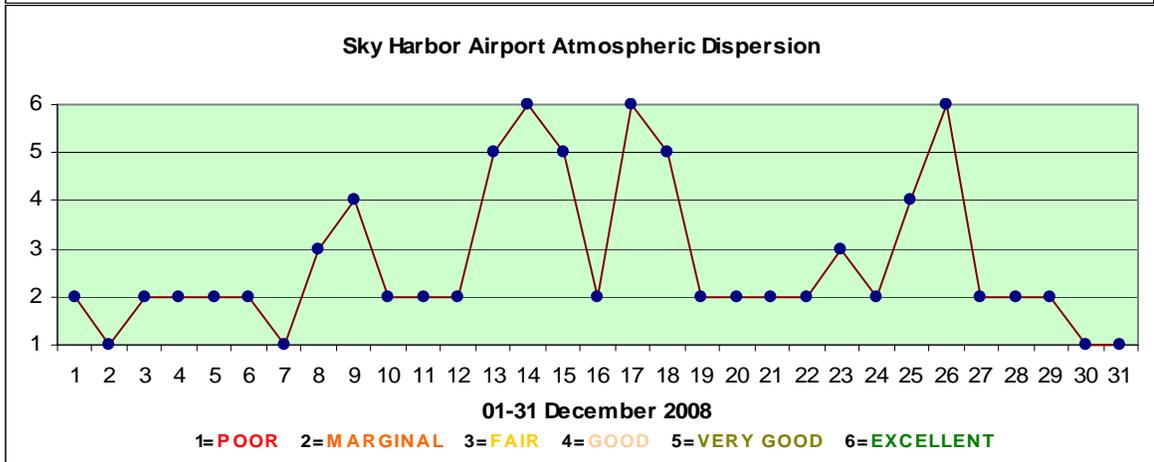
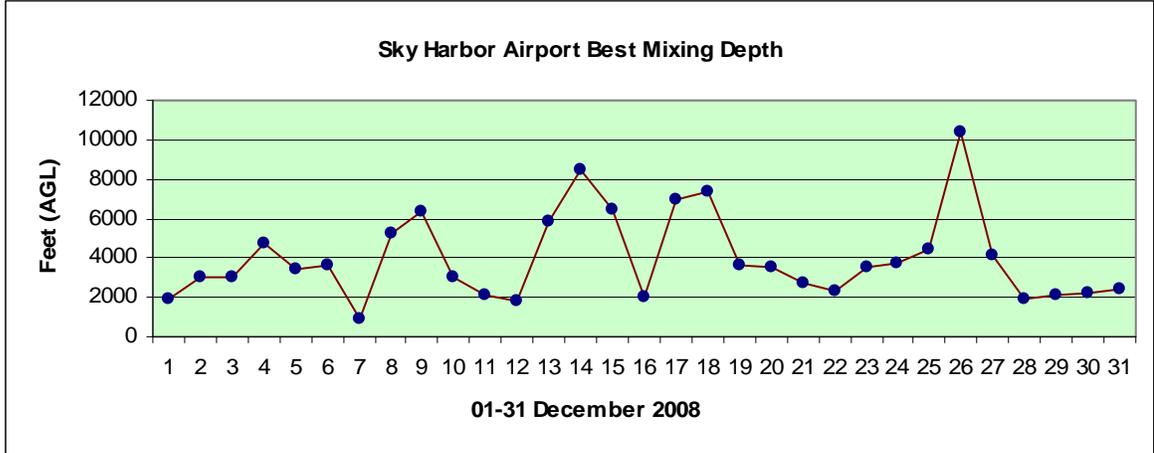
During the month of December local ozone and carbon monoxide levels were typically low, but coarse particle (PM-10) concentrations were abnormally low due to antecedent stable soil conditions due to recurrent rainfall events during November, as well as additional precipitation this month. As has been the case since 2005, the month of December again presented serious forecast challenges regarding fine particle (PM-2.5) pollution, due in large part – at least anecdotally – to smoke emissions from residential and recreational wood burning. This situation has recently become critical during the Christmas and New Year’s Day holidays as the graph below illustrates:



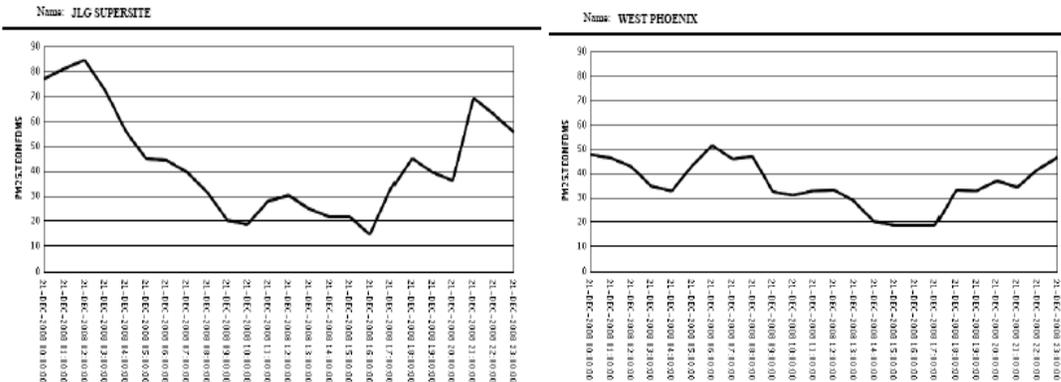
Weather conditions and generalized boundary layer characteristics for December 01 2008 thru January 01 2009 are best summarized by the following graph:



Additional detail on boundary layer characteristics can be gleaned from the following graphs that show best mixing depths and dispersion indices for Sky Harbor Airport, located in the heart of the Phoenix metro area:



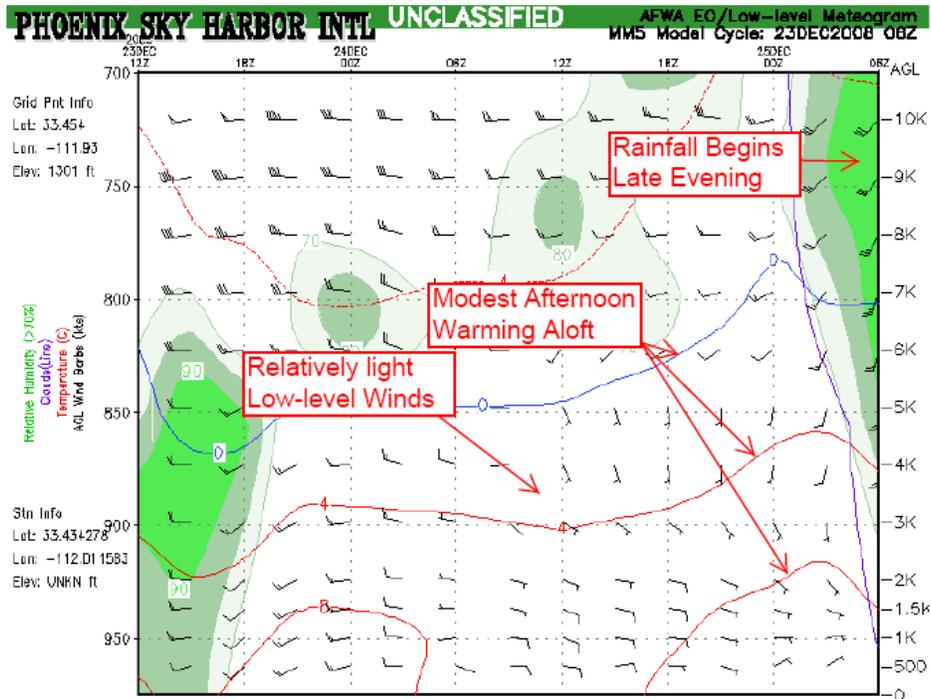
As can be seen, although four significant trough and frontal passages occurred (on the 9th, 14th, 18th, and 26th), the air mass over the Valley quickly stagnated after each event. It has become very evident over the past few years that local PM-2.5 concentrations exhibit a direct correlation to the degree of low-level stability. Also noted is that when smoke emissions from wood burning activities are added to the normal background levels of fine particles due to combustion, the effects on air quality can be exceedingly adverse. One such incident apparently began during the evening of Saturday Dec 20 and resumed late on Sunday Dec 21 with the result that two sites reached unhealthy levels of PM-2.5:



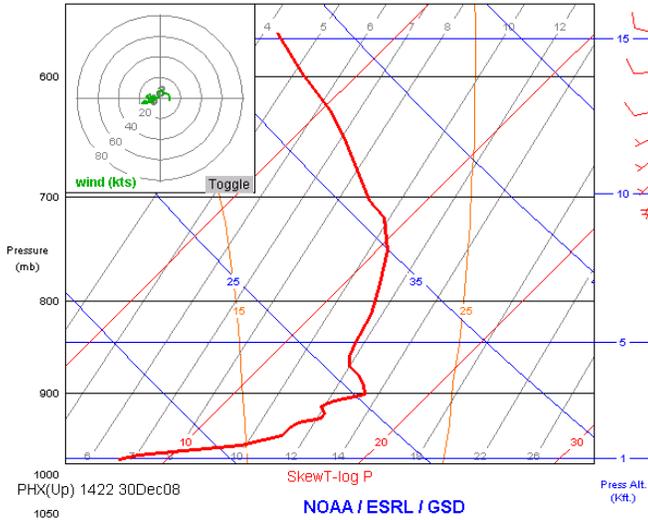
Armed with the knowledge that PM-2.5 exceedances had occurred on December 24 and 25 of the three previous years, forecasters paid especially close attention to the pending weather situation for that period. Indeed, the 24th began with a rather thick layer of haze/smoke over the area as seen below:



Analysis of an atmospheric forecast cross-section (below) from the surface to 10K' (700mb) showed the scenario that was likely to occur on Christmas Eve. Whether it was due to the approach of a weak upper level trough, or that significant wood-burning did not occur is not positively known, but fine particle levels were well below their potential on December 24. On Christmas Day steady light rain and breezy winds helped keep PM-2.5 levels down once again.



After the frontal passage on the 26th, a persistent low-amplitude ridge aloft became established over Arizona. Forecasters again geared up for another round of stagnant weather and potentially high PM-2.5 levels. The strongest surface-based radiation inversion of the season thus far (10.2 deg C) that occurred on the morning of the 30th helped to trap a significant amount of particles under its umbrella. (See illustrations below):



Despite the issuance of High Pollution Advisories for the 28th and 30th, and Maricopa County Air Quality Department No-Burn declarations on the 30th and 31st, more exceedances occurred on the 31st. As the attached time-series graphs show, dramatic increases in PM-2.5 emissions began around 1700 hrs and continued into the late night hours of New Year's Eve. -Reith

