

FINE PARTICLES (PM_{2.5})

2007 January – December

Fine particles, or PM_{2.5}, is a year-round pollutant. However, it is particularly active during the summer season, due to some precursors of PM_{2.5} chemically reacting faster in warm temperatures. To measure this pollutant's level of activity, the number of days that the 24-hour average PM_{2.5} National Ambient Air Quality Standard (NAAQS) is exceeded must be determined. This standard is exceeded when the Air Quality Index¹ (AQI, see color bar below) is greater than 100. When this occurs, that day is labeled as an exceedance day.

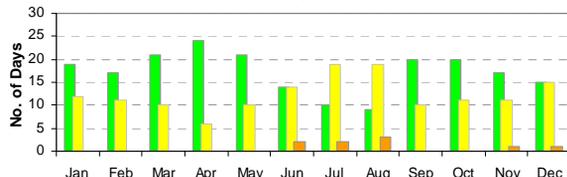
Air quality during 2007 appeared to be much less active than average. The 2007 fine particle season accumulated a total of nine² exceedance days while across the past five years (2002-2006), the average number of exceedance days was 21. The chart "Seasonal Comparison of Exceedance Days" (pg. 2) displays the monthly trends of 2007 exceedance days compared with the five-year average. High PM_{2.5} AQI values can also be seen visually. Haze Cam images located on the right show air quality conditions at Frostburg, MD on a good day and a bad day. On a clear day, such as December 6, 2007, the Negro Mountain Range (located in Pennsylvania) can be seen. These mountains are approximately 14 miles away from the Haze Cam location. During high fine particle AQI conditions, the view of this range is often obscured.



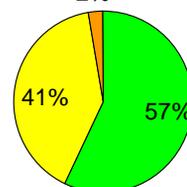
SEASONAL HIGHLIGHTS

During the 2007 season, nine days extended into the Unhealthy for Sensitive Groups (USG) range. The pie chart to the right displays the overall AQI trends for the year. These three days represent about 2% of all AQI values over the course of this year. The most common AQI categories reported were Good at 57% and Moderate at 41%. It is very rare for PM_{2.5} to be measured at levels of Unhealthy or greater. 2007 was no different as there were no Unhealthy AQI days recorded.

Maryland 24-hour Average PM_{2.5} AQI 2007 Monthly Distribution



Maryland 24-hour Average PM_{2.5} AQI 2007 Total



The fine particle season kept within the Good and Moderate range during the months of January through May. The chart to the right "Maryland 24-hour Average PM_{2.5} AQI 2007 Monthly Distribution" displays the number of days an AQI category was reached for each month. April proved to be the cleanest month with only six Moderate days and 24 Good days, the highest number of Good days in any given month during the year. In June, the first USG day was reported. June was also the first month in which Moderate days increased so that it nearly surpassed the occurrence rate of Good days. The month of July continued this trend of increased Moderate days with 19, while only 10 Good days occurred. Like June, two USG days occurred in this month as well. The most USG days were experienced in August with three. From the months of September through November, the most frequent AQI category was Good again. The final USG days of the season occurred in November and December. (continued on pg. 2)

Air Quality Index (AQI)



¹ AQI based on the 2006 24-hr proposed PM_{2.5} thresholds

² PM_{2.5} data from official FRM measurements

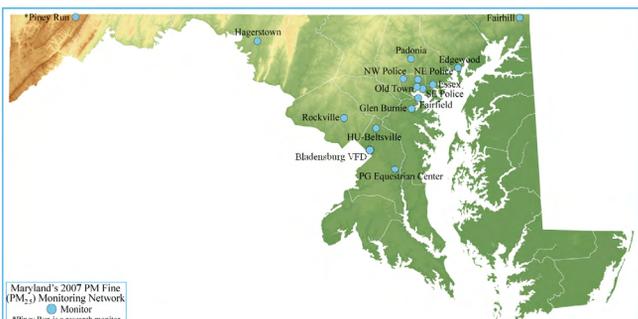
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SEASONAL HIGHLIGHTS

(continued from pg. 1)

There were nine exceedance days overall during the year. The table to the left, "Maryland's 2007 PM_{2.5} Exceedance Days," lists each day an AQI value was above 100. AQI values were emphasized using its designated AQI color. The first exceedance day occurred on June 19th and AQI values over 100 occurred at three air monitoring sites in Maryland.



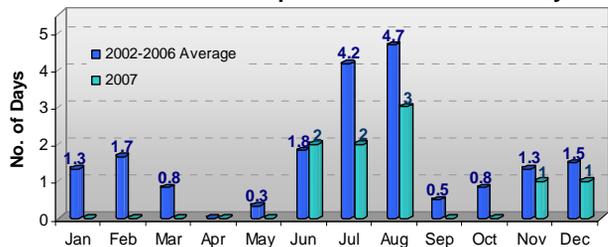
On this day, the highest 24-hour average fine particles AQI was 122 at the Old Town air monitoring site. For the location of this site, refer to the monitoring network map above the table. During the month of July, two exceedance days were reported and reached AQI values of 102 and 105. The worst exceedance day was experienced on August 7th, as 10 air monitoring sites exceeded an AQI of 100. The highest AQI value was 127 at the SE Police Station. In December, the last exceedance day occurred on December 8th at the Essex air monitoring site.

Maryland's 2007 PM _{2.5} Exceedance Days			
Date	No. of Monitors	Monitor with Highest AQI	24-hour Average PM _{2.5} AQI
19-Jun	3	Old Town	122
26-Jun	2	Old Town	105
9-Jul	3	FMC-Fairfield	102
10-Jul	1	Old Town	105
4-Aug	8	FMC-Fairfield	122
6-Aug	3	Essex	112
7-Aug	10	SE Police Station	127
21-Nov	1	Old Town	107
8-Dec	1	Essex	105

WEATHER & AIR QUALITY

Temperature and precipitation trends in 2007 were compared with the climatological average of 1950-2007. Maps of the U.S. (pg. 3) display anomalies of these long-term averages from January to December in 2007. During 2007, temperatures across the U.S. appeared to be generally above normal, or warmer than average, especially in the Rocky Mountains region and central U.S. areas east of the Mississippi River. Some areas such as central Texas and northern New England proved to be slightly below normal, or cooler in temperature. On the other hand, southern New England, the Northwest region, and some locations north and west of Texas were close to average. Precipitation trends throughout the year appeared to be about average for the majority of the west coast to the Rocky Mountains as well as some areas in the Midwest. Nearly all central locations of the U.S. experienced above normal precipitation, or wetter conditions. In contrast, a significant deficit of precipitation was apparent in the Southeast to southern Mid-Atlantic regions.

Seasonal Comparison of Exceedance Days



In Maryland, temperatures remained close to average in 2007 with some slightly above average temperatures in the Delmarva Peninsula. Precipitation appeared to be average to just below average, or drier, throughout Maryland. These conditions seem to have influenced the number of exceedance days experienced in the state. The chart, "Seasonal Comparison of Exceedance Days" located above indicates that through the months of January (continued on pg. 3)

Air Quality Index (AQI)

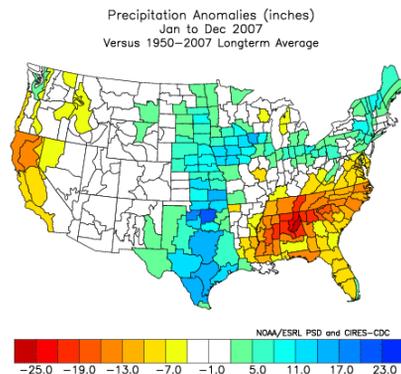
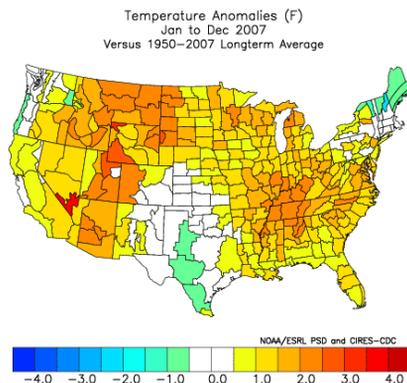


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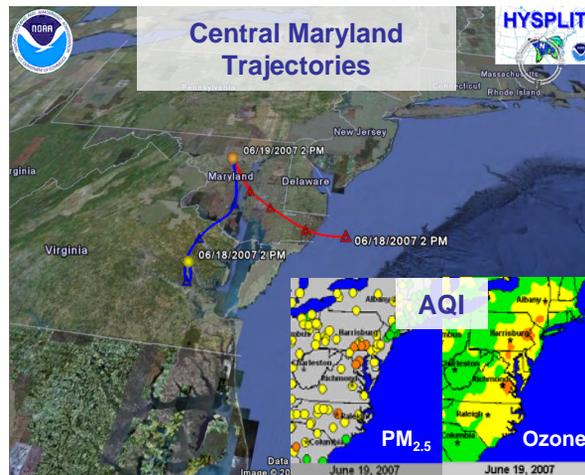
WEATHER & AIR QUALITY

(continued from pg. 2) to May, no exceedance days occurred. This pattern was shown to be a bit below the five-year average of exceedance days during the years 2002-2006. About one to two exceedance days would commonly occur per month through this time period. The summer months indicated a below average trend continued to exist in 2007 fine particle exceedance days from the five-year mean. Between July and August, there were approximately four exceedance days less than what normally occur. This may be due to drought conditions that the Southeast region faced in the mid to late summer. Fine particle pollution usually accumulates best in a warm and moist environment. The lack of moisture in the air may have inhibited prime PM_{2.5}-developing conditions, thus leading to a decrease in exceedance days during this time. From September to the end of the 2007 fine particle season, exceedance days were overall close to average.



FEATURED EVENT: June 19, 2007

The poor air quality event began with a high pressure system over the Southeast region. A warm front stretched from central Maryland to the Chesapeake Bay. This allowed for light and variable winds behind the front while also inducing light southeasterly winds ahead of the front. This southeasterly surface wind can be seen in the image to the right as the red 24-hour back trajectory (initiated at 10 m above ground level, or AGL). It is also important to note the short distance that the air parcel travelled from the previous day to June 19th. The blue trajectory (500 m AGL) indicates southerly light winds were prominent aloft. Both trajectories indicate that short range transport as well as potentially local pollutants were contributors to this PM_{2.5} episode. The trajectories' endpoints are color-coded based on the daily average AQI reached on June 18th and 19th. Other prominent weather conditions that aided fine particle development were warm temperatures in the mid 80's (F) and ample moisture.



As a result of these atmospheric factors, the 24-hour average fine particle AQI rose to USG at three locations in Maryland. The AQI maps to the right indicate the regional extent of which this episode spread for both PM_{2.5} and ozone pollution. This event ended with the passage of a cold front causing rain showers and a change in airmass resulting in drier conditions.

MORE INFORMATION

Visit www.cleanairpartners.net for current air quality conditions and forecasts, or call the air quality hotline at 410-537-3247.
References: [AIRNow](#), [NOAA ARL READY HYSPLIT Trajectory Model](#), [NOAA ESRL PSD Climate Analysis Branch](#)

Air Quality Index (AQI)

0-50 Good	51-100 Moderate	101-150 USG	151-200 Unhealthy	201-300 Very Unhealthy	301-500 Hazardous
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