MARYLAND
Department of the Environment

# Seasonal Report

## 2014 Ozone

## CLEANEST OZONE SEASON EVER

During the summer of 2014 Maryland observed its cleanest ozone season ever, and for the first time since ozone measurements began in 1980, the Baltimore area received a passing grade for ozone air quality. Surface ozone is typically worst between May and September, frequently becoming the lead pollutant for the Mid-Atlantic and causing health concerns for Maryland residents. The increase in ozone occurs as warm temperatures, intense sunlight and light winds of summer enhance surface ozone production. However, due to the 2014 summer weather pattern and ongoing pollution reductions, 2014 set an all-time clean ozone season record.

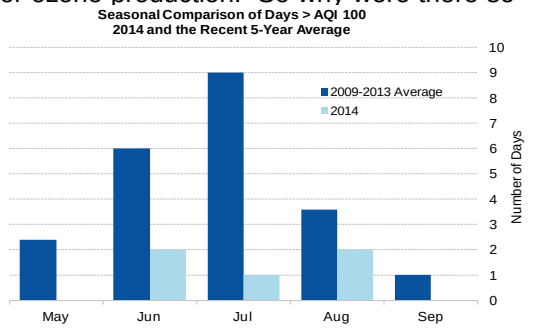
Surface ozone concentrations are monitored and forecast to protect the public welfare. Unlike helpful ozone in the upper atmosphere that shields earth from harmful solar radiation, ozone at the surface adversely affects the human respiratory system. The Air Quality Index *(AQI, see legend at bottom)* was developed to easily communicate air quality status. When ozone has an AQI value in excess of 100, ozone concentrations have reached levels deemed unhealthy by health studies. Days that have an 8-hour average in excess of 100 AQI are classified "exceedance days" and their total number in a particular year provides a measure of the severity of an ozone season. The 5 exceedance days of the 2014 season were the lowest number Maryland has ever experienced *(see table, left)*.

**Maryland 2014 Ozone Exceedance Days**

| Date | No. of Monitors Exceeding 100 AQI | Highest AQI Monitor | 8-hr Average Ozone AQI |
|---|---|---|---|
| 16-Jun | 1 | Padonia | 114 |
| 17-Jun | 1 | Edgewood | 111 |
| 11-Jul | 3 | Fair Hill | 109 |
| 6-Aug | 1 | S. Maryland | 104 |
| 27-Aug | 4 | Fair Hill | 124 |

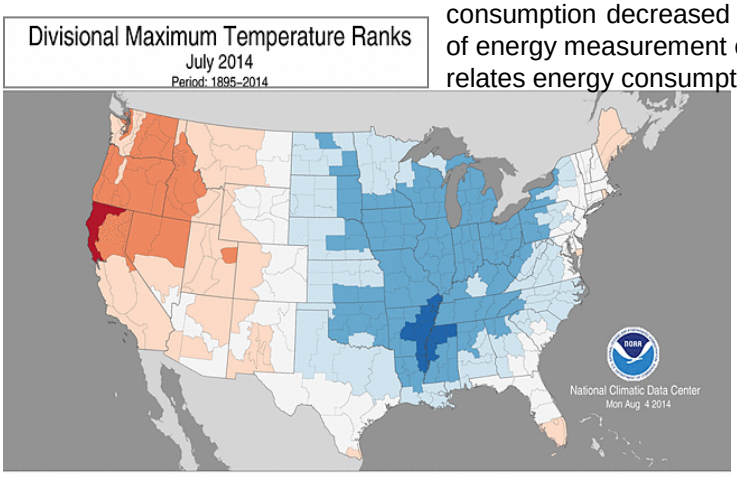
## A SIGNIFICANT FACTOR: THE WEATHER

The vast majority of ozone exceedance days occur from June through August because of intense sunlight, warm temperatures and light winds typical of summer. However, a notable lack of extreme daytime maximum temperatures occurred from June to August in 2014. Only 10 days reached 90°F or greater during this time period, less than half of normal. In fact 2014 tied for the fourth fewest number of days reaching 90°F or greater since 1980. Extremely warm temperatures aid the production of surface ozone, but they are not a requirement. In fact, three of the five ozone exceedance days in 2014 occurred with temperatures in the 80s. So even though extreme heat was not present, temperatures were still warm enough for ozone production. So why were there so few exceedance days in Maryland?



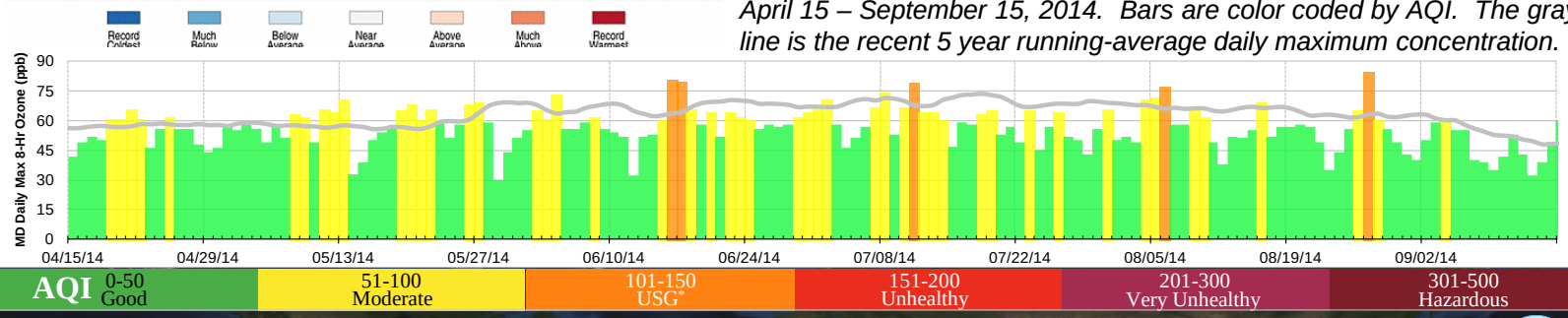

On average, July has the greatest number of days where ozone reaches an AQI of at least 101, concentrations considered Unhealthy for Sensitive Groups (USG) or code orange levels *(graph, right)*. July of 2014 had only one day where ozone reached code orange levels, 8 fewer days than the recent 5 year average. Maryland avoided the extreme heat, but remained only slightly (1.5°F) cooler than normal. However, a large portion of the central United States set record or near record low temperatures during July *(below)*.

With record low maximum temperatures over such a large area of the country, energy consumption decreased to near all time lows. A unit of energy measurement called a Cooling Degree Day relates energy consumption to temperature. It showed that 22 of the 37 states east of the Rocky Mountains (~60%) had June, July, and August energy consumption that ranked in the lowest 10 years since 1980 with only 2 states with above normal energy usage (Texas and Florida). In other words, wide spread lower than normal temperatures in the east-central United States caused low summer energy usage that lowered total emissions and thereby kept ozone concentrations low. As a consequence, air entering Maryland from this region was cleaner than normal.




*Left: Divisional Maximum Temperature Ranks (in colored bins) for July of 2014. The Mississippi and Ohio River Valleys saw "Much Below Average" to "Record Coldest" conditions.*

*Below: Maximum daily 8-hour ozone concentration in Maryland from April 15 – September 15, 2014. Bars are color coded by AQI. The gray line is the recent 5 year running-average daily maximum concentration.*




*Unhealthy for Sensitive Groups Based on 2008 8-hour ozone NAAQS


MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard | Baltimore, MD 21230
410-537-3000 | 1-800-633-6101
Martin O'Malley, *Governor* | Anthony G. Brown, *Lt. Governor* | Robert M. Summers, Ph.D., *Secretary*


Source: National Climate Data Center (NCDC)

MDE

MARYLAND
Department of the Environment

# Seasonal Report

## 2014 Ozone

## MARYLAND'S AIR QUALITY GETS A PASSING GRADE AT EDGEWOOD

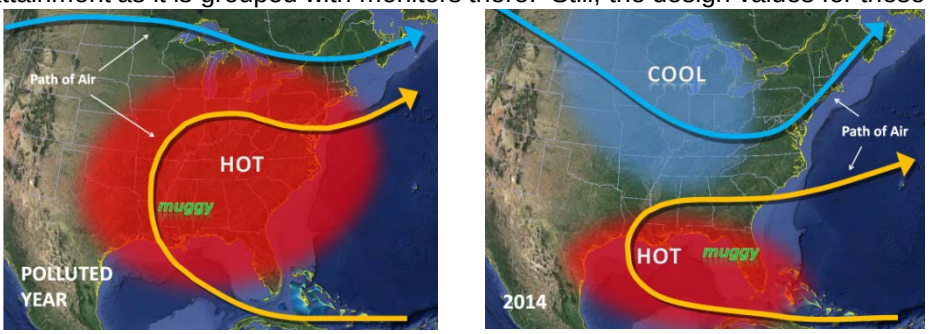
The Environmental Protection Agency (EPA) has established guidelines for air quality and defined areas of the country for air quality monitoring and compliance designation purposes. The Baltimore area, for example, includes Anne Arundel, Howard, Carroll, Baltimore, Baltimore City, and Harford counties in Maryland. Any defined areas not meeting the EPA air quality standards are given a designation of "non-attainment" by the EPA. A status of non-attainment forces the state or local government to take action at several levels, including implementing new policies to curtail pollution and enacting programs to ensure air quality improvements in future years or face federal penalties.


*Above: The 2014 Maryland ozone monitor network. Maryland Department of the Environment (MDE) monitors are dark gray dots while monitors operated by the EPA CASTNET program are white. The background map is elevation; browns show higher, dark greens show lower elevations. The Edgewood monitor is circled in red. Monitors out of attainment in 2014, as mentioned in the text, are circled in blue.*

Since extensive ozone records began around 1980, the non-attainment status given to the Baltimore area has been governed by ozone concentrations northeast of downtown Baltimore. In fact, the ozone monitor at Edgewood, Maryland *(map above)* has observed the highest ozone of all Baltimore area monitors since 1980!! Efforts to clean the air have been successful, but Edgewood remains the dirtiest monitor in the Baltimore area. However, for the first time in Maryland ozone history, the ozone concentrations at Edgewood have dropped far enough to achieve a "passing grade." This grade, called a design value, is based on three years of ozone observations. With a record setting clean year in 2013, followed by another record clean year in 2014, Edgewood's design value has improved to an acceptable level. Due to the annual variability of weather, it is possible future design values may not always improve year to year. It is also likely that Baltimore will once again be deemed "non-attainment" in light of the new proposed ozone National Ambient Air Quality [Heath] Standard (NAAQS) set to become final by October 1, 2015. The new proposed standard reflects research showing health impacts of ozone at lower concentrations. Regardless of the future design value or designation, for now Baltimore can breathe easy, having achieved "attainment" for the first time in over 30 years!

## NOT EVERYONE SHARES THE SAME RESULT

All of the eastern United States observed seasonally low ozone but not all areas benefitted equally. Connecticut, for example, has had approximately half the improvement as Baltimore in their design value. Other areas also remain in non-attainment. In fact, there are two monitors in Maryland with design values above the NAAQS *(see figure above)*. The monitor in Prince Georges' county will keep the Washington DC area in non-attainment. The Fair Hill monitor in Cecil county Maryland will keep the Philadelphia area in non-attainment as it is grouped with monitors there. Still, the design values for these areas are the best they have been in decades.




*Above: Prevailing summer weather patterns influencing air quality in Maryland. The left panel shows the typical weather pattern of a polluted summer in Maryland where warm, moist air moves northward, then turns eastward across industrial and urban areas allowing air modification and ozone production (orange path). In contrast, northerly winds in the Midwest in 2014 (right panel) supported below normal temperatures there and clean air for the east coast.*

## WEATHER AND AIR QUALITY

2014 illustrated the immense dependence of air quality on weather. Weather determines the amount of energy consumed, which directly affects how much pollution is produced. The cooler than normal weather over the central United States resulted in a low ozone year. Since the typical summer pattern blows air from the central United States towards the east coast the quality of that air has direct implications to Maryland. The national prevailing weather pattern in 2014 supported clean, mainly Canadian air being blown towards the east coast. In contrast, a poor air quality summer supports warm, humid conditions over a wide area *(left)*. These differences illustrate the pivotal influence that people and weather patterns have on air quality.

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


MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard | Baltimore, MD 21230
410-537-3000 | 1-800-633-6101
Martin O'Malley, *Governor* | Anthony G. Brown, *Lt. Governor* | Robert M. Summers, Ph.D., *Secretary*


MDE