

## **Air Quality – Ozone Exceedances**

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### **Status Summary**

In essence there has been no quantitative improvement in the air quality of Barnstable County since the 2003 Sustainability Indicators Report (<http://www.capecodedc.org/documents/2003IndicReptIndicator6.pdf>). We continue to have the discomfiting status as having the worst air quality in the Commonwealth. In the previous report we detailed the facts as revealed by the DEP monitors in Truro and in Boston for the years 2001 and 2002. The deleterious health effects of various levels of atmospheric ozone are well documented in that report. The public is informed in newspaper weather forecasts in an easily understood air quality index (AQI) scaled from 0 to 500 with breakpoints for definitive levels of health impairment in accordance with an EPA color coded scale. One should note that there is no apparent threshold below which health effects do not occur, particularly for extremely sensitive individuals.

This year we are using a simplified presentation of condensed air monitor data that is based on a three year running average which will be more revealing of a trend rather than the condition in any one year. Ozone is formed in the atmosphere by chemical reactions of nitrogen oxides and unburned hydrocarbons primarily from power plants and vehicles. That chemical reaction is exacerbated by higher temperatures and direct sunlight. Therefore the three-year average will tend to smooth ozone data from extremes in seasonal meteorological variations such as a cool and cloudy spring or a long spell of hot and sunny days.

This condensed data is taken from the American Lung Association's weighted average<sup>1</sup> of so called "exceedance days", that is days when the AQI is above 100 as measured by DEP monitors in Truro and elsewhere in the commonwealth and is presented in Table 1. As a basis for relevant comparison we also show the results in greater Boston, i.e. Suffolk County, where some old oil fired power plants have been replaced in recent years by cleaner burning natural gas units<sup>2</sup>, which may explain why there is a considerably lower AQI in that metropolitan region. We also show Bristol County where the communities of Fall River, New Bedford and Somerset are in the neighborhood of some of the largest old coal and oil fired power plants<sup>3</sup> that impact their air quality. We note Bristol County is invariably the second worst county for air quality in the commonwealth.

**Table 1. Weighted Air Quality Indicators for a Three-Year Running Average**

	Weighted AQI Average	AQI: 101 to 150 Orange Days	AQI: 151 to 200 Red Days	AQI: 201 to 300 Purple Days
		Unhealthy to Sensitive Groups	Unhealthy	Very Unhealthy
<b>2003</b>				
Barnstable	10.7	21	6	1
<b>2004</b>				

Barnstable	9.8	17	7	1
Bristol	9.0	18	6	0
Suffolk	7.2	15	3	1
<b>2005</b>				
Barnstable	11.3	22	8	0
Bristol	10.7	23	6	0
Suffolk	7.5	16	3	1

A more concise way of looking at the data is to consider just the weighted average alone for the comparative areas as shown in Table 2, below. Here we can see again that the AQI remains about 50% higher than in the greater Boston area as reported in the individual monitor data presented in the 2003 Indicators Report.

**Table 2. Yearly Weighted AQI Running Averages**

	2003	2004	2005
Barnstable	10.7	9.8	11.3
Bristol	n/a	9.0	10.7
Suffolk	n/a	7.2	7.5

### **Rationale for the Poor Air Quality on Cape Cod**

The air quality as measured by the DEP monitor in Truro cannot distinguish where the ozone originates. As a result it is somewhat difficult to identify the precise sources. However, we can draw some conclusions based on the following facts.

First, we are in the shadow of the states largest coal and oil fueled power plants, Brayton Point and the Canal Plant. The landmark Harvard Report<sup>4</sup> ([http://www.pewtrusts.com/pdf/env\\_estimated\\_public\\_health.pdf](http://www.pewtrusts.com/pdf/env_estimated_public_health.pdf)) on health impacts of local power plant emissions shows that the maximum intensity of primary pollutants falls within 5 to 20 miles of the source. Second, the Cape has its maximum influx of automobiles and trucks in the summer season which coincides with the maximum ozone forming conditions. Third, we are captive to the geography of a long peninsula where meteorological conditions create a dual sea breeze front<sup>5</sup>. That is a situation where early morning offshore prevailing winds carry pollutants out to sea, but in the late morning and afternoon the winds reverse and bring much of them back over the land and deposit them over our land mass. And finally, we are downwind of the numerous Midwest coal burning power plants in Ohio, Pennsylvania and the Virginias, thus we are subject to the “transport” phenomenon of pollutants from upwind states. Although difficult to quantify, Commissioner Golledge of the MA DEP has said up to half our pollution is from the upwind states<sup>6</sup>, the balance is from sources closer to home.

### **Outlook and Action Goals**

The major parameters contributing to air quality that can be affected by responsible action on the Cape are the generation and use of electrical energy, the use of heating fuels, and vehicular efficiency and traffic. Of course, local elected officials should

continue to support more stringent national emission regulations for upwind power plants not only for recognized national air quality criteria pollutants but for carbon dioxide emissions as well.

Effective programs focusing on energy efficiency such as the Cape Light Compact's voluntary plan should be encouraged with emphasis on public participation. More stringent future emission regulations in place for regional power plants should be helpful in improving air quality when compliance is achieved. We are fortunate on the Cape and Islands to have within our reach substantial non-polluting and sustainable energy resources from the wind and sun. The use of these resources must become a part of the total energy plan for the Cape and Islands to reduce unhealthy fossil fuel emissions and avoid substantial carbon dioxide production. Incentives for the use of fuel efficient vehicles and the establishment of major public transportation facilities must also be encouraged to improve our air quality and reduce carbon emissions. Sustainability can be achieved with new technologies at reasonable costs that conserve our energy, use renewable resources while limiting unhealthy emissions as well as those responsible for global climate change and rising ocean levels.

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<sup>I</sup> The weighted average is derived by adding the last three years of individual level data, multiplying the sum of each level by the assigned standard weights, i.e., 1 = orange, 1.5 = red, 2.0 = purple, and calculating the average by dividing by 3.

<sup>II</sup> The Mystic Plant just north of Boston has replaced 1950's oil fired units with larger natural gas generators.

<sup>III</sup> Brayton Point, the state's largest plant is primarily coal as is the Somerset plant. The Cleary plant is oil fueled.

<sup>IV</sup> "Estimated Public Health Impacts of Criteria Pollutant Air Emissions from the Salem Harbor and Brayton Point Power Plants," Jonathan Levy, John Spengler, Harvard School of Public Health, May, 2000, p. 4.

<sup>V</sup> "Development of a Dispersion Modeling Capability for Sea Breeze Circulations and other Air Flow Patterns over Southeastern Massachusetts, Upper Cape Cod Modeling Study," by Egan Environmental, REF File Number 1J2, January, 2002. Performed for the MA Department of Public Health.

<sup>VI</sup> Cape Cod Times Editorial, "EPA Lost In the Haze", June 12, 2004. "In Massachusetts, Department of Environmental Protection Commissioner Robert W. Gollidge Jr. said up to 50 percent of polluted air in the state comes from fossil fuel-burning plants in the Midwest, which directly affects the National Seashore."