

# Pasadena Citizens' Advisory Council

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## Summary of Thursday, December 5, 2014 Meeting

### Air Quality Trends and Emerging Issues

As a Followup to the October annual report on emissions, PCAC asked Houston Regional Monitoring (HRM) for an update on air quality trends for ozone and air toxics and how the concentrations of these pollutants compare to standards and other limits set to protect public health. Having decided last month to include particulate matter pollutants in its annual emissions report, members also asked to learn more about why it is important, its air monitoring trends, and concentrations compared to current and proposed National Ambient Air Quality Standards (NAAQS). Representing HRM was Technical Committee Chair, Steve Smith of LyondellBasell. His charts were based on data from HRM, Texas Commission on Environmental Quality (TCEQ), City of Houston, and other air monitors. The Houston area has more air monitors than some states, thus a lot is known about the air in this multi-county area. Highlights of the presentation follow:

#### Ozone

Ozone (O<sub>3</sub>) is a lung irritant. EPA has changed the NAAQS for ozone 3 times since 1987, making it stricter each time. The Clean Air Act requires EPA to evaluate the ozone standard every 5 years, and a new and stricter standard is expected in the first or second quarter of 2014.

There has been a significant decline in the number of ozone exceedance days based on each of the three standards: the 1-hour standard of 124 parts per billion (ppb), the 8-hour standard of 84 ppb in effect since 1997, and the 8-hour standard of 75 ppb in effect since 2008. The proposed standard may be as low as 60-70 ppb. One of Smith's slides shows a map of the Houston area color-coded by ozone concentration that compares 1985 to 2012, showing that nearly the entire region is now in the "green" category.

Year to date as of November 15, no monitor in the 8-county Houston area exceeded the 1-hour standard. None of the monitors have had "design values" greater than the 0.08 parts per million 8-hour standard. Less than 50% of the monitors have exceeded the 0.075 ppm 8-hour standard year to date.

Ozone is formed in the atmosphere on sunny days with clear skies and little or no wind when volatile organic compounds (VOCs) and Nitrogen Oxides (NOx) react. NOx is a product of combustion. Its sources include industry, on- and off-road mobile sources, small businesses, and natural occurrences like wild fires. VOCs are chemicals that evaporate, like gasoline and cologne do. The special nozzles on area gas station pumps are designed to reduce VOC releases to the air. Because other sources of VOCs, such as vehicle emissions, have been reduced significantly,

vegetation is now the largest piece of the pie chart. For example, pine trees emit terpene and oaks emit isoprene. (This does not mean we should get rid of trees.)

To explain why ozone levels are coming down, Smith said to think of it like a math equation, where  $A+B=C$ . To get less of C (ozone in this case), you need less of A and B (NOx and VOCs). More days per year less than 80° would also help but are beyond our control. So the focus is to reduce NOx and VOCs.

- A chart showed there has been a 50% reduction in ambient NOx concentrations since 1985, meaning there is less NOx in the outdoor air to react with VOCs. In 2002, there were about 900 tons per day (tpd) of NOx generated per day in the Houston area; today there are about 400 tpd. Industry has made reductions, but emissions from cars have also declined, though we are not driving less.
- The approximately 1000 tpd of VOCs in the air have also been reduced 27%.

Texas Air Quality Study 2000 and its followup revealed that certain VOCs are highly reactive and particularly good at making ozone. Four that have been given special emphasis since this scientific discovery are ethylene, propylene, butenes, and 1,3-butadiene—the basic building blocks for the chemical industry. The concentration of HRVOCs in the air has declined 68%, from 300 ppb in 2003 to 10 ppb in 2012. These reductions have occurred at all the air monitoring sites that measure HRVOC concentrations.

Slides showed the tons per day of NOx and VOCs in the emissions inventory from industry (point sources), on-road mobile sources (like cars and trucks), off-road mobile sources (like construction equipment and lawnmowers), and area sources (like drycleaners and gas stations). Members had asked to see how much each category contributes to the state's emissions inventory. Sheridan said a recap on the 2013 ozone season may be found at <http://houstonairquality.com>

### **Air Toxics**

In addition to ozone monitors, there are also monitoring stations that sample what are commonly known as air toxics. HRM monitors about 140 air toxics. The organization has tracked 4 common ones since 1988: **Benzene, Toluene, Ethylbenzene, and Xylenes**. Referred to as BTEX, they have been reduced 84% since 1988. Their concentrations in the outdoor air have declined from 10 ppb in 1989 to less than 2 ppb today.

While NAAQS are used to protect public health for criteria pollutants like ozone, TCEQ uses Air Monitoring Comparison Values for that purpose. The AMCV for benzene is 1.4 ppb annual average. A slide shows that all gas chromatograph monitor sites are below that level.

### **Particulate Matter**

Particulate matter (PM) is made up of small particles of various sizes. Some are as big as sand and others are so small they cannot be seen with the naked eye. The black exhaust coming out

of an old dump truck is PM, but PM is not just soot. Other things stick to it, including chemicals that can irritate lungs. Thus there are NAAQS for particulate matter.

All area monitors are below the annual standard for fine particulate matter (PM<sub>2.5</sub>, which is less than 2.5 microns in diameter). The Clinton Drive monitor does not quite attain the new, lower standard. That site is close to the Port of Houston, so there are trucks, ships, and rail lines nearby. A joint effort by TCEQ, the City of Houston, and the Port of Houston to pave an unpaved parking lot by the monitor helped, as did improved anti-dusting procedures in the port's nearby laydown yard.

Samples of particulate matter are collected on filters kind of like coffee filters. The color of the dust helps identify its source. When Saharan dust storms reach this area, dust from that source will spike for a few days. TCEQ has asked EPA to consider these exceptional events beyond our control so that the area does not have to count that day when calculating its annual average. Wildfires could cause a similar issue. Because diesel trucks are a significant source of PM, new trucks are less of a source. But the typical truck lasts 30 years, so it takes decades for the fleet to turn over.

Smith concluded by reminding members that Houston has the most extensive air monitoring network in the country, that HRM plays a key role in monitoring regional air quality and that data show the quality of our air has improved dramatically and continues to do so.