

# AIR QUALITY BASICS: Texas Air Quality Study II

Six years ago, a group of scientists converged on the Houston area to conduct a study of the region's air pollution. They flew planes equipped with air monitoring equipment, set up monitors on the ground, and measured air quality from towers. Through this Texas Air Quality Study (TexAQS), they accumulated a wealth of new data on the forces that affect Houston's air.

In October of 2006, the researchers completed a second study, called the Texas Air Quality Study II (TexAQS II). This 18-month study covered a larger area of the region and included measurements from a boat on the Ship Channel, a van with a detector on the roof, and two planes equipped with instruments. This most recent study provided additional information that will be used to develop a new clean air plan for the Houston-Galveston region. The plan is intended to help the region meet the 8-hour federal health standard for ozone.

## Study confirms significance of industrial activities

TexAQS II confirmed the earlier finding that highly reactive volatile organic compounds (HRVOCs) and nitrogen oxides (NO<sub>x</sub>), emitted simultaneously from petrochemical facilities, are responsible for production of high ozone in Houston. These pollutants form narrow but intense ozone plumes, which the afternoon winds carry throughout the metropolitan area. As a result, local air quality monitors often measure high concentrations of ozone over a short time period, exceeding the 1-hour ozone standard.

At other times, winds carry the pollution in a westerly direction from the Ship Channel in the morning. As the air moves toward west Houston, more ozone forms. This causes more moderate ozone levels over a longer period of time. These conditions lead to violations of the 8-hour ozone standard.

## Emissions reduced, but still under-reported

Measurements from TexAQS II also indicate that HRVOC and NO<sub>x</sub> emissions are significantly reduced from 2000. HRVOC levels are half of what they were in 2000, but still ten times higher than reported by industry. Most of the unreported emissions are presumed to come from storage tanks. The reductions do suggest that controls are being effective, but how they affect ozone formation is yet to be determined.

More sensitive instruments in 2006 picked up surprisingly high levels of formaldehyde. The presence of high levels at night indicates that formaldehyde concentrations are

As part of TexAQS II, planes fitted with air monitoring equipment flew over the Houston region, collecting data by means of lasers that are directed down to the ground.



Scientists took air quality measurements from a van equipped with a rooftop detector, as well as from a ship and from stationary monitors.

not simply an intermediate in ozone formation. Rather, high formaldehyde concentrations appear to be emitted directly, presumably from flares and diesel exhaust.

Researchers also concluded that pollution from commercial marine vessels in the Houston Ship Channel and offshore cannot be neglected. They will need to be included in any clean air plan for the Houston area.

In other findings, researchers determined that:

- Background concentrations of ozone in the Houston-Galveston area are greater than the 8-hour standard, partly due to recirculation of local emissions.
- Ozone plumes formed in the Houston area affect air quality in rural regions of eastern Texas.
- Houston's air pollution also affects other urban areas. For example, air pollutants transported from the Houston area to Dallas are three times greater than those coming from Dallas.

The additional data gathered from TexAQS and TexAQS II have greatly increased our understanding of Houston's unique air pollution problems. If properly applied in planning efforts, this information should advance our efforts to control ozone in the Houston-Galveston region.