

Follow your nose: Houston air quality study finds a few surprises

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As a frequent addition to the list of America's most polluted cities, Houston is no stranger to having more than just oxygen and carbon dioxide in the air. But a University of Houston study found a few surprising results in the air Houstonians breathe day in, day out: mercury and formaldehyde.

Although Houston's air quality has improved from previous years, the Texas Air Quality Study-II, a 45-day study conducted in 2006, is the first to provide solid mercury measurements in Houston, according to Barry Lefer and Bernhard Rappenglueck, UH professors of atmospheric science.

"Formaldehyde has been measured before in Houston's air, but, to the best of my knowledge, mercury has not been measured in Houston," Rappenglueck said. "There is now a significant amount of formaldehyde and mercury in the air here at times."

Scientists know mercury is emitted mostly from coal-burning power plants, such as the one in Sugar Land, but there is additional mercury coming from the area around the Houston Ship Channel and the nearby refineries and petrochemical plants, according to the study. The more than 100 scientists from UH and research institutions across the country who pored over the air quality data are still analyzing the information to identify what industrial processes are producing the mercury.

Most of the data was collected from the UH Moody Tower Atmospheric

Chemistry Facility, an 18-story building that is operational 24 hours a day, seven days a week, and from data collected from various aircrafts and a National Oceanic Atmospheric Administration ship in the Houston Ship Channel.

The Moody Tower facility measured three different types of mercury: gaseous elemental mercury, reactive gaseous mercury and fine particulate mercury. Although traces of mercury have been found all over the country, the amounts detected varied from double to more than six times what is typically found in other parts of the United States, Lefer said.

“Mercury is toxic and is most detrimental to children and pregnant women and causes developmental abnormalities,” Lefer said. “Mercury emissions from coal and other sources are going to be more problematic to reduce, but using cleaner fuels and alternative energy for electricity will reduce the mercury levels in the environment.”

The base for embalming fluid, formaldehyde is believed to be the catalyst in the production of ozone, a harmful pollutant that may be primarily emitted from traffic and poorly maintained diesel cars, and secondarily by chemical reactions in the atmosphere.

“Primary formaldehyde means it is directly emitted to the atmosphere,” Rappenglueck said. “Secondary formaldehyde means that it is chemically formed in the atmosphere from other chemicals.”

Formaldehyde emissions from automobile exhaust are directly emitted into the atmosphere, but their contribution is small, Rappenglueck said. Instead, the air quality data suggests there may be a “new” source of primary formaldehyde emissions in Houston.

“Once the source of the formaldehyde is identified, it should be possible

to figure out how to reduce these emissions,” Lefer said. “Formaldehyde is not toxic at these levels, but it is very efficient at producing ozone pollution. We think this is one of the ‘missing’ links in understanding Houston’s ozone pollution.”

The UH Atmospheric Science group is working on calculations to assess the impact of primary formaldehyde emissions in producing ozone in Houston. They hope to have the results in time for conferences in December and January.

The Texas Air Quality Study-II wasn’t all doom and gloom for Houston, though. Houston does have a serious ozone problem, but efforts to fix it are headed in the right direction.

“The bad news is that Houston’s ozone levels are above the Environmental Protection Agency’s (EPA) standards for 30 to 40 days each year,” Lefer said. “The EPA allows a city to have one to three ‘bad’ ozone days per year. So we are well above this average. But, the good news is that the number of ‘bad’ ozone days each year in Houston is decreasing. In addition, the peak ozone values observed in Houston have also been on a down trend the past six years. We still have a long way to go, though.”

Source: University of Houston

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