Results and Conclusion

Frequently Found Compounds in Texas

Benzene was frequently detected in urban air samples statewide in 1995. It was detected in 100 percent and 94 percent of the samples at the Clinton Drive and El Paso sites, respectively, but was detected in only 12 percent of the samples at the Midlothian site. Of the 69 compounds measured in 1995, 10 compounds were detected in 50 percent or more of the samples. These compounds are: n-butane, isopentane, n-pentane, n-hexane, propane, isobutane, benzene, 2,3-dimethylbutane, propylene, and toluene.

Comparison of Measured Levels to Health-Based Screening Levels

Measured concentrations of the 69 monitored compounds were compared to the TNRCC's health-based 24-hour and annual screening levels. Health-based screening levels are set well below levels reported in the scientific literature to cause adverse health effects and are set to protect the general public, including sensitive subgroups such as children, the elderly, or people with existing respiratory conditions. If an air concentration of a compound is below the screening level, adverse effects are not expected. If an air concentration of a compound is above the screening level, it is not indicative that an adverse effect will occur, but rather that further evaluation is warranted. (For more information about screening levels, contact TNRCC's Toxicology and Risk Assessment Section at 512-239-1795.)

Data from all sites were evaluated. However, for sites with incomplete data, there is some uncertainty about whether the data reported adequately represent actual ambient annual concentrations. The annual average concentration of a compound by site was compared to the compound's annual screening level to evaluate the potential for long-term or chronic health effects to occur. Individual 24-hour concentrations were also compared to the 24-hour screening level.

Measured concentrations of the 69 compounds were less than their respective 24-hour and annual health-based screening levels, except for benzene and 1,3-butadiene. At 13 of the 23 monitoring sites in the network, none of the concentrations of compounds exceeded either their annual or 24-hour screening levels. Therefore, adverse health effects would not be expected to result from exposure to these compounds at the concentrations measured in those 13 sites.

1,3-Butadiene

Monitoring results showed that 1,3-butadiene exceeded its 24-hour screening level of 20 ppbv once in Port Arthur in 1995. The highest concentration of 1,3-butadiene during 1995 was 89.8 ppbv. The maximum 24-hour concentrations of 1,3-butadiene were less than levels that would result in acute health effects. The annual averages of 1,3-butadiene at all sites were below the annual screening level of 5 ppbv. No adverse health effects would be expected as a result of exposure to these concentrations of 1,3-butadiene.

Benzene

Benzene was the only monitored compound that was consistently measured above its screening levels. Benzene exceeded the 24-hour screening level at seven sites and the annual screening level at eight sites in 1995. Figure 1 shows sites where the annual benzene concentration exceeded the screening level during 1993, 1994, or 1995. Only sites that met TNRCC's goal for data completeness are graphed because comparisons between sites with lower data return may be inappropriate.

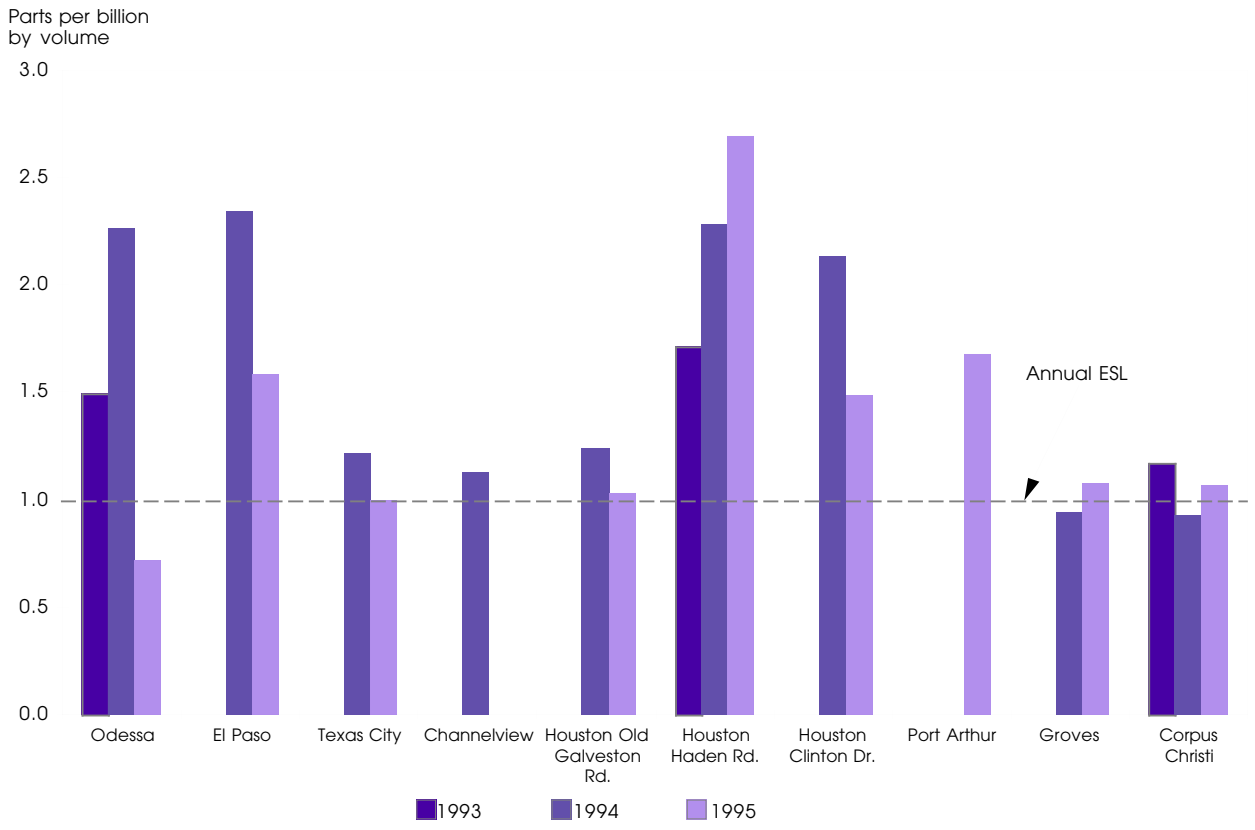

Figure 1. Sites Where Benzene Exceeded its Annual Effects Screening Level in 1993, 1994 or 1995

In 1995, benzene concentrations exceeded the 24-hour screening level of 4 ppbv at Haden Road in Houston, El Paso, Groves, Port Arthur, Corpus Christi, Brownsville, and Midlothian. The highest benzene measurement of 63.6 ppbv was sampled at the Houston (Haden Road) monitoring site on Sept. 12, 1995. The concentration was not associated with elevated levels of any other measured organic compounds. This finding indicates that the source was not from automobiles. The maximum 24-hour concentrations of benzene were less than levels that would result in acute health effects.

Benzene concentrations exceeded the annual screening level of 1 ppbv in 1995 at Houston sites Haden Road, 2.70 ppbv, Clinton Drive, 1.49, and Old Galveston Road, 1.03; Channelview, 1.05; Port Arthur, 1.68; Corpus Christi, 1.06; Groves, 1.08; and El Paso, 1.58 (Figure 1). The highest mean benzene level at a site where more than 45 samples were taken in 1995 was 2.7 ppbv at the Haden Road (Houston) site. The Clute, Dallas, and Brownsville sites had the lowest annual average benzene concentrations of sites with at least 75 percent data return rate. The average concentrations at these sites were less than the health-based screening level.

Long-term exposures to levels of benzene significantly in excess of the annual screening level may increase a person's lifetime risk of developing leukemia. While the measured levels at the eight monitoring sites where benzene exceeded its annual screening level do not significantly increase the risk of adverse health effects associated with benzene exposure, the TNRCC considers it important that benzene levels do not significantly increase.

Conclusion

In general, concentrations of the compounds monitored are below levels of concern from a health effects standpoint. Levels of benzene, while above health-based screening levels at several of the sites monitored, are typical of levels present in ambient air in most urban areas throughout the country. The levels of benzene monitored do not represent a meaningful increase in long-term exposure above the health-based screening level, and do not significantly increase the risk of adverse health effects associated with benzene exposure. Sites where higher concentrations are monitored are targeted for additional agency efforts to better define and reduce potential public exposure. ◆