Section 11. Poor Air Quality

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Why Poor Air Quality Is a Threat

Air quality, or ambient air, is measured by the composition of specific pollutants at one location and time. Six pollutants are measured: sulfur dioxide, nitrogen oxides, particulate matter, carbon monoxide, ozone and lead. When these six pollutants contaminate the air, it is commonly referred to as air pollution or poor air quality.

Ozone pollution, a key component of smog, is the most widespread air quality problem in the United States. Ozone is a gas that is formed in the atmosphere when three atoms of oxygen combine to form a molecule. There are two types of ozone: stratospheric ozone and ground-level ozone – one beneficial and one harmful.

Stratospheric ozone naturally occurs high in the atmosphere when intense sunlight causes oxygen molecules (O2) to break-up and re-form as ozone molecules (O3). Stratospheric ozone is popularly called “good ozone” because it shields humans, vegetation, property, and microorganisms from the harmful effects of the sun’s ultraviolet light.

One way that ozone forms low in the atmosphere, at ground level, is when certain substances naturally emitted by trees and other vegetation, soil microorganisms, and lightning react together to form low, background concentrations of ozone. If ground-level ozone were produced only from natural sources of emissions, it would be of no concern (since both animal and plant life tolerate natural background concentrations of ozone). However, many contemporary human activities result in emissions of additional chemical compounds, called precursors, which react in the air to form what is popularly called “bad ozone” and other harmful gases.

Harmful ozone is not emitted directly into the air. Instead, it is formed in sunlight, which initiates a series of complex atmospheric chemical reactions. These reactions primarily involve two main precursors: nitrogen oxide (NOx) and volatile organic compound (VOC) emissions. Nitrogen oxide

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emissions are almost entirely produced as a by-product of high-temperature combustion in cars, trucks, boats, construction equipment, power generators, industrial processes and natural gas furnaces. Volatile organic compounds include many organic chemicals that vaporize easily, such as those found in gasoline and industrial solvents. In addition, biogenic, or natural, emissions from trees and plants are another major source of VOCs. The concentration of ozone in the air is determined not only by the amounts of ozone precursor chemicals, but also by weather and climate factors. Intense sunlight, warm temperatures, stagnant high-pressure weather systems and low winds cause ozone to accumulate in harmful amounts during the summer months in north central Texas.

Poor air quality can damage the environment and property. Plants and animals and their habitats can be harmed by air pollution. Air pollution has thinned the protective "good" ozone layer above Earth. It can damage buildings, monuments, statues and other structures. Air pollution can also result in haze, which reduces visibility and can sometimes interfere with aviation.

Legal uncertainty, bureaucratic unpredictability and the costs of implementing air pollution reduction measures can drastically increase the costs of doing business, which can have significant economic impacts. For instance, in February 2003, Toyota rejected North Texas as a location for its new truck plant because of this area's air pollution problems. Furthermore, failure to improve air quality and comply with federal requirements could lead to other sanctions such as the withholding of federal transportation funding.

In addition to its impacts to the environment and to the economy, poor air quality can also cause health problems, including burning eyes and nose, itchy irritated throat, headaches, nausea, coughing or wheezing and difficulty breathing. Research has shown that some contaminants found in polluted air can cause cancer, birth defects, brain and nerve damage, and long-term injury to the lungs and breathing passages. Above certain concentrations and durations, air pollutants can be extremely dangerous and can lead to severe injury or death. Doctors and scientists acknowledge heavy correlations between poor air quality and respiratory illnesses, but they stop at proclaiming an unquestionable causal relationship.

In a recent *Dallas Morning News* article, writer Scott Farwell quotes Dr. Arnold Schecter, a physician and a professor of environmental sciences at the Dallas branch of the University of Texas-Houston School of Public Health. According to Dr. Schecter, "Not every person exposed to cigarette smoke becomes sick, and we can say the same thing about air pollution. But…population-wide, if you have more pollution, you will have more sickness."

In that same article, Mr. Farwell cites two important statistics from the American Lung Association: (1) nearly a half-million people in the Dallas-Fort Worth region live with diseases that are aggravated by air pollution and (2) scientists estimate that between 50,000 and 100,000 people die each year in the United States of diseases related to air pollution.

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Hazard Profile

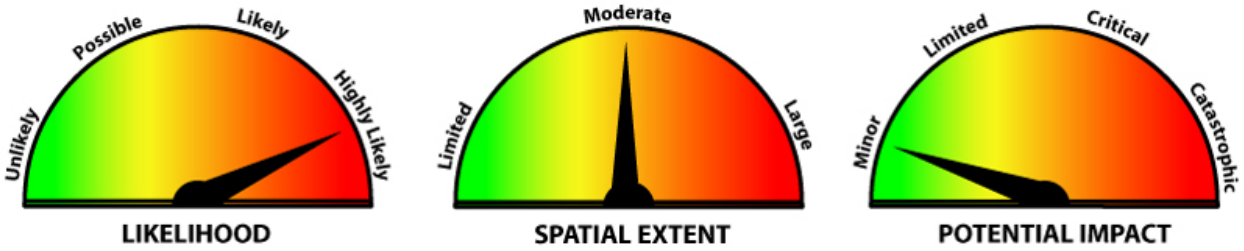

Figure 11-1. Poor Air Quality Hazard Profile Summary for the City of Plano

The frequency, or likelihood, of poor air quality in the City of Plano is "Highly Likely", with an event probable in the next year. The spatial extent of poor air quality is "Moderate," expected to affect more than 25% of property the City of Plano. While the health impacts are substantial, the potential impact of poor air quality is determined to be "Minor," resulting in few, if any, acute injuries. There is only minor property damage and any shutdown of facilities, if it occurs, is temporary.

Location of Hazardous Areas

The 1990 Clean Air Act Amendments authorized the EPA to designate areas failing to meet National Ambient Air Quality Standards (NAAQS) for ozone as nonattainment and to classify them according to severity. The Dallas/Fort Worth area was classified a "moderate" nonattainment area and was required to demonstrate attainment by November 1996. A State Implementation Plan (SIP) was submitted to the EPA but failed to help the Dallas/Fort Worth area reach national air quality standards by the deadline. As a result, the EPA reclassified the Dallas/Fort Worth area from "moderate" to "serious," resulting in a new attainment deadline of November 1999. The Dallas/Fort Worth area failed to reach attainment by the November 1999 deadline. By April 2000, a new SIP for the Dallas/Fort Worth area was approved by the Texas Natural Resource Conservation Commission (now TCEQ) with subsequent revisions in August 2001. This SIP shows attainment for the Dallas/Fort Worth area by 2007.

In Texas, there are four urban areas that do not meet federal standards for ozone. One of those urban areas, the Dallas/Fort Worth area Consolidated Metropolitan Statistical Area (CMSA), includes 12 counties: Denton, Collin, Dallas, Tarrant, Johnson, Ellis, Kaufman, Parker, Rockwall, Hunt, Hood, and Henderson. Four of these counties (Denton, Collin, Dallas and Tarrant) have "nonattainment" status for ground-level ozone. The rest of the eight counties are "near nonattainment" status for ground-level ozone.

There is no distinct geographic boundary to poor air quality. Poor air quality can occur in every area of the City and of the North Central Texas region. Figure 11-2 provides a map of reported poor air quality in the North Central Texas region. As you will note, both Dallas and Collin counties have been designated by the U.S. Environmental Protection Agency as "Serious Non-Attainment Areas" for ozone.

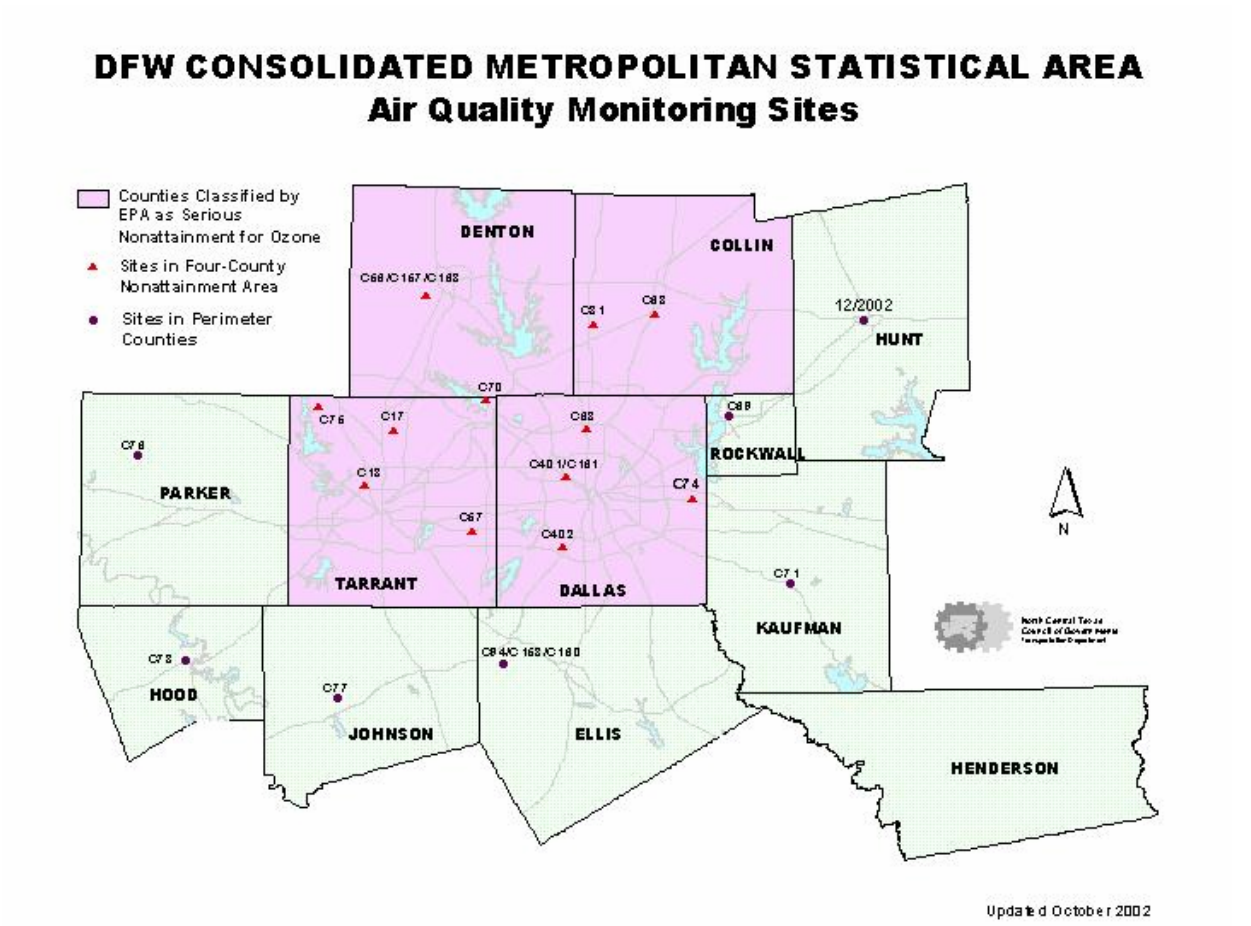

Figure 11-2. Dallas-Ft. Worth Consolidated Metropolitan Statistical Area
Air Quality Monitoring Sites

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History of Poor Air Quality

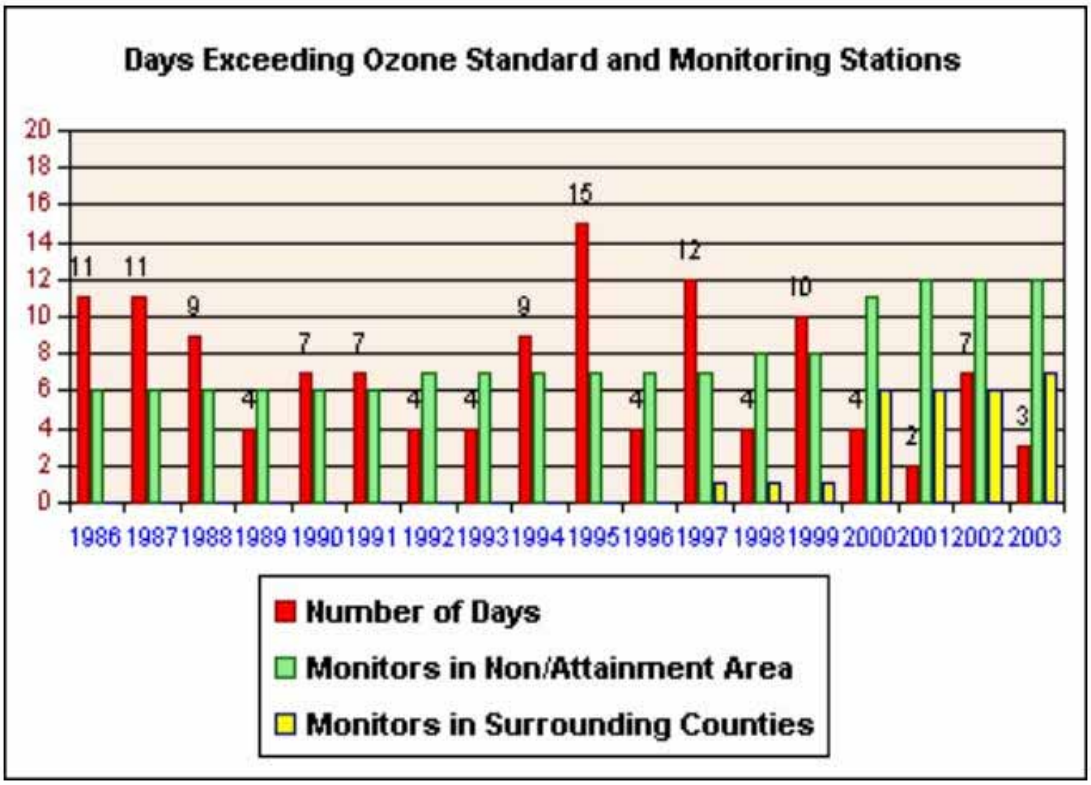

Figure 11-3. Days Exceeding Ozone Standard and Monitoring Stations

Figure 11-3 shows the number of days that the North Central Texas region has exceeded the U.S. Environmental Protection Agency ozone standard. The highest number of days exceeding the standard was in 1995 when there were 15 days exceeding the standard. Ozone levels have generally improved such that in 2003, there were only 3 days exceeding the standard. At the same time, since 1995, the number of monitors in non-attainment areas has increased from seven to twelve in 2003. Figures 11-4 and 11-5 show historical trends for one- and eight-hour ozone exceedances, respectively.

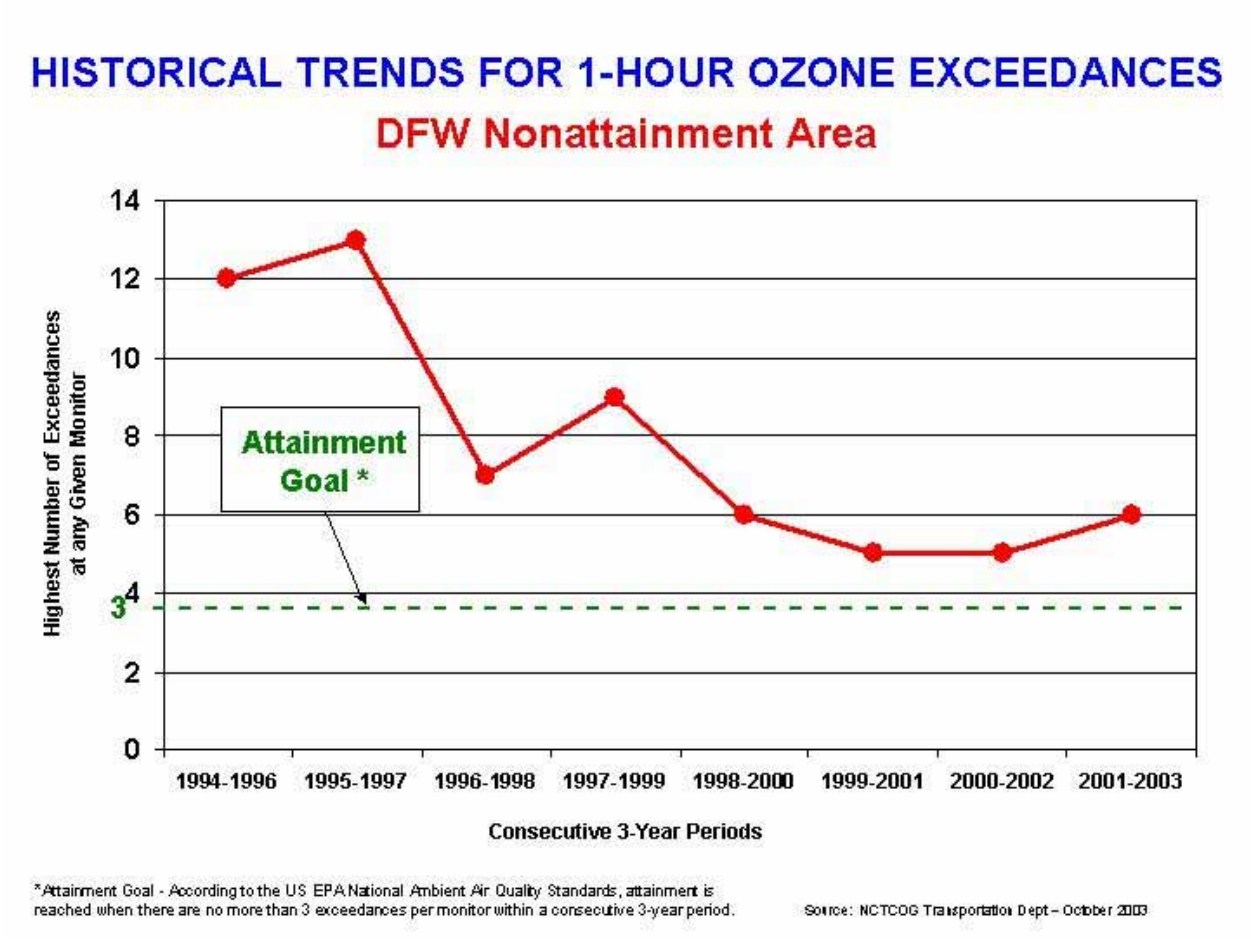

Figure 11-4. Historical Trends for 1-Hour Ozone Exceedances

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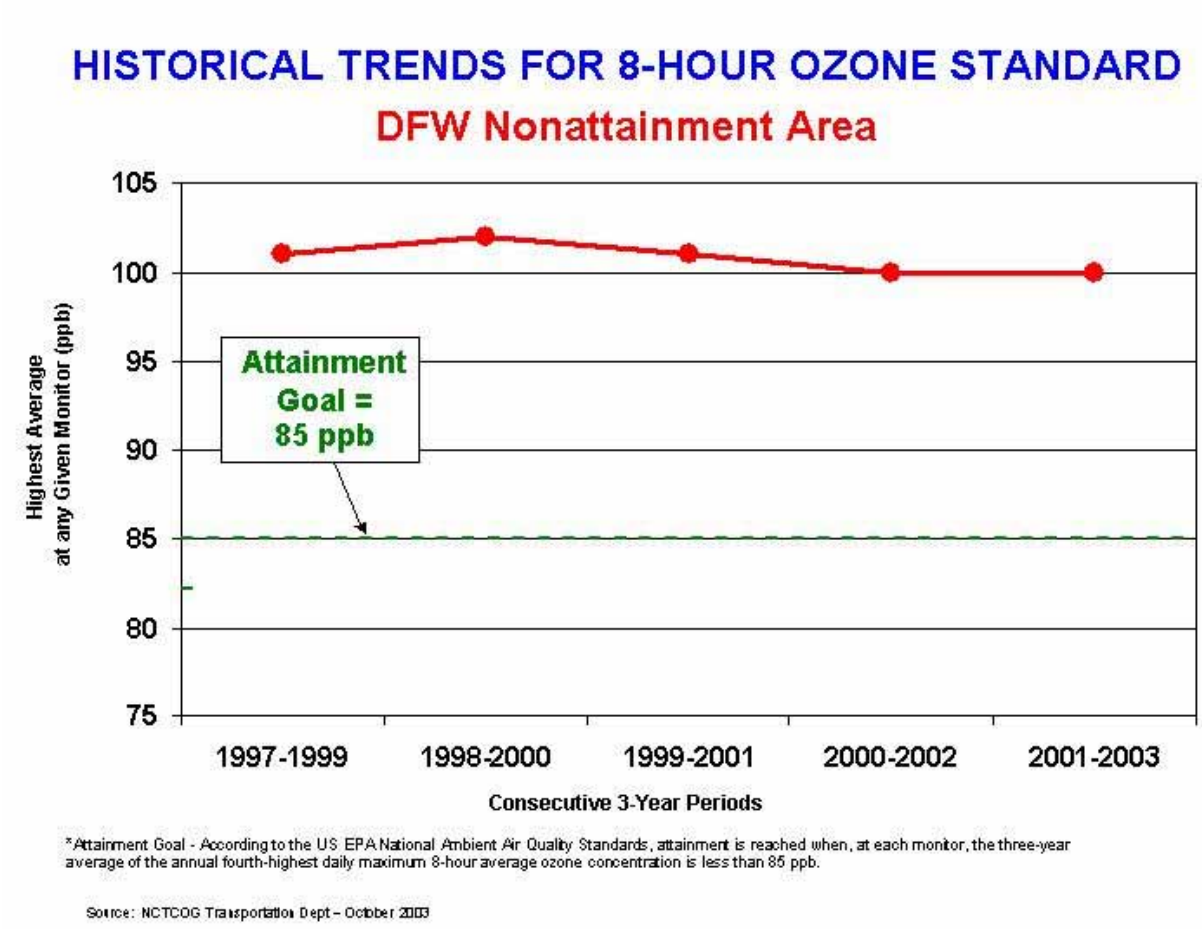

Figure 11-5. Historical Trends for 8-Hour Ozone Standard

People and Property at Risk

There is no defined geographic boundary poor air quality. All population, buildings, critical facilities, infrastructure and lifelines, and hazardous materials facilities are considered exposed to the poor air quality hazard. However, people are most affected by this hazard. Poor air quality is a significant hazard throughout the entire region and merits mitigation consideration by the City of Plano.