Emission Trends in the Central Puget Sound Region

Over the past 20 years, air quality in the region has improved, even with a growth in both population and vehicle miles traveled. However, over the past several years, levels of emissions of fine particulates and ozone have been on the rise, and new concerns such as air toxics, visibility and climate change have grown. Under the Clean Air Act, the Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six “criteria” pollutants, for the purpose of protecting human health and the environment. These pollutants are ground level ozone, carbon monoxide, particle pollution (or particulate matter), sulfur oxides, nitrogen oxides and lead.

Emissions of carbon monoxide, sulfur oxides, and lead are below levels of concern in our region, and have been for many years. The region was once in nonattainment for carbon monoxide, but has been maintaining the standard since the early 1990s. Levels of carbon monoxide in the region have been on a downward trend for the last 20 years. Levels of sulfur oxides in the region have shown significant decreases in the last 20 years, and monitoring by the Puget Sound Clean Air Agency ceased in 1999 for this pollutant. Lead in the ambient air is no longer considered a public health concern, and has not been monitored in the region since 1999. Nitrogen oxides are a concern in the region due to their role in the formation of ozone (along with volatile organic compounds in the presence of sunlight); however, emissions of this pollutant have been dramatically reduced in the region.

Emissions of ozone and fine particulates have been a concern in recent years. In fact, since more stringent standards for both pollutants have been set by the EPA\textsuperscript{1}, the region is soon to be designated in “nonattainment” of the ozone and fine particulate standards. Figure 1 shows the ozone trend since 1992. The dashed blue line represents the current federal standard; this summer’s high ozone concentrations plus several previous years’ exceedances have resulted in a violation of the standard.\textsuperscript{2} Figure 2 shows the fine particulate concentrations in Pierce County since 2001; the graph illustrates that the Tacoma area has violated the standard.\textsuperscript{3} Other monitors throughout the region are close but have not yet violated the fine particulate standard.

\textsuperscript{1} The fine particulate standard was revised in 2006, and the ozone standard was revised in 2008. EPA is required to periodically review the NAAQS to ensure continued protection of public health and the environment.
\textsuperscript{2} The standard is based on the 3-year average of the 4th highest 8-hour concentration. The three highest concentrations exceeding the standard in previous years were not enough to violate the standard; the exceedance in 2008 was the fourth and final exceedance resulting in violation of the standard.
\textsuperscript{3} The standard is based on the 3-year average of the 98th percentile of daily concentrations.
While the EPA sets the federal standards for particulate matter and other criteria pollutants, the Puget Sound Clean Air Agency has also set a local health goal for fine particulates. This local health goal is more stringent than the most recent federal standard. Figure 3 shows the number of days in our region this health goal has been exceeded over the past several years.4

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4 PM2.5 emissions have seasonal variations, while motor vehicles are a significant year-round source. In wintertime, wood burning stoves and fireplaces are a major contributor.
Another indicator of air quality in the region is the Environmental Protection Agency’s Air Quality Index, which interprets values of five of the six criteria pollutants and translates them into the following six categories based on levels of health concern: Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy, Very Unhealthy and Hazardous. Figure 4 shows the number of days in the “Good” category since 1990, for the entire region.

Source: Puget Sound Clean Air Agency
Note: Includes data from all sites in King, Pierce, and Snohomish counties, both daily and continuous methods. The Darrington monitor was added in 2004.
Climate change has become a primary issue at the national, state, regional and local level. Washington state has taken numerous steps to begin addressing climate change, including setting goals for the reduction of greenhouse gases. These goals are to reduce statewide greenhouse gas emissions to 1990 levels by the year 2020, to 25 percent below 1990 levels by 2035, and to 50 percent below 1990 levels by 2050.

The primary source of greenhouse gas emissions (which contribute to global warming and climate change) is the burning of fossil fuels. In the Puget Sound region, transportation sources account for approximately 50 percent of our greenhouse gas emissions. The two years for which there are regional inventories — 2000 and 2005 — indicate an overall increase of approximately 0.8 mmtCO$_2$e (million metric tons of carbon dioxide equivalent) during this 5-year time period; the percentage by source has stayed roughly the same.

Summary

The region has had many successes in maintaining its air quality over the past 20 years, but with continued growth the region continues to face air quality issues. Reducing greenhouse gases to stabilize climate change is an issue being addressed at all levels, including the Puget Sound region. With the recent fall into nonattainment for fine particulates and ground-level ozone, the region must address the challenges of reducing emissions while at the same time anticipating growth in population and employment.

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