

### 2.3.1 Ozone

Ozone is just one of six major air pollutants that are regulated by EPA but it is by far the most complex and the most difficult to regulate. Ozone is different from stratospheric or high level ozone in that it is detrimental to human health and welfare. Stratospheric ozone is the ozone layer that protects the earth from ultraviolet sunlight. Ozone is formed in the air by chemical reactions which may involve nitrogen oxides and volatile organic compounds. The reactions that form ozone are stimulated by sunlight, so that ozone reaches peak levels in most of the United States during the summer months. This type of pollution first gained public attention in the 1940's as Los Angeles "smog".

The chemistry of ozone formation is complicated and based on variable factors such as temperature level, quantity of sunshine and wind patterns. Even though substances other than volatile organic compounds play a role in the photochemical reaction that generates ozone, the EPA has determined that volatile organic compounds are a significant target for its efforts to control ozone.

Ozone may be responsible for many adverse health effects in humans. Ozone severely irritates the mucous membranes of the

nose and throat; impairs normal functioning of the lungs and reduces the ability to perform physical exercise. The effects of ozone at any concentration are felt most by those with asthma, chronic obstructive lung disease such as emphysema, or allergies. When ozone levels are high, hospital admissions increase. There is more sickness generally and physical activity becomes difficult even for healthy individuals. Some acute health effects of ozone include inflammation of the lung, impaired breathing, coughing, chest pain, nausea and throat irritation. Chronic health effects caused by ozone include increased susceptibility to respiratory infection and permanent damage to lung tissue and breathing capacity.

Agricultural studies have indicated that high levels of ozone can cause a reduction in crop yields. One set of studies showed that even levels of ozone below health standard can reduce several major cash crops by as much as 10 percent a year. Studies involving higher levels of ozone have reduced plant yield in tomatoes by 33 percent, beans by 26 percent, soybeans by 20 percent and snapbeans by up to 22 percent.

Ozone has been responsible for lower forest growth rate and premature leaf-drop. Many scientists think ozone is a major contributor to the decline in growth of many species of trees. The existing data suggest strongly that ozone pollution has played a role in the loss of at least some forests. Repeated ozone peaks have been implicated in damage to white pine in the eastern United States and Canada and reduced growth rates for the red spruce at numerous high elevation sites in the Appalachian Mountains.