2010 Air Quality Reference Guide for the Houston-Galveston-Brazoria Area

Executive Summary

In Cooperation with the Regional Air Quality Planning Committee and Their Partners

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Dedication

It is with great honor and appreciation that RAQPC dedicates the 2010 Air Quality Reference Guide for the Houston-Galveston-Brazoria Area to Jacqueline Lentz in recognition of her efforts and achievements in improving air quality in the Houston-Galveston-Brazoria area.

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Executive Summary

Introduction

In 2010 the Regional Air Quality Planning Committee and Houston-Galveston Area Council (H-GAC) staff, updated its Air Quality Reference Guide for the Houston-Galveston Area.

This guide is intended for the eight county region designated as the Houston-Galveston-Brazoria (HGB) area: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Walker. The guide helps citizens better understand air quality, pollutants, the current status of "ozone nonattainment" and how to improve air quality for citizen health and safety.

What is an Air Pollutant?

Air pollutants are defined as any substance in the air that can potentially cause harm to humans and the environment. These pollutants can be solids, liquids and gases, or droplets and particles.

Pollutants may be emitted by man-made processes, as well as by natural events such as wildfires and volcanic eruptions.

Air pollutants can be categorized as criteria pollutants, air toxics/hazardous air pollutants (HAPs), and greenhouse gases (GHGs).

Criteria Pollutants

The U.S. Environmental Protection Agency (EPA) has identified common criteria air pollutants that can harm human health, property, and the environment. The Clean Air Act (CAA) requires EPA to set National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.

The NAAQS are based on the latest scientific knowledge applying a margin of safety. Primary Standards are established to protect public health, while Secondary Standards are established to protect public welfare. The Table of current NAAQS is included on page 8.

Geographic regions that fail to meet the NAAQS for a pollutant are classified as nonattainment.

Air Toxics

People exposed to air toxics, or hazardous air pollutants (HAPs), at sufficient concentrations and durations may have an increased chance of cancer or other serious health effects. HAPs may also have adverse effects on the environment and ecology.

Most HAPs are man-made, resulting from activities such as combustion, pesticide use, dry cleaning, mobile sources, building materials and industrial processes.

Specifically, HAPs are a class of 187 toxic air pollutants identified and regulated by EPA. The CAA Amendments of 1990 directed EPA to establish standards for HAPs, thus prompting EPA to develop strategies for reducing the release of HAPs, in partnership with local and state governments.

Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. GHGs can be created from naturally occurring methods as well as man-made processes.

EPA will implement a mandatory green house gas reporting rule in order to study how to best regulate man-made emissions from large sources.

EPA found that current and projected concentrations of GHGs in the atmosphere threaten the public health and welfare of current and future generations. This finding allows GHGs to fit within the CAA's definition of an air pollutant.

The six GHGs that EPA identifies as posing a threat to public health and welfare are:

- Carbon Dioxide
- Methane
- Nitrous Oxide
- Hydrofluorocarbons
- Perfluorocarbons
- Sulfur Hexafluoride

What are the Criteria Pollutants?

Ozone

Ozone is a reactive form of oxygen that can occur in two different levels of the atmosphere, the stratosphere and troposphere. Exposure to ground level ozone (troposphere) in high concentrations can result in adverse effects to humans, plants and animals.

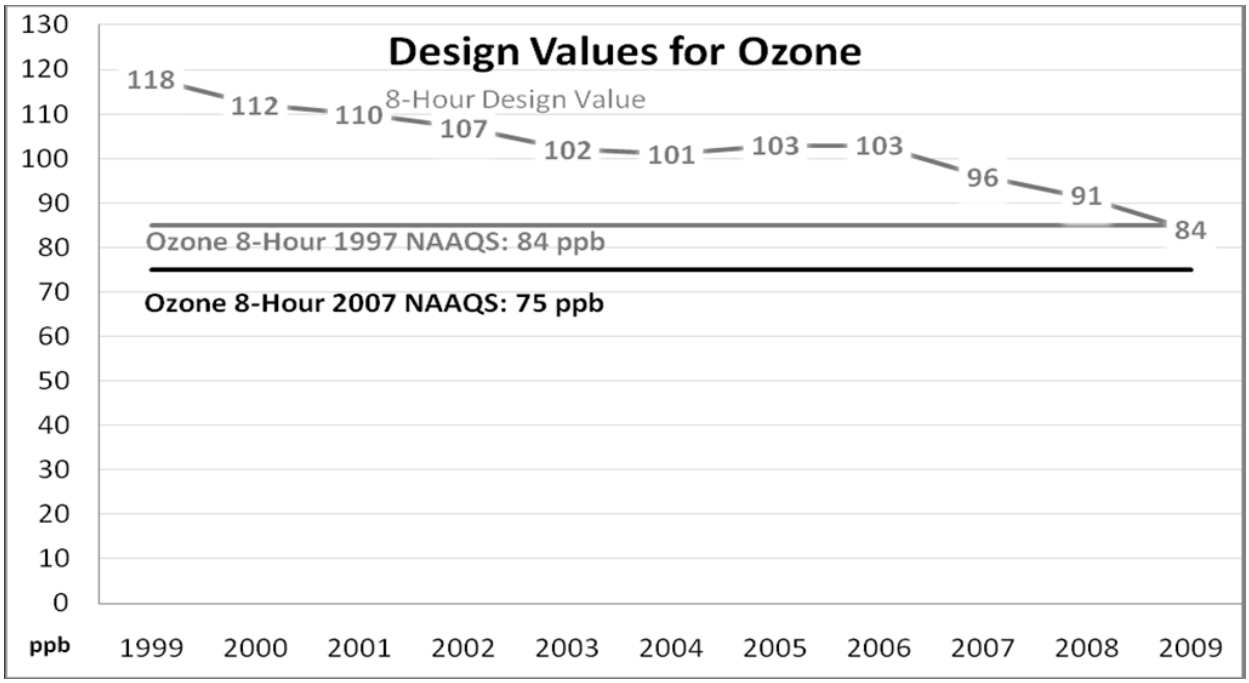
As the new EPA ozone standard approaches 60 ppb, more nonattainment areas in Texas and the United States are expected.

Ground level ozone is primarily formed by the reaction of sunlight with man-made emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Urban areas typically have high levels of ground level ozone.

In 2008 EPA strengthened the 1997 eight-hour ozone standard from 84 parts per billion (ppb) to the current 75 ppb value.

In September 2009, EPA proposed strengthening the primary eight-hour ozone standard from 75 ppb to within the range of 60 to 70 ppb.

The HGB area is currently in nonattainment for the primary eight-hour ozone standard. However, great progress has been made, and the HGB area reached the 84 ppb level in 2009.



Particulate Matter

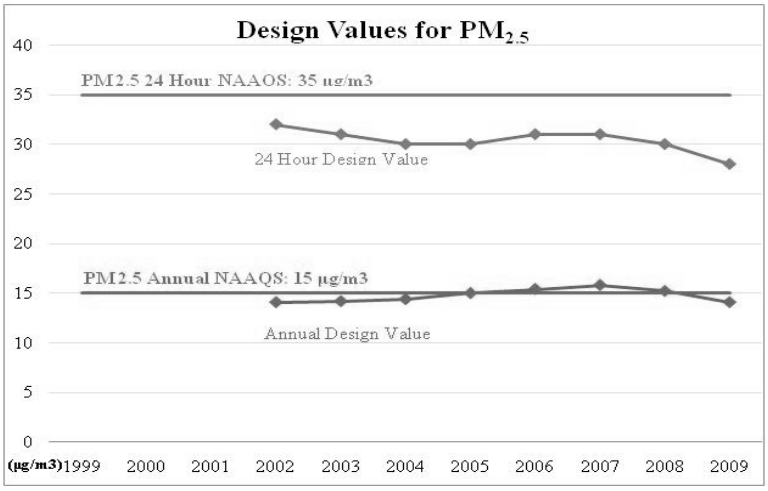
Particulate Matter (PM) is a category of air pollutants made up of small particles suspended in the air.

Particulate matter may be emitted by:

- Combustion
- Soil Disturbance and Surface Dust
- Abrasion of Tires
- Chemical Reactions in the Atmosphere
- Production or Degradation of Metals
- Naturally Occurring Sources

Correcting issues with fine PM (2.5 microns) also corrects issues with larger PM (10 microns).

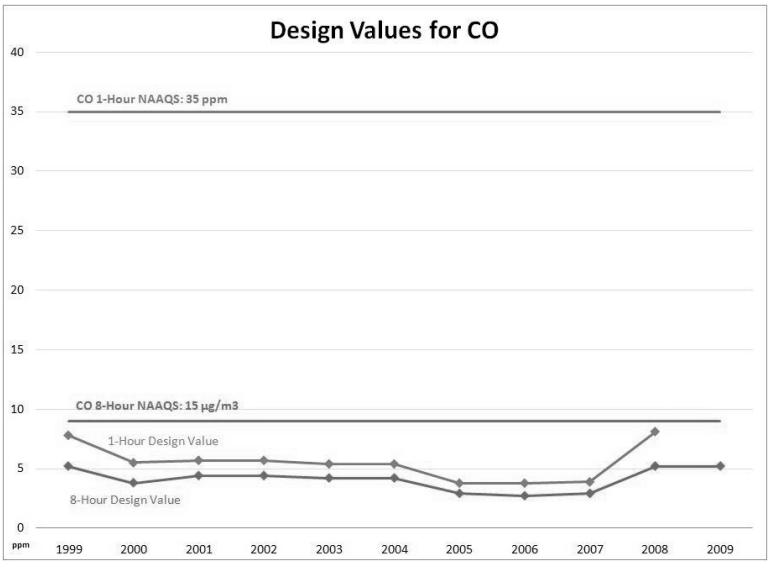
Currently, the HGB area is in attainment for PM2.5.



Carbon Monoxide

Carbon Monoxide (CO) is a colorless, odorless gas that is emitted during the combustion of gasoline, wood, natural gas, and other fuels.

Although there has been an increase in both the one-hour and eight-hour average levels of CO in recent years, the HGB area remains in attainment.

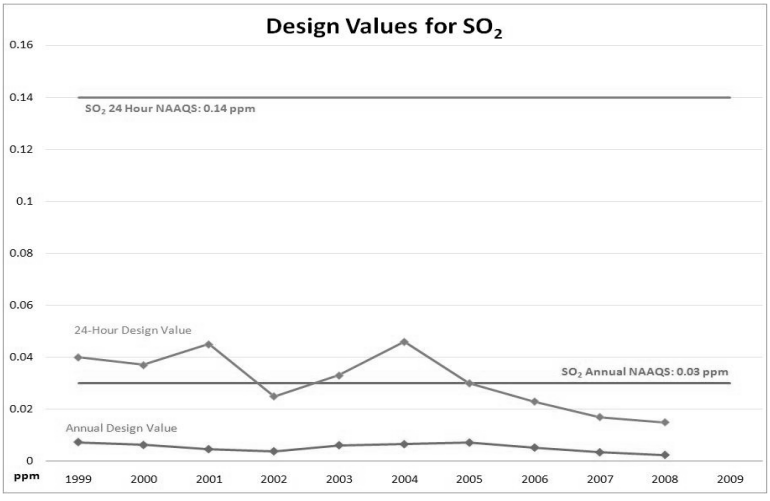


Sulfur Dioxide

Sulfur Dioxide (SO_2) is a colorless, odorless gas at low concentrations, but has a very potent odor at higher concentrations. SO_2 can harm vegetation, impair visibility, contribute to acid rain, and may lead to adverse health effects.

SO_2 is primarily emitted by stationary sources that burn high sulfur coal, petroleum refineries, sulfuric acid plants, and diesel fuel powered engines.

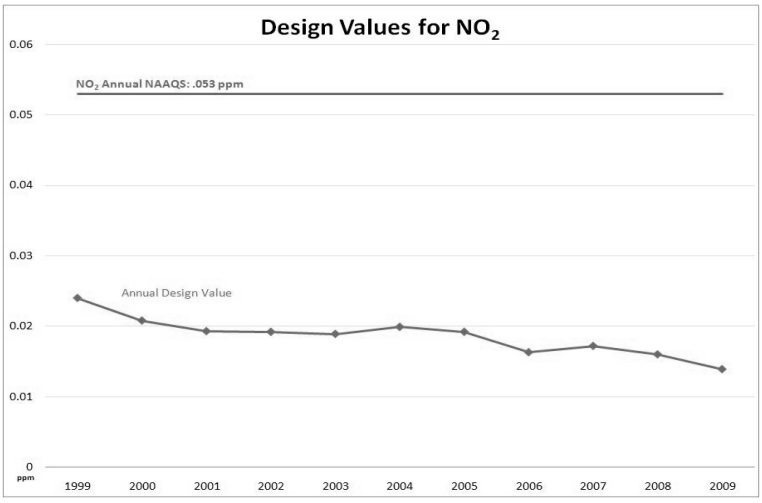
The HGB remains in attainment for the one-hour SO2 NAAQS.



Nitrogen Dioxide

Nitrogen Dioxide (NO_2) is one of several nitrogen oxide compounds, collectively referred to as NO_x. NO_x is formed almost entirely by high-temperature combustion and plays an important role in the formation of ground level ozone.

The HGB area remains in attainment for NO_2 and has experienced a noticeable decrease in the last several years.



Lead

In the United States, lead has been phased out of gasoline, paint and other consumer products because of its undesirable health effects.

In 1997, the Texas Commission on Environmental Quality (TCEQ) and the City of Houston ceased ambient monitoring in the HGB area because all monitoring sites measured near or below the limit of detection.

The HGB area remains in attainment for lead.

What are the Health Effects of Air Pollution?

Air pollutants have the potential to cause adverse health effects. These effects depend on the physical and biochemical nature of the pollutant, pollutant toxicity, pollutant level, mode and duration of exposure, and individual susceptibility.

Lower pollutant levels and shorter exposures may cause adverse health effects to individuals who are sensitive to the pollutant, individuals with a weakened immune system, and individuals with ailments that reduce their ability to detoxify pollutants. Higher pollutant levels and longer exposure times generally have greater effects.

Exposure to multiple air pollutants may amplify the effects of individual pollutants.

Some of the adverse health effects include:

- Abnormal Neural Development
- Asthma
- Cardiovascular Disease
- Exacerbation of Allergies
- Inflammation of Lung Tissue
- Pulmonary Edema
- Respiratory Difficulties
- Seizures

How is Houston's Air Monitored and How is the Data Used?

The HGB monitoring system has expanded significantly over the last few decades. Twenty-two ozone monitoring sites in the area are recognized by EPA for determining attainment with the ozone NAAQS. The monitors help to obtain better measurements, improve the understanding of local levels of ozone, NO_x, and VOCs, and aid in the identifying and implementing of effective ozone reduction control strategies.

The TCEQ has implemented new monitoring methods to develop Air-Monitoring Comparison Values which allow for more frequent and faster determinations of concentrations.

The HGB area is currently designated as a "severe ozone nonattainment area" for the 1997 eight-hour ozone standard. The HGB area needs to be in attainment of the ozone standard by the end of 2019.

EPA requires states with nonattainment areas to develop a comprehensive plan for action that describes how each area will reach air quality standards by the established attainment date.

The HGB area uses an EPA approved photochemical computer modeling system to determine if the attainment demonstration will be successful by the attainment date.

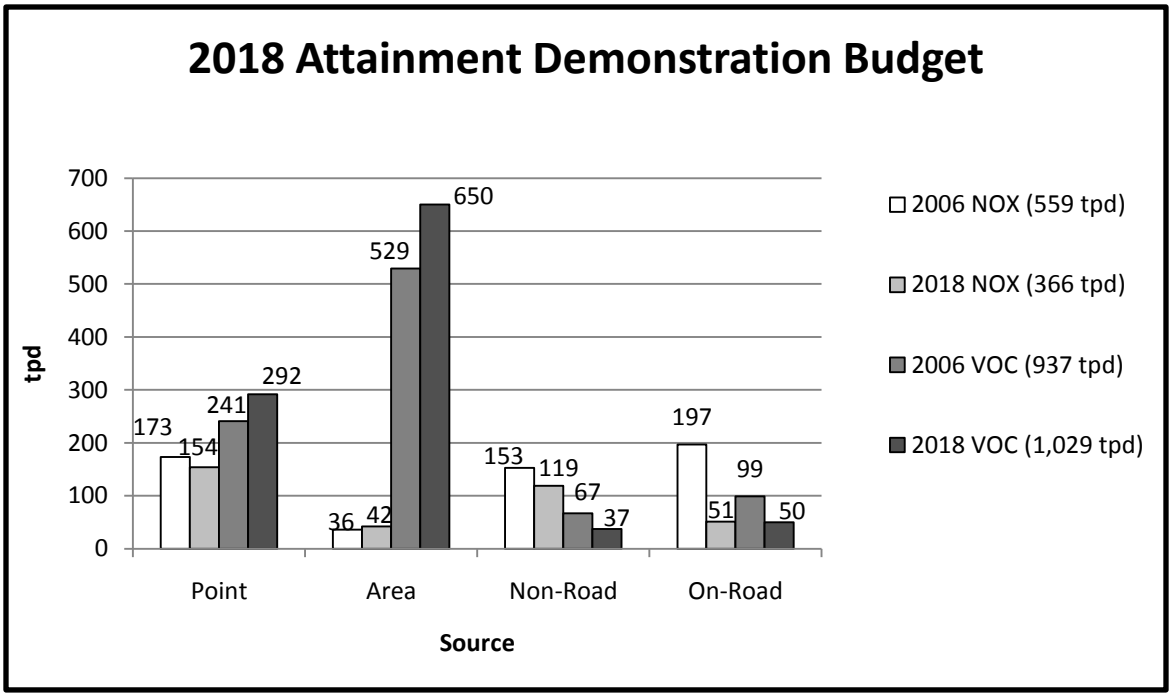
The model analyzes historical, actual and projected emission rates from sources of ozone-forming pollutants. It then integrates complex equations that are based on historical meteorological conditions with atmospheric chemical reactions that form ozone in the HGB area.

What are Sources of VOCs and NOx?

Sources of VOCs and NO_x, the precursors of ozone, are grouped into five categories. The total emissions of VOCs and NO_x from these categories create the emissions inventory for the area.

The five categories of sources are:

- *Point Sources:* industrial, commercial, or institutional plants or operations which emit a minimum of 10 tons per year (tpy) of VOCs, 25 tpy of NOx, or 100 tpy or more of a contaminant subject to NAAQS.
- *Area Sources:* stationary sources, such as dry cleaners and restaurants, which generally report emissions by categories rather than by individual source.
- *On-Road Sources:* automobiles and vehicles that emit both VOCs and NOx.



- *Off-Road and Non-Road Sources:* commercial and general aircraft operations, marine vessels, locomotives and other heavy duty equipment.
- *Biogenic Sources:* forests and vegetation of the HGB area. As biogenic emissions are not man-made, it is not considered practical or desirable to reduce them.

The business and industry sector has seen an estimated 80 percent reduction in NOx emissions due to control strategies.

What are We Doing to Clean Up the Air?

EPA requires Texas to prepare and execute a dynamic plan, called the State Implementation Plan (SIP). The SIP outlines how Texas plans to achieve compliance with the NAAQS by the attainment date.

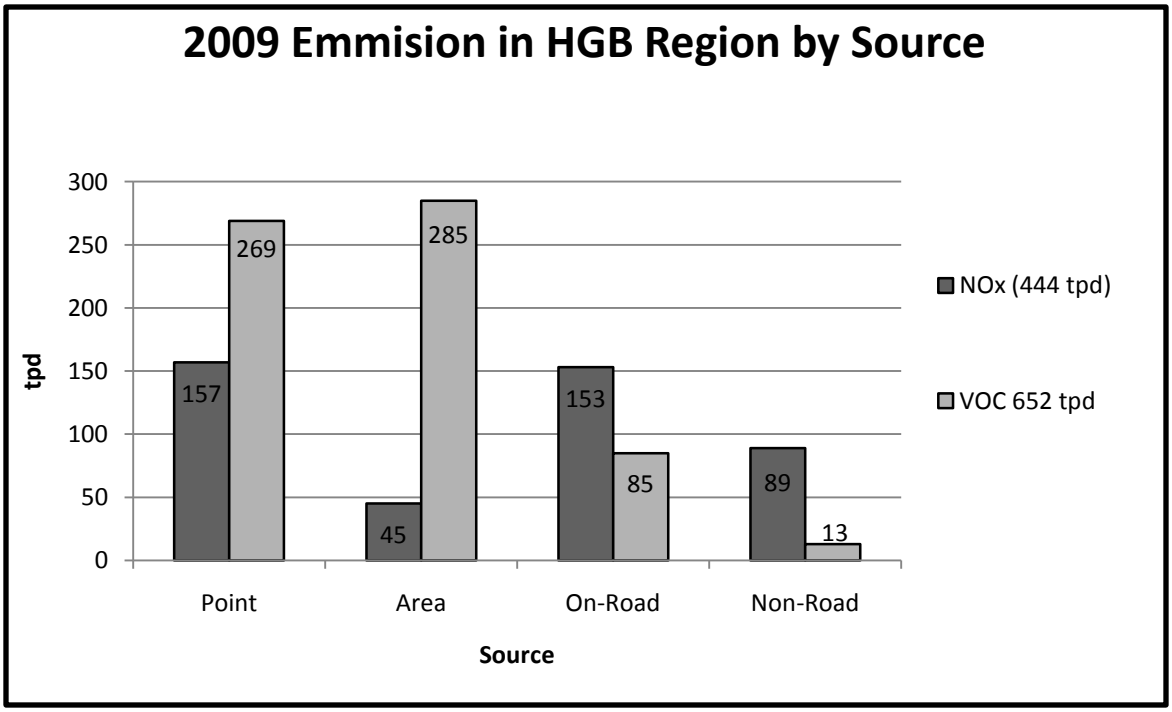
The CAA requires the state to revise the SIP regularly to incorporate new information as it becomes available.

The HGB area currently has an approved subsection in the SIP; thus, the HGB area is meeting the goals and designated timelines for nonattainment pollutants.

The SIP includes several ozone reduction strategies known as control strategies. Some control strategies modify the current process or method of a business, industry, or organization.

Other control strategies are typically funded by federal, state, or local government. These strategies include incentives, grants, loans, and replacement programs.

Research initiatives, outreach programs, and detailed health reports also contribute to the process of improving regional air quality.



What can I Do to Improve Air Quality?
Every citizen can contribute to improving air quality. Some small lifestyle changes that can create large benefits to the HGB area include:

- *Change Driving Habits:* avoid rush hours, combine trips, reduce unnecessary trips, carpool, cycle, telework, and walk.
- *Perform Vehicle Maintenance*: keep tires properly inflated, change filters, service air conditioning, get car regularly inspected.
- *Become a Knowledgeable Consumer:* purchase energy efficient and recycled goods when replacing older items.
- *Power Conservation*: turn off lights not in use, use energy-efficient light bulbs and appliances, weather strip, caulk, and insulate homes and businesses.
- *Become an Advocate*: attend programs and meetings regarding improving air quality improvement.

What Happens if We Don't Improve Air Quality?
There are severe consequences if the HGB area fails to reach attainment with the ozone NAAQS by the designated attainment date.

Residents of the HGB area will continue to experience the adverse health effects of elevated ozone levels when they occur.

Furthermore, the HGB area may experience loss of federal transportation funding, severe restrictions on growth of existing and new industry in the area, and imposition of a Federal Implementation Plan by EPA in lieu of state or local controls.

How Much Does Air Pollution Cost?
The total cost incurred by society as a result of air pollution is very difficult to measure. Increased air pollution levels can lead to increased health care costs and property damage, as well as decreased property values and quality of life.

Reducing the amount of air pollution requires investment in the installation, operation, maintenance, monitoring, and recordkeeping of emission control systems.

The cost of air pollution will be paid directly by individuals or businesses or indirectly by the consumer.

However, H-GAC anticipates that some of these expenditures may be offset by the recovering wasted product and creating business that develop and implement control strategies.

Please view the entire 2010 Air Quality Reference Guide at: www.cleanairaction.org

National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9,000 ppb (10 mg/m^3)	8-hour	None	
	35,000 ppb (40 mg/m^3)	1-hour		
Lead	0.15 $\mu g/m^3$	Rolling 3-Month Average	Same as Primary	
	1.5 $\mu g/m^3$	Quarterly Average	Same as Primary	
Nitrogen Dioxide	53 ppb	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour	None	
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual (Arithmetic Average)	Same as Primary	
	35 $\mu g/m^3$	24-hour	Same as Primary	
Ozone	75 ppb (2008 std)	8-hour	Same as Primary	
	84 ppb (1997 std)	8-hour	Same as Primary	
	124 ppb	1-hour	Same as Primary	
Sulfur Dioxide	30 ppb	Annual (Arithmetic Average)	500 ppb	3-hour [(1)]
	140 ppb	24-hour		
	75 ppb	1-hour	None	