11 AIR QUALITY

This chapter describes existing air quality conditions in Novato. Air quality is primarily assessed in relation to federal and State standards for pollutants harmful to human health. This chapter also provides an overview of federal, State and local regulations relating to air quality and describes the local climate and meteorology. A separate discussion of global warming caused by greenhouse gas (GHG) emissions is provided in Chapter 18, Greenhouse Gases.

A. Regulatory Framework

Regulatory oversight for air quality in the San Francisco Bay Air Basin is overseen by the Environmental Protection Agency Region IX office at the federal level, the California Air Resources Board (CARB) at the State level and the Bay Area Air Quality Management District (BAAQMD) at the regional level.

1. Federal Regulations

a. Federal Clean Air Act

The Environmental Protection Agency (EPA) is responsible for implementing the Federal Clean Air Act (FCAA), which was first enacted in 1955 and amended numerous times thereafter. The FCAA established federal air quality standards known as the National Ambient Air Quality Standards (NAAQS). These standards identify levels of air quality for "criteria pollutants" that are considered the maximum levels of ambient (background) air pollutants considered safe, with an adequate margin of safety, to protect the public health and welfare. As shown in Table 11-1, the "criteria pollutants" regulated by the NAAQS are: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$) and lead (Pb).

2. State and Regional Regulations

a. California Clean Air Act

Approved in 1988, the California Clean Air Act (CCAA) requires that each local air district prepare and maintain an Air Quality Management Plan to achieve compliance with the California Ambient Air Quality Standards (CAAQS). The amendments to the California Clean Air Act establish the CAAQS and a legal mandate to achieve these standards by the earliest practical date. These standards apply to the same criteria pollutants as those regulated under the Federal Clean Air Act and also include sulfate, visibility-reducing particles, hydrogen sulfide and vinyl chloride.

These standards, included with the NAAQS in Table 11-1, are generally more stringent and apply to more pollutants than the NAAQS. In addition to the criteria pollutants, CAAQS have been established for visibility reducing particulates, hydrogen sulfide and sulfates. The CCAA requires that each local air district prepare and maintain an Air Quality Management Plan (AQMP) to achieve compliance with CAAQS. These AQMPs also serve as the basis for preparation of the State Implementation Plan (SIP) for the State of California.

TABLE 11-1 **NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS**

		California[a]		Federal[b]	
Pollutant	**Average Time**	**Standard[c]**	**Attainment Status**	**Standards[d]**	**Attainment Status**
NAAQS Criteria Pollutants					
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Nonattainment	N/A[e]	N/A[e]
	8 Hours	0.09 ppm (137 µg/m³)	Unclassified	0.075 ppm (157 µg/m³)	Nonattainment
Particulate Matter (PM_{10})	24 Hours	50 µg/m³	Nonattainment	150 µg/m³	Unclassified
	Annual Arithmetic Mean	20 µg/m³	Nonattainment	-	-
Fine Particulate Matter ($PM_{2.5}$)	24 Hours	*No Separate State Standard*		35 µg/m³	Nonattainment
	Annual Arithmetic Mean	12 µg/m³	Nonattainment	15 µg/m³	Attainment
Carbon Monoxide (CO)	8 Hours	9.0 ppm (10 mg/m³)	Attainment	9 ppm (10 mg/m³)	Attainment
	1 Hour	20 ppm (23 mg/m³)	Attainment	35 ppm (40 mg/m³)	Attainment
Nitrogen Dioxide (NO_2)[f]	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)	-	0.053 ppm (100 µg/m³)	Attainment
	1 Hour	0.18 ppm (338 µg/m³)	Attainment	0.100 ppm	Unclassified
Lead (PB)	30 Days Average	1.5 µg/m³		-	Attainment
	Calendar Quarter	N/A	N/A	1.5 µg/m³	Attainment
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	N/A	N/A	0.030 ppm (80 µg/m³)	Attainment
	24 Hours	0.04 ppm (105 µg/m³)	Attainment	0.14 ppm (365 µg/m³)	Attainment
	3 Hours	N/A	N/A	N/A	Attainment
	1 Hour	0.25 ppm (655 µg/m³)	Attainment	0.075 ppm (196 µg/m³)	Attainment

TABLE 11-1 **NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS** (CONTINUED)

California Ambient Air Quality Standard Criteria Pollutants				
Visibility-Reducing Particles	8 Hours (10 a.m. to 6 p.m., PST)	Extinction coefficient = 0.23 km@<70% RH	Unclassified	*No federal standards*
Sulfates	24 Hour	25 μg/m³	Attainment	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m³)	Unclassified	
Vinyl Chloride	24 Hour	0.01 ppm (26 μg/m³)	No information available	

Notes: μg/m³ = micrograms per cubic meter; ppm = parts per million; km = kilometer(s); RH = relative humidity; PST = Pacific Standard Time; N/A = Not Applicable

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter-PM_{10} and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California Ambient Air Quality Standards (CAAQS) are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations. In 1990, CARB identified vinyl chloride as a toxic air contaminant (TAC), but determined that there was not sufficient available scientific evidence to support the identification of a threshold exposure level. This action allows the implementation of health-protective control measures at levels below the 0.010 ppm ambient concentration specified in the 1978 standard.

[b] National standards (other than ozone, particulate matter and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. EPA also may designate an area as *attainment/unclassifiable*, if: (1) it has monitored air quality data that show that the area has not violated the ozone standard over a three-year period; or (2) there is not enough information to determine the air quality in the area. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[c] Concentration is expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[e] The Federal 1-hour ozone standard was revoked on June 15, 2005 in all areas except the 14 8-hour ozone nonattainment Early Action Compact (EAC) areas.

[f] The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007 to lower the 1-hour standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after the regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

[g] The EPA revoked the annual PM_{10} standard in 2006 (effective December 16, 2006).

Source: California Air Resources Board and U.S. Environmental Protection Agency, September 2013

b. California Air Resources Board

The California Air Resources Board (CARB) administers the air quality standards in California. Similar to the EPA, the CARB designates areas within California as either attainment or nonattainment for each criteria pollutant based on whether the CAAQS have been achieved. Under the California Clean Air Act, areas are designated as nonattainment for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous three calendar years.

In 2005, CARB released the final version of the Air Quality and Land Use Handbook, which is intended to encourage local land use agencies to consider the risks from air pollution prior to making decisions that approve the siting of new sensitive receptors, such as homes or day care centers near sources of air pollution. Unlike industrial or stationary sources of air pollution, siting of new sensitive receptors does not require air quality permits, but could create adverse human health effects. The primary purpose of the document is to highlight the potential health impacts associated with close proximity to common air pollution sources and to ensure that those issues are considered in the planning process.

CARB makes recommendations regarding the siting of new sensitive land uses near freeways, truck distribution centers, dry cleaners, gasoline dispensing stations and other air pollution sources. Each of these sources is known to emit pollution that is likely to result in adverse health effects. CARB has reviewed proximity studies, air sampling studies, studies of hospital and medical visits, and air quality modeling to establish the appropriate recommended buffer distances from each source type.

CARB acknowledges that land use agencies have to balance other siting considerations such as housing and transportation needs, economic development priorities and other quality of life issues. These "advisory" recommendations, summarized in Table 11-2, are based primarily on modeling information and may not be entirely reflective of conditions in Novato. The siting of new sensitive land uses within these advisory distances may be possible, but only after site-specific studies are conducted to identify the actual health risks.

c. California Government Code

Under the General Plan requirements in California Government Code, coverage/analysis of air quality is an optional component of the Conservation Element. The BAAQMD encourages local jurisdictions to include General Plan policies or elements that, when implemented, would improve air quality. Although air quality elements are not mandated, General Plans are required to be consistent with any air quality policies and programs that exist within that jurisdiction. Local plans should also be consistent with regional air quality plans, such as the Bay Area Clean Air Plan discussed below.

d. Bay Area Air Quality Management District

The Bay Area Air Quality Management District (BAAQMD) is primarily responsible for assuring that the NAAQS and CAAQS are attained and maintained in the Bay Area. BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions and conducting public education campaigns. BAAQMD has jurisdiction over much of the nine-county Bay Area region, including all of Marin County.

TABLE 11-2 **CARB RECOMMENDED SETBACK DISTANCES FOR COMMON SOURCES OF TOXIC AIR CONTAMINANTS**

Source Type	Recommended Buffer Distance
Freeways and busy arterial roadways	500 feet
Distribution Centers with 100 or more daily truck trips or 40 daily truck trips that use refrigeration units	1,000 feet
Dry cleaners (onsite dry cleaning)	300 feet for any dry cleaning operation
	At least 500 feet for operations with 2 or more machines
Large gasoline stations (i.e. over 3.6 million gallons pumped per year)	50 feet for typical gas stations
	Up to 300 feet for large gas stations

Under the CCAA, areas not in compliance with the CAAQS for ozone must prepare an ozone reduction plan. All major metropolitan areas within the State of California, including the Bay Area, must comply with this standard and must therefore submit an attainment plan every three years. The following section notes efforts by the BAAQMD to address ozone and ozone precursors through the implementation of the *Ozone Strategy* and *Clean Air Plan.*

i. 2001 Ozone Attainment Plan

The Bay Area 2001 Ozone Attainment Plan was prepared by BAAQMD, the Metropolitan Transportation Commission (MTC), and the Association of Bay Area Governments (ABAG). This plan is a proposed revision to the Bay Area's part of the State Implementation Plan (SIP) to achieve the NAAQS for the 1-hour ozone standard. The plan was prepared in response to US EPA's partial approval and partial disapproval of the Bay Area's 1999 Ozone Attainment Plan. Although the EPA revoked the 1-hour NAAQS, commitments and emissions budgets made in that plan remain valid until the region develops an attainment demonstration/maintenance plan for the 8-hour NAAQS for ozone. As on July 20, 2012, the final Bay Area designation was that of nonattainment.

A Carbon Monoxide Maintenance Plan was approved in 1998 by EPA, which demonstrated how NAAQS for carbon monoxide standard would be maintained.

ii. 1991 Clean Air Plan

In 1991, BAAQMD, MTC and ABAG prepared the Bay Area 1991 Clean Air Plan (CAP). This air quality plan addresses the CCAA. Updates are developed approximately every three years. The plans are meant to demonstrate progress toward meeting the more stringent 1-hour ozone CAAQS. The latest update to the plan, which was adopted in January 2006, is called the *Bay Area 2005 Ozone Strategy*. This plan includes a comprehensive strategy to reduce emissions from stationary, area, and mobile sources. The plan objective is to indicate how the region would make progress toward attaining the stricter State air quality standards mandated by the CCAA. The plan is designed to achieve a region-wide

reduction of ozone precursor pollutants. The plan proposes expanded implementation of transportation control measures (TCMs) and programs such as Spare the Air. Spare the Air is a public outreach program designed to educate the public about air pollution in the Bay Area and promote individual behavior changes that improve air quality. Some of these measures or programs rely on local governments for implementation. An update to the plan is currently being developed and should be available by the end of 2009.

iii. 2010 Clean Air Plan

The Bay Area 2010 Clean Air Plan serves to update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone. The plan also provides a control strategy to reduce ozone, particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan. The plan reviews progress in improving air quality in recent years and establishes emission control measures to be adopted or implemented in the 2010-2012 timeframe.

iv. PM_{10} and $PM_{2.5}$ Plans

The clean air planning efforts for ozone will also reduce PM_{10} and $PM_{2.5}$, since a substantial amount of all three air pollutants comes from combustion emissions such as vehicle exhaust. BAAQMD also adopts and enforces rules to reduce particulate matter emissions and develops public outreach programs to educate the public on methods for reducing PM_{10} and $PM_{2.5}$ emissions.

Senate Bill (SB) 656, approved in 2003, requires further action by CARB and air districts to reduce public exposure to PM_{10} and $PM_{2.5}$. BAAQMD's PM control Program to control PM emissions includes: regulations and permit conditions to limit emissions of primary PM and PM precursors from stationary sources; wood smoke regulation; and control measures in the 2010 Clean Air Plan.

PM levels in the Bay Area have declined significantly in recent years in response to emissions reductions from the Air District measures described above, as well as a comprehensive program by the ARB to reduce PM emissions from mobile sources (both on-road and off-road motor vehicles and equipment). On January 9, 2013, the U.S. EPA issued a final rule to determine that the San Francisco Bay Area has attained the 24-hour PM2.5 National Ambient Air Quality Standard (NAAQS).

3. Local Regulations

a. Novato General Plan

Air quality is addressed in the Environment chapter of the existing Novato General Plan. Objective EN 32 in this chapter calls for the City to "work to protect and improve air quality." Policies and actions to implement this objective call for the City to work with BAAQMD to implement the regional Clean Air Plan, encourage alternate modes of transportation, mitigate air quality impacts associated with development proposals, enforce dust emissions control plans for construction, and supporting street tree and urban forestry programs. Energy conservation and transportation policies and programs included in the General Plan are also intended to help improve air quality.

B. Climate and Meteorology

Novato is located in the Marin County subregion of the San Francisco Bay Area Air Basin. The basin includes the counties of San Francisco, Santa Clara, San Mateo, Marin, Napa, Contra Costa and Alameda, along with the southeast portion of Sonoma County and the southwest portion of Solano County. Due to the proximity of the San Francisco Bay and Pacific Ocean, the climate in the basin is characterized by warm dry summers and cool moist winters. In summers, temperatures in Novato generally range from the 50s to high 70s and low 80s. In winter, temperatures range from the 30s to the 50s.

The major large-scale weather feature controlling climate in the Novato area is a large high pressure system located in the eastern Pacific Ocean, known as the Pacific High. During winter months marine air trapped in the lower atmosphere is often condensed into fog by the cool Pacific Ocean. Stratus-type clouds usually form offshore and move into the area during the evening hours.

During winter months, the Pacific High becomes weaker and shifts south, allowing weather systems associated with the polar jet stream to affect the region. Low pressure systems produce periods of cloudiness, strong shifting winds and precipitation. Novato, which lies mostly on the lee side of the coastal mountains in Marin County, receives about 30 inches of precipitation per year. Mountains to the west receive 40 to 50 inches. Most rainfall occurs from November through April. High-pressure systems are also common in winter, with low-level inversions that produce cool stagnant conditions. Radiation fog and haze trapped near the surface are common during extended winter periods where high-pressure systems influence the weather.

The prevailing wind in most of Novato is primarily from a westerly direction, especially during spring and summer. In winter, winds become variable with more of a southeasterly orientation. Nocturnal winds and land breezes during the colder months of the year prevail with variable drainage out of the mountainous areas. Wind speeds are highest during the spring and early summer and lightest in the fall. Winter storms bring relatively short episodes of strong southerly winds.

C. Existing Air Quality Conditions

Air quality is affected by the rate of pollutant emissions and by meteorological conditions such as wind speed, atmospheric stability and mixing height, all of which affect the atmosphere's ability to mix and disperse pollutants. Long-term variations in air quality typically result from changes in air pollutant emissions, while short-term variations result from changes in atmospheric conditions.

For the most part, Novato experiences good air quality due to the almost persistent westerly flow of air. There are little or no pollution sources upwind or to the west of Novato. Episodes of high particulate levels can occur in late fall and winter when the Pacific High can combine with high pressure over the interior regions of the western United States (known as the Great Basin High) to produce extended periods of light winds and low-level temperature inversions. This condition frequently produces poor atmospheric mixing that results in degraded regional air quality. Ozone standards traditionally are exceeded in downwind portions of the Bay Area when this condition occurs during the warmer months of the year.

1. Monitored Air Pollutant Levels for Criteria Pollutants

BAAQMD monitors air pollutant levels continuously throughout the nine-county Bay Area Air Basin. The closest monitoring station to Novato is located in downtown San Rafael, which is the only station in Marin County. This monitoring station is located about a block east of US Highway 101 and near the freeway ramps. As a result, PM_{10} and CO levels may be affected by local sources. BAAQMD reports that San Rafael's climate and air quality are representative of that found throughout the populous northeastern side of the county. Afternoon sea breezes in Marin County typically keep air pollution levels low.

A summary of air quality monitoring data is shown in Table 11-3. The values in the table are the highest air pollutant levels measured at these stations over the past five years (2008 to 2012). The number of days in which measured concentrations exceeded the NAAQS or CAAQS are given in Table 11-4. As shown, air pollutant levels measured in San Rafael meet all ambient air quality standards with the exception of the State standard for 1-hour Ozone and PM_{10}. The 1-hour Ozone and the 24-hour State PM_{10} standard is exceeded in San Rafael on about 0 to 1 sampling day per year. Because PM_{10} is sampled once every 6th day, the number of days exceeding the standard is estimated at 0 to 6 days per year. The San Rafael station has exceeded either State or federal ozone standards twice during the last five years. During this period, the Bay Area as a whole experienced an exceedance somewhere within the basin on up to 13 days per year. It should be noted that $PM_{2.5}$ was measured in San Rafael beginning in 2010.

Air quality conditions in San Rafael are described for each criteria air pollutant below:

- **Ozone:** Over the last five years in San Rafael, the NAAQS for 1- and 8-hour ozone was not exceeded. The Bay Area as a whole exceeded the 8-hour ozone NAAQS on 0 to 12 days annually and the 8-hour CAAQS on 9 to 22 days (statistics kept since 2005). The 1-hour State standard for ozone was also not exceeded in San Rafael, but was exceeded on 4 to 19 days annually in the Bay Area as a whole. Most exceedances of ozone standards in the Bay Area occur in the Eastern and Santa Clara Valley Districts.

- **Carbon Monoxide**: The highest carbon monoxide concentrations measured in San Rafael have been well below the NAAQS and CAAQS standards.

- **PM_{10} and $PM_{2.5}$**: High levels of PM_{10} can cause negative health effects, as well as reduced visibility. The primary sources of these pollutants are wood smoke and local traffic, and their buildup is greatest during the evenings and early morning periods. Measured exceedances of the PM_{10} standards occurred on two separate sampling days over the last five years. $PM_{2.5}$ was measured in San Rafael from 2010 through 2012. where monitoring data indicate about 0 to 4 exceedance of the standards annually.

- **Other Pollutants:** Other criteria pollutants, such as nitrogen dioxide, sulfur dioxide and lead have always been measured at low levels in San Rafael and the rest of the Bay Area. These pollutants should not pose a major air pollution concern in Novato.

TABLE 11-3 **HIGHEST MEASURED AIR POLLUTANT CONCENTRATIONS**

Pollutant	Avg. Time	Measured Air Pollutant Levels 2008	2009	20010	20011	20012
San Rafael						
Ozone (0_3)	1-Hour	0.085 ppm	0.075 ppm	0.083 ppm	0.092 ppm	0.076 ppm
	8-Hour	0.069 ppm	0.059 ppm	0.059 ppm	0.070 ppm	0.057 ppm
Carbon Monoxide (CO)	8-Hour	1.1 ppm	1.2 ppm	1.1 ppm	1.0 ppm	1.1 ppm
Nitrogen Dioxide ($N0_2$)	1-Hour	0.056 ppm	0.052 ppm	0.057 ppm	0.053 ppm	0.052 ppm
	Annual	0.00.013ppm	0.0122 ppm	0.012ppm	0.012ppm	0.011ppm
Fine Particulate Matter ($PM_{2.5}$)	24-Hour			46.5 ug/m³	42.2 ug/m³	26.5 ug/m³
	Annual	--	--	10.7 ug/m³	9.9 ug/m³	8.0 ug/m³
Respirable Particulate Matter (PM_{10})	24-Hour	41 ug/m³	38 ug/m³	51 ug/m³	54 ug/m³	37 ug/m³
	Annual	18.6 ug/m³	16.2 ug/m³	16.7 ug/m³	16.5 ug/m³	13.2 ug/m³
Bay Area (Basin Summary)						
Ozone (0_3)	1-Hour	0.141 ppm	0.001 ppm	0.150 ppm	0.115 ppm	0.102 ppm
	8-Hour	0.111 ppm	0.095 ppm	0.098 ppm	0.085 ppm	0.09 ppm
Carbon Monoxide (CO)	8-Hour	3.08 ppm	2.82 ppm	2.52 ppm	2.53 ppm	2.56 ppm
Nitrogen Dioxide ($N0_2$)	1-Hour	0.056 ppm	0.054 ppm	0.062 ppm	0.070 ppm	0.074 ppm
	Annual	0.017 ppm	0.015 ppm	0.015 ppm	0.015 ppm	0.015 ppm
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	24.9 ug/m³	49.8 ug/m³	41.5 ug/m³	50.5 ug/m³	38.4 ug/m³
	Annual	16.5 ug/m³	10.1 ug/m³	8.9 ug/m³	9.8 ug/m³	6.6 ug/m³
Respirable Particulate Matter (PM_{10})	24-Hour	77ug/m³	55.4 ug/m³	69.6 ug/m³	73.4 ug/m³	59.6 ug/m³
	Annual	24.1 ug/m³	20.3 ug/m³	19.5 ug/m³	20.2 ug/m³	18.8 ug/m³

Note: ppm = parts per million.
Shaded values report exceedances of ambient air quality standards.
NA = data not available

Source: BAAQMD, Bay Area Air Pollution Summaries 2008-20012

TABLE 11-4 **SUMMARY OF MEASURED AIR QUALITY EXCEEDANCES AT SAN RAFAEL MONITORING STATION**

Pollutant	Standard	Monitoring Station	Days Exceeding Standard 2008	2009	2010	2011	2012
Ozone (O_3)		San Rafael	0	0	X[a]	X	X
		Bay Area	1	0	X	X	X
	NAAQS 8-hr	San Rafael	0	0	0	0	0
		Bay Area	12	8	9	4	4
	CAAQS 1-hr	San Rafael	0	0	0	0	0
		Bay Area	9	11	8	5	3
	CAAQS 8-hr	San Rafael	**0**	**0**	0	0	0
		Bay Area	**20**	**13**	11	10	8
Respirable Particulate Matter (PM_{10})	NAAQS 24-hr	San Rafael	0	0	0	0	0
		Bay Area	0	0	0	0	0
	CAAQS 24-hr	San Rafael	0	1	0	1	1
		Bay Area	5	1	2	3	2
Fine Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr	San Rafael	–	–	4	1	0
		Bay Area	12	11	6	8	3
All Other (CO, NO_2, Lead, SO_2)	NAAQS 24-hr	San Rafael	0	0	0	0	0
		Bay Area	0	0	0	0	0

[a] X means the standard was revoked and is no longer applicable.
Source: BAAQMD, Bay Area Air Pollution Summaries 2008-2013. This table reports exceedances at the San Rafael Station and throughout the Bay Area.

2. Attainment Status

Areas that do not violate ambient air quality standards are considered to have attained the standard. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. The Bay Area as a whole does not meet CAAQS or NAAQS for ground level ozone, nor State standards for PM_{10} and $PM_{2.5}$.

In May 2008, the EPA lowered the 8-hour ozone standard from 0.08 to 0.075 ppm. Under the Federal CAA, the EPA has classified the region as "marginally nonattainment" for the 2008 8-hour ozone standard. .

The EPA has recently designated the entire Bay Area region as nonattainment for the 2006 24-hour $PM_{2.5}$ standard because recent monitoring data indicate levels in San Jose and Vallejo slightly above the standard. Most nonattainment areas have until 2015 to attain the standards with some extensions to 2020 possible.

The Bay Area has met the CO standards for over a decade and is classified attainment maintenance by the US EPA. The EPA grades the region unclassified for all other air pollutants, which includes PM_{10}.

At the State level, the region is considered "serious non-attainment" for ground level ozone and "non-attainment" for PM_{10} and $PM_{2.5}$ (an annual standard). The region is required to adopt plans on a triennial basis that show progress to-

wards meeting the State ozone standard. The area is considered attainment or unclassified for all other pollutants.

3. Toxic Air Contaminants

In addition to the pollutants discussed above, BAAQMD and CARB measure concentrations of TACs throughout the Bay Area. Typical compounds measured by BAAQMD include benzene, carbon tetrachloride, chloroform, ethylene dibromide, ethylene dichloride, methyl tert buytl ether (MTBE), methylene chloride, acetaldehyde, perchloroethylene, toluene, 1,3-butadiene, formaldehyde, and the class of compounds known as polycyclic aromatic hydrocarbons (PAHs). Since the ambient concentrations of these TACs are very small, they are measured and reported as parts per billion (ppb) or nanograms per cubic meter (ng/m^3) on a volume basis.

Emissions of the major TACs are as follows:

- **Diesel particulate matter (DPM).** Emitted by heavy-duty trucks, buses, construction equipment and electrical generation. DPM makes up the greatest inhalation health risk in the Bay Area.
- **1,3 Butadiene.** Emitted primarily by on-road motor vehicles. Like carbon monoxide, older model vehicles without adequate catalytic converters have much higher emission rates.
- **Benzene.** Emitted primarily by on-road motor vehicles and gasoline evaporation.
- **Formaldehyde.** Emitted both directly and indirectly into the atmosphere. It is primarily formed through photochemical oxidation in the atmosphere with elevated levels of ozone and nitrogen oxides. Sources of emissions leading to elevated formaldehyde levels are fuel combustion from a variety of mobile and stationary sources, especially motor vehicle operations.

Table 11-5 contains a summary of the measured TAC concentrations at the San Rafael monitoring station. These results are based on data reported by BAAQMD for 2007 (the most recent year available). Also included in Table 11-5 are the overall Bay Area monitoring results for 2003 along with the calculated cancer risk. Risks associated with DPM were calculated for 2000, based on modeling information.

Bay Area cancer risk represents the number of excess cancer cases per million people based on a lifetime exposure (70 years) to the annual average TAC concentration in the Bay Area. CARB published maps showing the 2001 total inhalation health risk in the State. According to these maps, the 2001 health risk in Novato ranged from 100 to below 250 cases per million. More densely populated urban areas, such as San Francisco, Oakland and San Jose had higher risks of 1,000 in a million. With all diesel risk reduction measures implemented, CARB predicts that the overall inhalation health risk in Novato would decrease to less than 100 cases per million by 2010. Health risks associated with TACs are based on the average concentration for the entire region; and the health risk at individual locations will vary considerably. Since 1990, average concentrations of TACs and the associated health risks have been reduced by 50 percent or more for many compounds.

TABLE 11-5 **SUMMARY OF RECENTLY MEASURED TOXIC AIR CONTAMINANT CONCENTRATIONS**

	Concentration (in ppb)		Cancer Risk (Chance in One Million)
Toxic Contaminant	**Novato 2003**	**Bay Area 2007**	**Bay Area**
Gaseous TACs – Annual Concentration (ppb)			
1,3-Butadiene	0.11	0.06	23.0
Benzene	0.38	0.274	25.0
Carbon Tetrachloride	0.10		
Formaldehyde	--	1.45	11.0
Acetaldehyde	--	0.56	3.0
Perchloroethylene	0.08	0.031	1.0
Methylene Chloride	0.26	0.1	<1
MTBE	0.37	0.53	0.5
Chloroform	0.02	0.02	0.6
Trichloroethylene	0.03	0.02	0.2
Particulate TACs – Annual Concentration (ng/m³)			
Diesel Particulate Matter (DPM)	–	–	480.0*
Chromium (hexavalent)	–	0.53	8.0
Dioxin	–	0.000025	1.0
Nickel	–	3.3	0.8
PAHs	–	0.47	0.5
Lead	–	7.8	0.1
Total for all TACs Excluding Diesel Particulate Matter			**143**

Notes:
NA = data not available
PPB = parts per billion
Ng/m3 = nanograms of contaminant per cubic meter of air
ug/m3 = micrograms of contaminant per cubic meter of air
Source: (1) Air Resources Board Almanac 2009 – Chapter 6, and (2) Status Report: BAAQMD Toxic Air Contaminant Control Program.

4. Existing Sources of Air Pollution

Traffic is the primary source of air pollution in and around Novato. Table 11-6 summarizes emissions for Marin County and the Bay Area for 2006 (the most recent year available). Traffic accounts for about 40 to 50 percent of the emissions of ozone precursor pollutants.

a. Stationary Sources

Excluding gas stations, dry cleaning facilities and repair shops, the 2008 BAAQMD Toxic Air Contaminants 2008 Annual Report emission inventory database identified the Novato Sanitary District as the only stationary source in Novato. Although Redwood landfill is listed in the inventory, the facility is outside of Novato. The list included about 10 dry-cleaning operations that emit perchlorethylene, a solvent commonly used for dry cleaning.

Emissions of TACs from stationary sources in Novato can be found in the most recent version of BAAQMD's annual Toxic Contaminant Control Report. The most prevalent TACs in Novato and Marin County (excluding diesel particulate matter) are benzene and 1,3-Butadiene from mobile sources and formaldehyde that comes from a variety of sources.

b. Area-Wide Sources

Area-wide sources, which include construction activities, residential wood smoke, off-road travel and agriculture, account for the greatest portion of PM_{10} emissions (about 80 percent) and over 50 percent of the $PM_{2.5}$ emissions.

However, $PM_{2.5}$ is also formed from reactions of NOx and other gaseous air pollutants in the atmosphere.

c. Mobile Sources

Mobile sources of air pollution make up a large portion of the emissions inventory for Marin County. On-road mobile sources, or cars and trucks, account for about 40 to 50 percent of the emissions of ozone precursor pollutants (NOx and ROG). Off-road mobile sources include boats, construction equipment, trains and aircraft. Approximately 65 percent of the ROG and 93 percent of the NOx emitted in Marin County is from mobile sources, most of which are related to traffic.

d. Dust

Construction and vehicle travel result in the generation of dust, which leads to elevated PM_{10} levels in the region. Dust from construction activities can affect nearby land uses. Activities that generate visible dust clouds extending beyond their boundaries are a source of air pollution that can be controlled.

5. Odors

Significant sources of offending odors are typically identified based on complaint histories received and compiled by BAAQMD. It is difficult to identify sources of odors without requesting information about a given facility from BAAQMD. There are no known facilities with complaint histories in Novato. Typical large sources of odors that result in complaints are wastewater treatment facilities, landfills, food processing facilities and agricultural operations.

TABLE 11-6 **2008 AIR POLLUTANT EMISSIONS INVENTORY FOR OZONE PRECURSORS AND PARTICULATE MATTER**

	Emissions (Tons/Day)			
	ROG	**NOx**	**PM_{10}[a]**	**$PM_{2.5}$**
Marin County				
Stationary Sources	2.41	0.38	0.65	0.58
Area-Wide Sources	4.45	0.96	9.05	3.80
On-Road Mobile Sources	4.56	7.48	0.34	0.23
Off-Road Mobile Sources	5.14	12.16	1.07	0.96
Total (Rounded)	**16.5**	**20.99**	**11.11**	**5.57**
Bay Area				
Stationary Sources	10.6	50.6	16.3	12.1
Area-Wide Sources	87.9	16.9	175.5	52.9
On-Road Mobile Sources	112.3	206.7	10.1	7.1
Off-Road Mobile Sources	70.8	173.8	10.2	9.1
Total (Rounded)	372.6	448.0	212.1	81.3

[a] PM_{10} includes $PM_{2.5}$
Source: California Air Resources Board (http://www.arb.ca.gov/aqd/almanac/almanac07/almanac07.htm) Mobile Source.

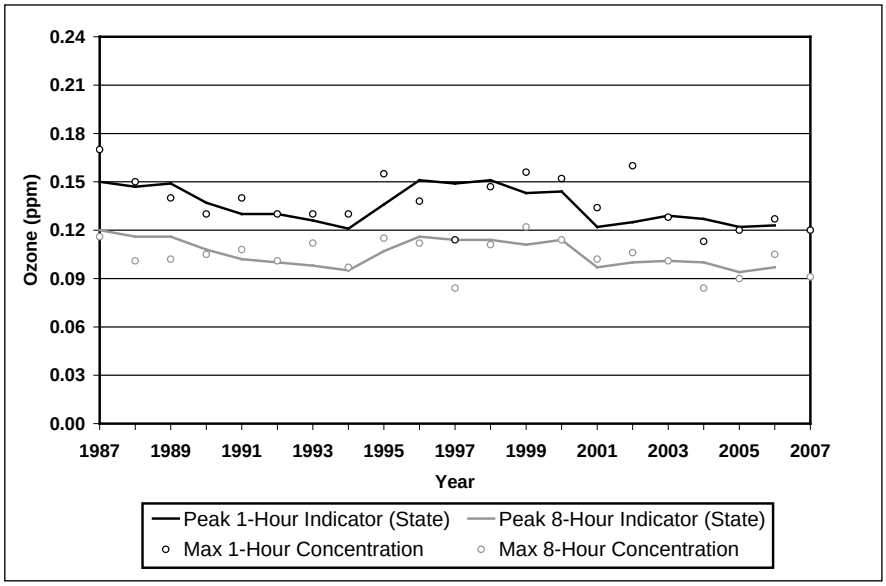
D. Air Quality Trends

Table 11-7 shows the trend in emissions for the Bay Area since 1975. Emissions of ozone precursors have decreased considerably over the last 30 years. During the past ten years, ozone precursor emissions have decreased by 30 to 40 percent. Figure 11-1 shows that, although ozone precursor emissions decreased substantially, the effect on ozone levels is subtle. However, the trend toward lower ozone levels has been fairly consistent for the last 20 years. In fact, the downward trend appears to have been sufficient to show attainment of the NAAQS for ozone. Ozone precursor emissions are projected to continue to decrease by 25 to 40 percent over the next 15 years, while population and vehicle use increases. The projected reductions would be the result of rules and regulations that will be implemented in the future. For instance, new vehicle standards require time to reduce emissions until older more polluting vehicles are retired.

TABLE 11-7 **TREND IN SF BAY AREA AIR BASIN EMISSIONS (TONS/DAY, ANNUAL AVERAGE)**

Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NOx	928	904	808	787	718	614	488	414	335	284
ROG	1413	1327	1075	804	707	572	420	359	331	318
PM_{10}	178	179	192	192	188	216	207	216	225	235
PM_{25}	80	78	78	84	82	84	81	82	83	85
CO	9,056	8,314	6,991	5,308	3,901	2,944	2,021	1,596	1,340	1,206

FIGURE 11-1 **20-YEAR TREND IN SAN FRANCISCO BAY AREA OZONE LEVELS**



The trends in PM_{10} and $PM_{2.5}$ concentrations are shown below in Figure 11-2. PM_{10} levels have increased slightly during the past 10 years. Many of the sources that contribute to ozone formation also lead to PM_{10} formation through chemical reactions in the atmosphere. These secondary particulates contribute to overall PM_{10} and $PM_{2.5}$ concentrations, so efforts to reduce ozone precursor emissions should also provide some reduction to PM_{10} and $PM_{2.5}$ concentrations.

FIGURE 11-2 **15-YEAR TREND IN SAN FRANCISCO BAY AREA ANNUAL PM_{10} AND $PM_{2.5}$ LEVELS**