Triennial Assessment and Plan Update

07-13- 2016

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Triennial Assessment and Plan Update

Prepared for:

California Air Resources Board

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Yolo-Solano Air Quality Management District

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Executive Summary

The California Clean Air Act (CCAA) of 1988 requires submission of a plan for attaining and maintaining state ambient air quality standards for ozone with subsequent updates every three years. This Triennial Assessment and Plan Update (Plan) discusses the progress the Yolo-Solano Air Quality Management District (District) has made towards improving the air quality in its jurisdiction since its last Triennial Plan Update, which addressed the 2009-2011 time period. This Plan will examine the years 2012-2014.

This is the seventh update to the District's original 1992 Air Quality Attainment Plan (AQAP) and includes:

- Information about emission reductions achieved during the 2012-2014 period,
- District emission inventory and emission forecasts,
- Air quality data and analysis of air quality trends through 2014, and
- Proposed commitments for the 2015 - 2017 period.

The State has set two health-based standards for ozone. The 1-hour standard is exceeded when monitored ground-level ozone exceeds 0.09 parts per million (ppm) during a one hour period. The 8-hour standard is exceeded when levels exceed 0.070 parts per million over any 8-hour period. From 2012 to 2014, the State 1-hour standard was only exceeded once at monitoring stations located within the District. The 8-hour standard was exceeded on 13 days over the same 3-year time period. Examining the actual number of exceedances of State standards over time, the District has shown a steady improvement in air quality. This improvement is also evident when looking at ozone exposure indicators over the last 20 years.

The CCAA requires air districts to adopt all feasible control measures. The District has conducted an "all feasible measure" analysis for ozone control measures as part of the prior federal planning process for ozone. The District believes that this analysis represents the most up-to-date information currently available and is adequate for the all feasible measures requirement for this Triennial Plan update. The District is scheduled to adopt several control measures over the next few years. These rule amendments will achieve additional reductions in the emissions of ozone precursors.

The ozone trend analysis indicates that even with the adoption of new control measures scheduled for adoption by the District through 2020, the District will still need to rely heavily on mobile source control measures implemented by the State to make significant further progress towards achieving the state ozone standard.

The District is not required to prepare an attainment plan for particulate matter measuring 10 microns and less in diameter (PM_{10}) or 2.5 microns and less in diameter ($PM_{2.5}$). However, the District continues to work to reduce particulate emissions through rules affecting stationary sources, the construction industry, and the District's agricultural burning program. The District also works with the California Air Resources Board (ARB) to

identify measures that can, where possible, reduce both ozone and particulate emissions. The District has been proactive in its attempt to implement the most readily available, feasible, and cost-effective measures that can be employed to reduce emissions of particulate matter (PM).

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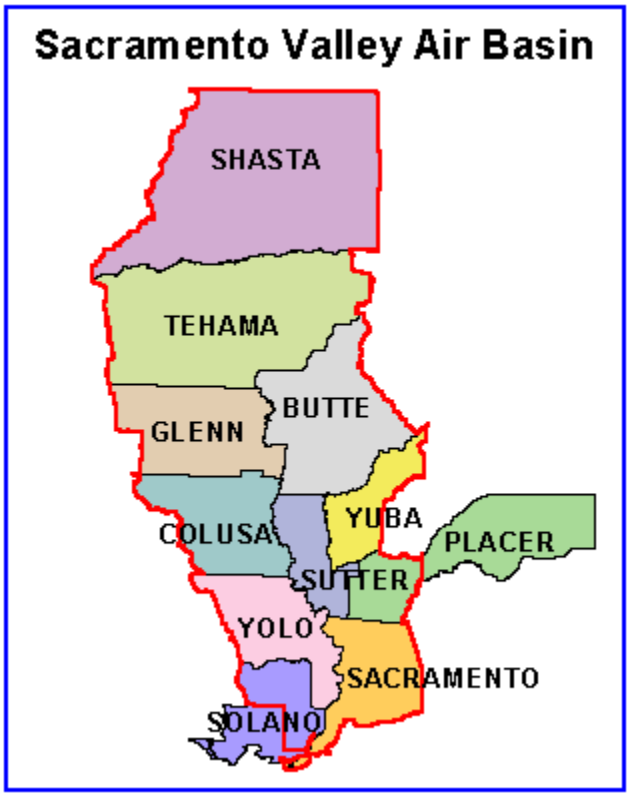
1. INTRODUCTION

The Yolo-Solano Air Quality Management District (District) is one of 35 air districts in California that were established to protect air quality. The District includes Yolo County and the northeastern portion of Solano County. Figures 1 and 2 illustrate the District's jurisdiction in relation to the Sacramento Valley Air Basin.

Figure 1: Sacramento Valley Air Basin[1]



The District is responsible for achieving and maintaining healthful air quality for its residents. This is accomplished by establishing and enforcing air pollution control rules and regulations in order to attain all state and federal ambient air quality standards and limit public exposure to airborne toxins and nuisance odors. Although the District does not have direct jurisdiction over mobile source emissions, the District does provide some financial incentives and employs public education campaigns to encourage mobile source reductions.

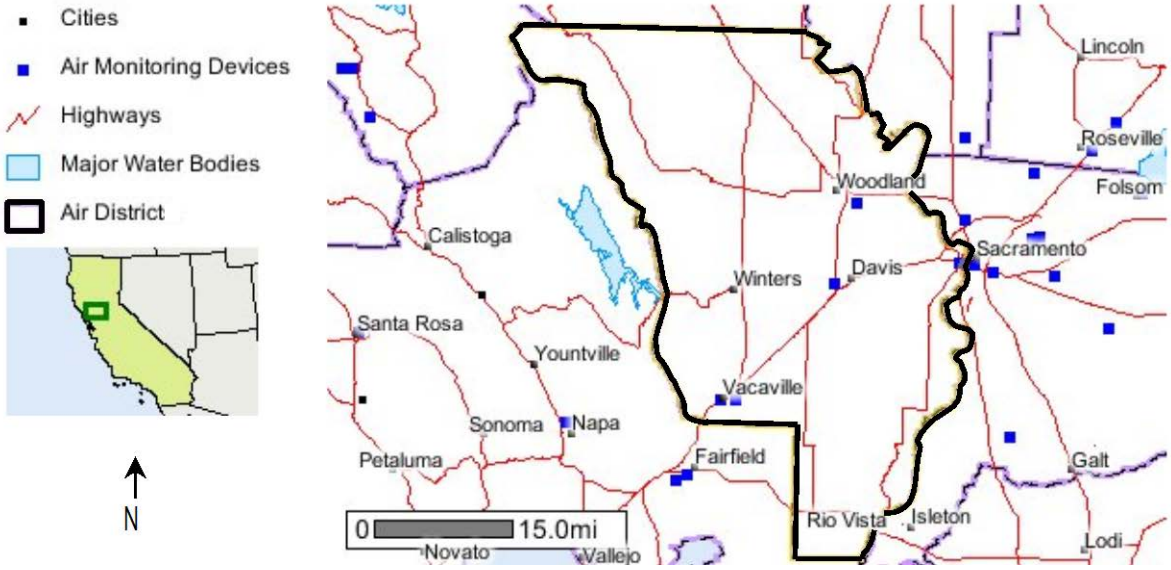
The California Clean Air Act (CCAA) includes provisions requiring areas to attain State ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulate matter (PM_{10} and $PM_{2.5}$). The District has attained each of these standards, with the exceptions of ozone and the particulates. The CCAA includes provisions requiring

[1] Source: http:/www.arb.ca.gov/maps/basinmap.jpg

areas that have not attained State ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, to prepare plans to attain these standards by the earliest practicable date.[2] A plan for particulates is not required.

Accordingly, the District's original Air Quality Attainment Plan (AQAP) was developed pursuant to the CCAA requirements and identified feasible emission control measures to provide for expeditious progress towards attaining the State ozone standard. The District's Board of Directors adopted the AQAP on February 19, 1992 and the Air Resources Board (ARB) approved it on May 28, 1992. The District updated the AQAP by the end of 1994 and is required to provide reports once every three years thereafter describing the progress the District has made towards attaining the state standard. Control measures included in the original AQAP and all AQAP updates focus on emission sources under the District's authority, specifically stationary emission sources[3] and some area-wide sources[4].

Figure 2: YSAQMD Jurisdiction[5]



1.1 Ozone

At certain levels, ozone can impact lung function by irritating and damaging the respiratory system. Ozone can also be harmful to crops and vegetation and can damage rubber, plastic, and other materials. Ozone is not a directly emitted pollutant, but is formed in the atmosphere by certain "precursor" pollutants. Consequently, the pollutants addressed by

[2] California Health and Safety Code (H&SC) §40911(a)
[3] Examples of stationary sources include power plants, manufacturing and industrial facilities, stationary internal combustion engines, gas stations, landfills, and solvent cleaning and surface coating operations.
[4] Area-wide emission sources are individually small and are spread over a wide area. They are mostly residential sources, including water heaters, furnaces, architectural coatings, and consumer products.
[5] Source: ARB CHAPIS website

the AQAP are the ozone precursors, reactive organic gases (ROG) and oxides of nitrogen (NOx).

In 1988, the ARB adopted a 1-hour ozone standard of 0.09 parts per million (or 180 μg/m^3). In 1997, the ARB assigned designations to individual counties for this standard, and the District was determined to be in nonattainment. On July 26, 2007, the State adopted a more stringent 8-hour ozone standard of 0.070 ppm (or 137 μg/m3) in addition to the 1-hour standard. This new 8-hour standard was developed in part to achieve greater protection for sensitive groups. The District was found to be in nonattainment of the standard by the ARB.

1.2 Particulate Matter (PM)

Particulate matter (PM) larger than 2.5 microns and less than 10 microns, often referred to as coarse PM, is mostly produced in the District by automobile tire wear, industrial processes such as cutting and grinding, and suspension of particles from the ground or road surfaces by wind and human activities such as vehicle operation, construction or agriculture.

In contrast, PM less than or equal to 2.5 microns in diameter (fine PM or $PM_{2.5}$) is mostly derived from fuel combustion sources, such as automobiles, trucks, and other vehicle exhaust, as well as from stationary combustion sources. The particles can be either directly emitted or formed secondarily in the atmosphere when gases such as NOx and sulfur oxides (SOx) combine with ammonia.

When the California Legislature passed the CCAA in 1988, it recognized the difficulty in managing PM. Therefore, State law does not require attainment plans for State PM standards. Even so, PM emissions are being reduced through enforcement of District rules, technological advancements in industry, and implementation of agricultural burning programs. In addition, pursuant to Senate Bill 656 (SB656) requirements, ARB and the local air districts have developed a list of the most readily available, feasible, and cost-effective control measures that could be employed to reduce PM emissions. The list of measures to be implemented in the District was adopted by the District's Board of Directors in July 2005. The District has adopted many of the measures originally included on the list.

1.3 Requirements of the CCAA

The CCAA requires an air quality strategy that will achieve a five percent average annual ozone precursor emission reduction or, if that is not achievable, an expeditious schedule or adopting every feasible emission control measure under air district purview (H&SC §40914).[6]

[6] The term "feasible" is not specifically defined in the CCAA. However, the statutory criteria for assessing a potential control measure include cost effectiveness, technological feasibility, total emission reduction potential, the rate of emission reduction, public acceptability, and enforceability [H&SC 40922(a)].

This Plan Update addresses the progress the District has made towards achieving the 1-hour and 8-hour ozone California Ambient Air Quality Standards (CAAQS). The Plan complies with all of the following applicable progress report and plan revision requirements of the CCAA:

- Assess the extent of ozone air quality improvement achieved during the preceding three years,[7]
- Describe rates of total emission reductions over the preceding three years and incorporate updated projections of population, industry, and vehicle-related emissions growth,[8]
- Identify the proposed and actual dates for adopting and implementing District control measures,[9] and compare the expected emission reductions for each control measure to a newly revised estimate,[10]
- Include an updated schedule for expeditiously adopting every feasible control measure for emission sources under District purview,[11]
- Include an assessment of the cost-effectiveness of available and proposed control measures and contain a list which ranks the control measures from the least cost-effective to the most cost-effective,[12] and
- Determine whether a State-mandated, no-net-increase permitting program (i.e., State emission offset requirements) is necessary to achieve and maintain the State ozone standard by the earliest practicable date.[13]

Additionally, pursuant to ARB guidance, this Plan includes sections that:

- Summarize the existing financial incentive programs for reducing emissions,
- Discuss the District's schedule to have the same "no net increase" program as our downwind Districts in order to mitigate transport emissions,
- Document trends in air quality using air quality indicators, and
- Provide a long-term view of emissions projections for future years by four primary source sectors (stationary, area-wide, on- and off-road mobile sources).

The second, third, and fourth Triennial Progress Reports were completed in 1997, 2000, and 2003 respectively. The fifth Report combined years 2003-2008 and was completed in 2010. The 2010 report incorporated conclusions from the Sacramento Federal Nonattainment Area's (SFNA's) 2008 federal ozone plan which was prepared to address a new 8-hour ozone NAAQS. The report covering the 2009-2011 time period was adopted by the District Board of Directors in April of 2013. All of the Triennial Progress Reports have concluded that the District has continued to show air quality improvements and continued

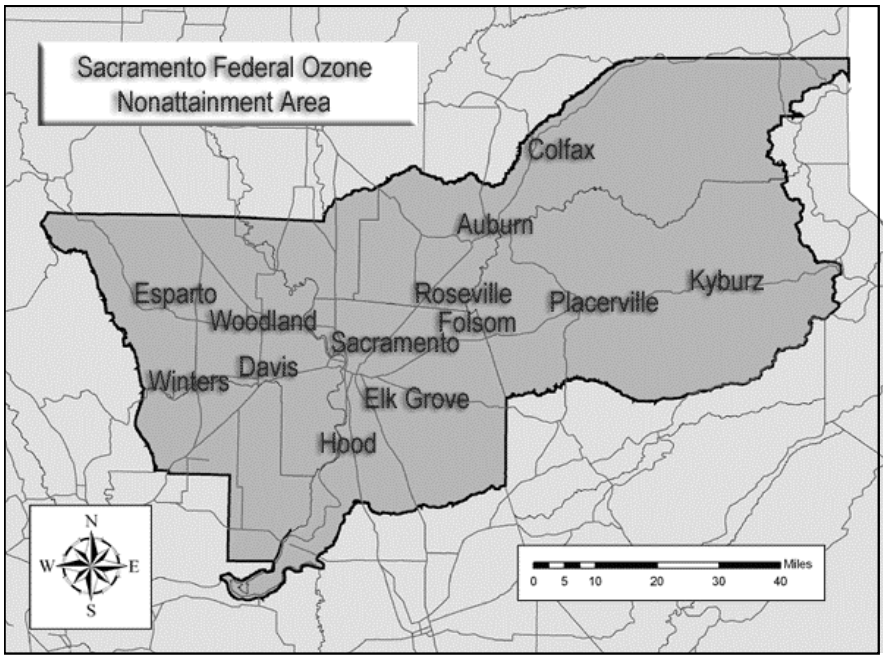
[7] H&SC §40924(b)(1)
[8] H&SC §40925(a)
[9] H&SC §40924(a)
[10] H&SC §40924(b)(2)
[11] H&SC §40914(b)(2)
[12] H&SC §40922(a)
[13] H&SC §40918.6

to consider, review, and adopt additional control measures where appropriate. This report is the seventh update.

1.4 Federal Clean Air Act (FCAA)

Prior to development of the state's regulation of air quality, the Federal Clean Air Act (FCAA) established national ambient air quality standards (NAAQS) and requirements with respect to criteria air pollutants. One of the requirements of the FCAA that applies to areas that violate the NAAQS is the requirement for designated non-attainment areas to create attainment plans. These plans must describe the efforts that will be employed to meet the NAAQS. The District is included in the Sacramento Federal Non-attainment Area (SFNA) for ozone. Figure 3 illustrates the boundaries of the SFNA which were designated by the EPA. Attainment plans, which are typically submitted by each non-attainment region, are included as part of an overall State Implementation Plan (SIP).

Figure 3: Sacramento Federal Ozone Non-attainment Area[14]



Due to violations of the national one-hour ozone standard, the SFNA was required to develop a SIP which was submitted to the EPA in 1994. The SIP was deemed by ARB to fulfill the requirements for the first Triennial Progress Report.

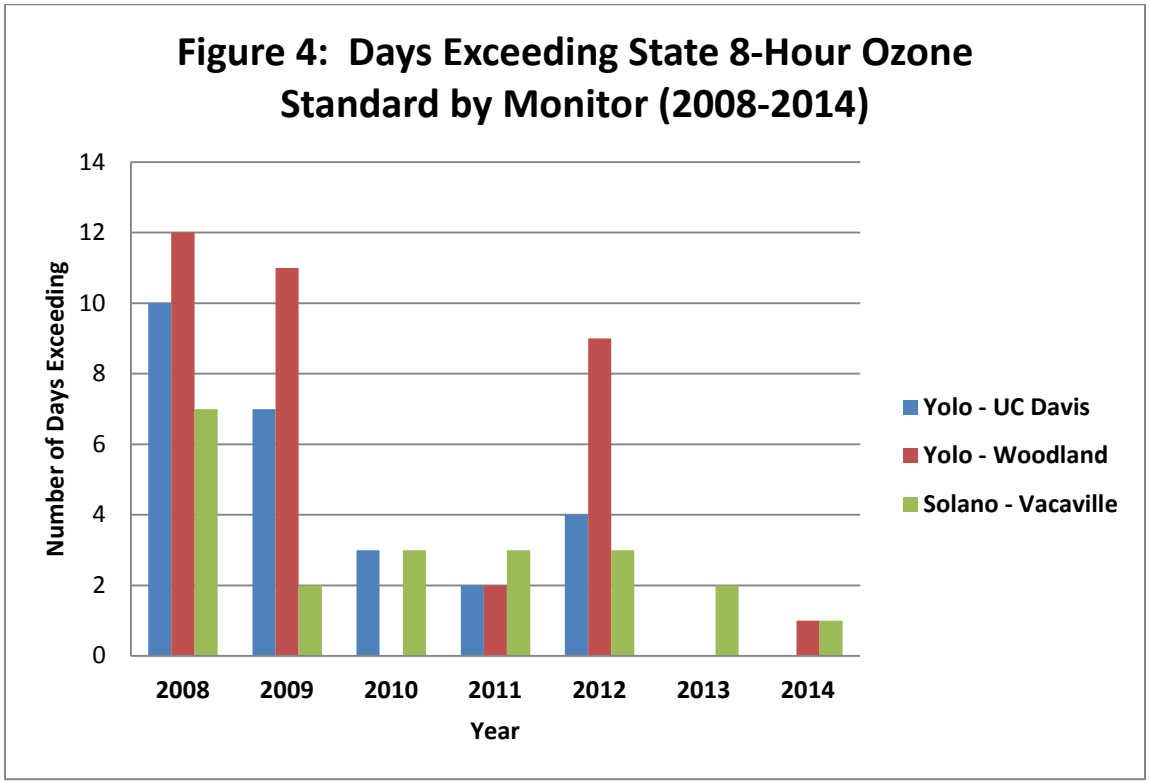
[14] Source: 2002 Milestone Report – SFNA represented by heavy shaded area

2. OZONE AIR QUALITY TRENDS

State law requires the triennial assessment of ozone air quality improvements achieved during the preceding three years to be based on ambient pollutant measurements and air quality indicators.[15] Accurate, real-time measurements of ambient air pollution, including ozone, are collected throughout the District at several sites to identify the status and trend of ambient air quality in Yolo and northeast Solano Counties. Appendix B shows the locations of monitoring stations operating in the District which satisfy the federal government's published standards for monitor siting and quality assurance. Three stations in the District monitor for ozone and were used for the purposes of this report: Davis (UCD Campus), Woodland (Gibson Road), and Vacaville (Ulatis Road).

2.1 Ozone Exceedance Trends

The ozone trends for Yolo and northeast Solano Counties are presented in Figure 4, which identifies the number of days the State 8-hour ozone standard was exceeded between 2008 and 2014. An exceedance of the 8-hour ozone standard occurs when the monitored ambient concentration level is 0.070 ppm or greater over an 8-hour period.



- Data for 2008 excludes days for which an exceptional events request was approved by EPA due to wildfires.

[15] H&SC Section 40924(b)(1)

As shown in Figure 4, ozone concentrations have been trending downward since 2008, and the general pattern suggests that the worst years for air quality are becoming less severe while the best air quality years are becoming cleaner.

Section 40925.5 of the California Health and Safety Code specifies that an air district "which is nonattainment for the state ozone standard shall be designated 'nonattainment-transitional' by operation of law if, during a single calendar year, the state standard is not exceeded more than three times at any monitoring location within the district." As shown in Figure 4, the District met these criteria for the State one-hour ozone standard in 2012, 2013, and 2014. The District also met these criteria for the 8-hour ozone standard in 2013 and 2014.

2.2 Other Ozone Improvement Indicators

In addition to the actual number of ozone exceedances that have been observed over time, other statistical indicators can be used to assess air quality improvements for ozone based on the monitored air quality data. These indicators include: 1) population-weighted ozone exposure, 2) area-weighted ozone exposure, and 3) Expected Peak Day Concentrations (EPDC). These indicators are discussed in response to recommendations in guidance produced by ARB.

2.2.1 Exposure Indicators: Population-Weighted Exposure

The population-weighted exposure indicator consolidates hourly ozone monitoring data from all sites within the District into a single exposure value. The result is a value representing the average potential exposure in the District. The purpose of the population-weighted ozone indicator is to characterize the potential average outdoor exposure per person to concentrations above the State ozone standard. The calculation methodology assumes that an "exposure" occurs when a person experiences a 1-hour concentration outdoors that is higher than 0.09 ppm, the level of the State standard. It is reported in terms of parts per million-hours (ppm-hours) for each year. Population-weighted ozone exposure is a good indicator of the extent and severity of the ozone problem for human health because it indicates whether relatively few people or many people are being exposed to unhealthful ozone levels and for how long. Table 1 shows the population-weighted exposure indicators for the years 2012, 2013, and 2014. As can be seen from the table, population-weighted ozone exposure decreased significantly after 2012.

Table 1: Population-Weighted Ozone Exposure Indictors

	1-Hour Ozone	8-Hour Ozone
2012	**0.0048**	**0.0008**
2013	**0.0000**	**0.0000**
2014	**0.0000**	**0.0000**

2.2.2 Exposure Indicators: Area-Weighted Exposure

Area-weighted ozone exposure is similar to population-weighted exposure except that all areas are equally influential, regardless of the local population. Because rural and urban areas receive equal weight, the area-weighted exposure indicator is a more appropriate estimate of the exposure of crops and vegetation to the damaging effects of ozone. Table 2 shows the area-weighted exposure indicators for the years 2012, 2013, and 2014. As with population-weighted exposure, area-weighted exposure decreased significantly after 2012.

Table 2: Area-Weighted Ozone Exposure Indictors

	1-Hour Ozone	8-Hour Ozone
2012	**0.215**	**0.158**
2013	**0.005**	**0.001**
2014	**0.007**	**0.000**

2.2.3 Expected Peak Day Concentration

Another useful statistical indicator that can be used to assess improvement in air quality is the Expected Peak Day Concentration (EPDC). The EPDC tracks progress in reducing daily 1-hour and 8-hour ozone concentrations at each monitoring site. This indicator represents the potential worst-case for exposure to ozone and acute adverse health impacts. The EPDC represents a statistically derived value that reflects the concentration expected to be exceeded once per year, on average, based on the distribution of data for a particular monitoring location.

The September 1993 ARB staff report entitled: "Guidance for Using Air Quality-Related Indicators in Reporting Progress in Attaining the State Ambient Air Quality Standards," identifies the EPDC as the best indicator for tracking progress at locations in a non-attainment area.

A goal of the planning process is for all EPDCs in the District's network to be below the standard because that is when the District will likely become an attainment area for the State standard.

Figures 5 through 10 display the 1-hour and 8-hour ozone EPDC values and the corresponding yearly trends for the District's ozone monitoring sites. Overall there have been variations in the EPDC values at each site with both increasing and decreasing values. However, the data indicates that there has been a steady trend in decreasing ozone exposures throughout the District since 2000.

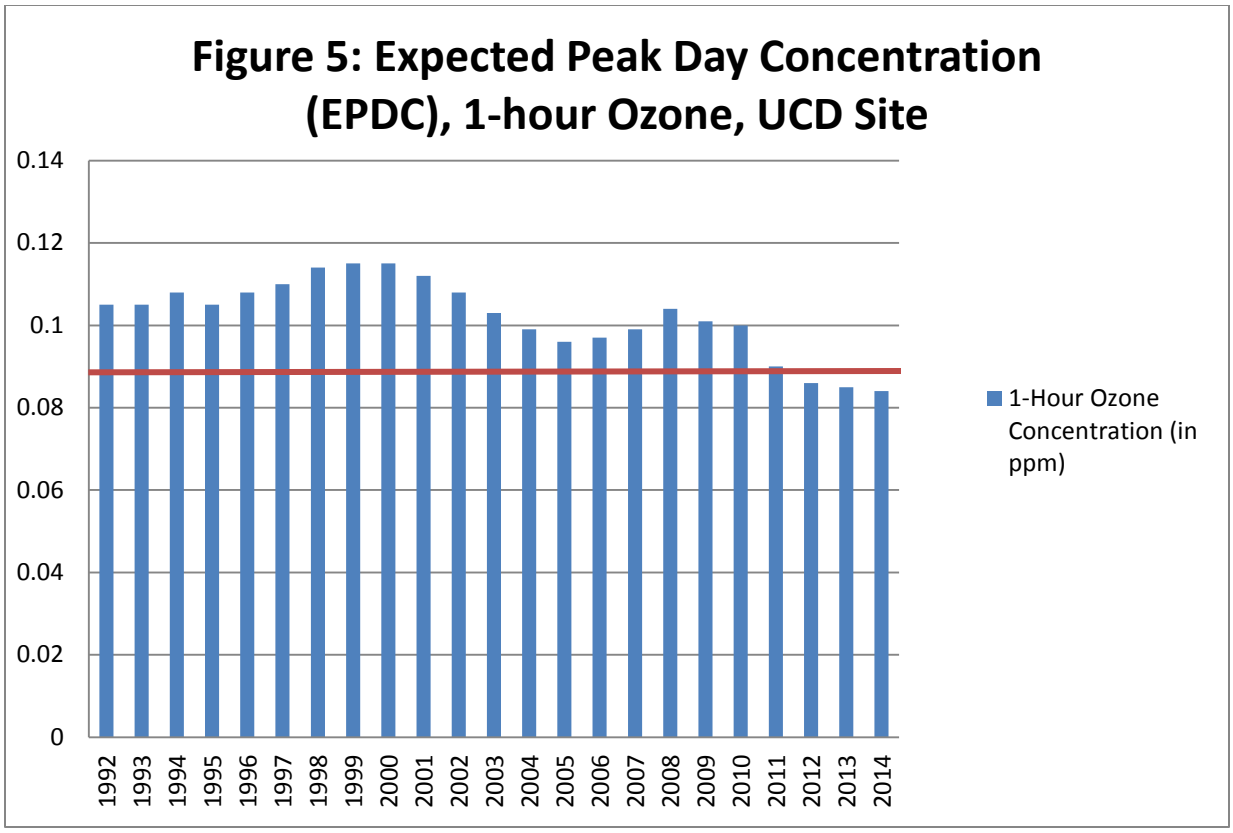


Figure 5: Expected Peak Day Concentration (EPDC), 1-hour Ozone, UCD Site
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
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2011
2012
2013
2014
1-Hour Ozone Concentration (in ppm)

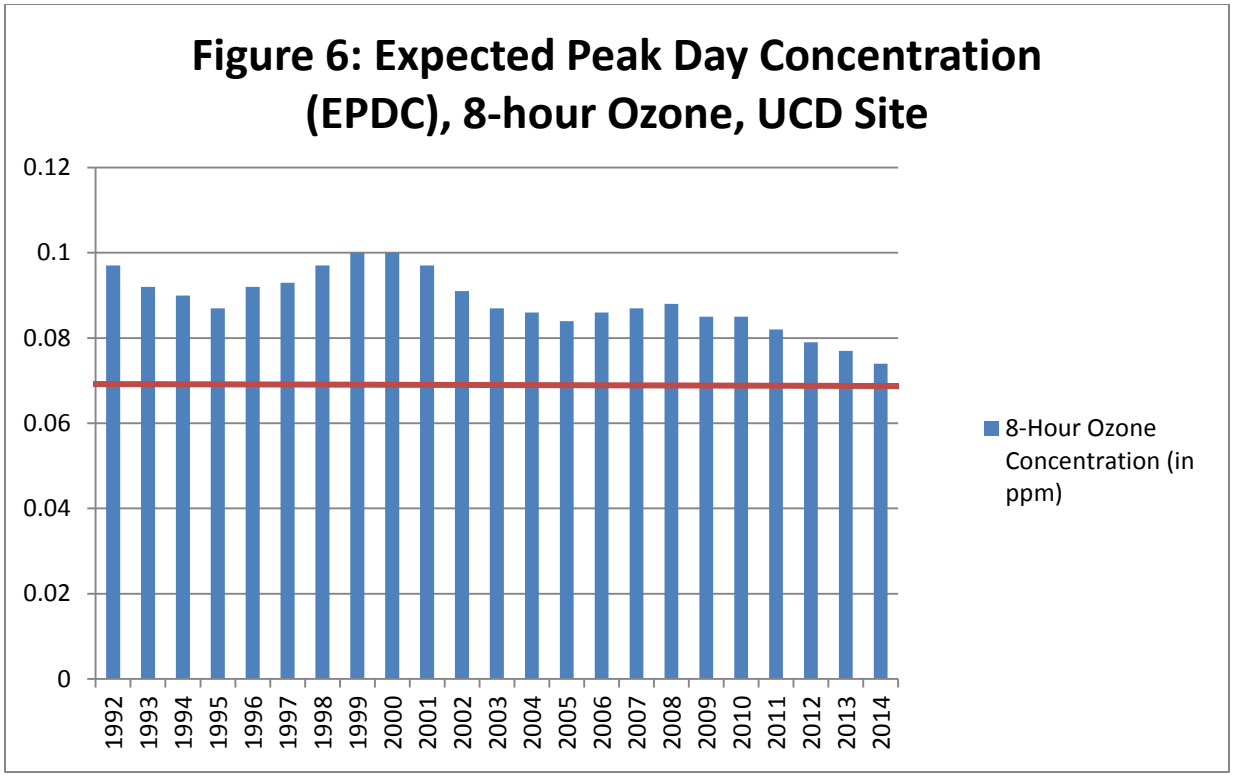
Figure 6: Expected Peak Day Concentration (EPDC), 8-hour Ozone, UCD Site
0.12
0.1
0.08
0.06
0.04
0.02
0
1992
1993
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1995
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2007
2008
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2010
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2012
2013
2014
8-Hour Ozone Concentration (in ppm)

Figure 7: Expected Peak Day Concentration (EPDC), 1-hour Ozone, Vacaville Site

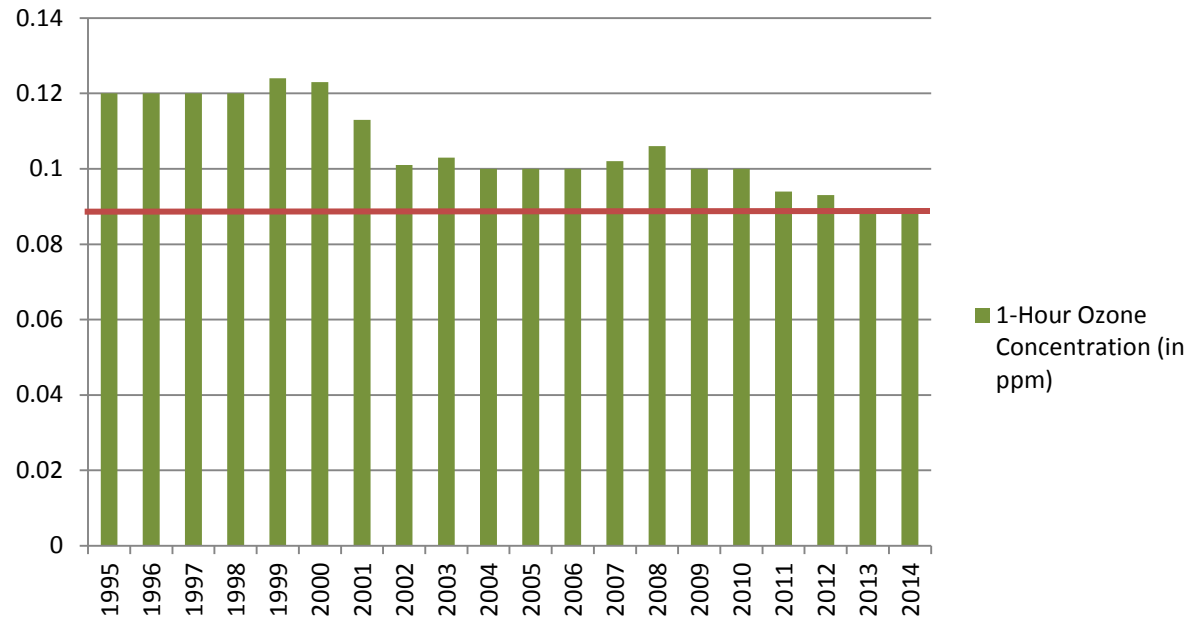
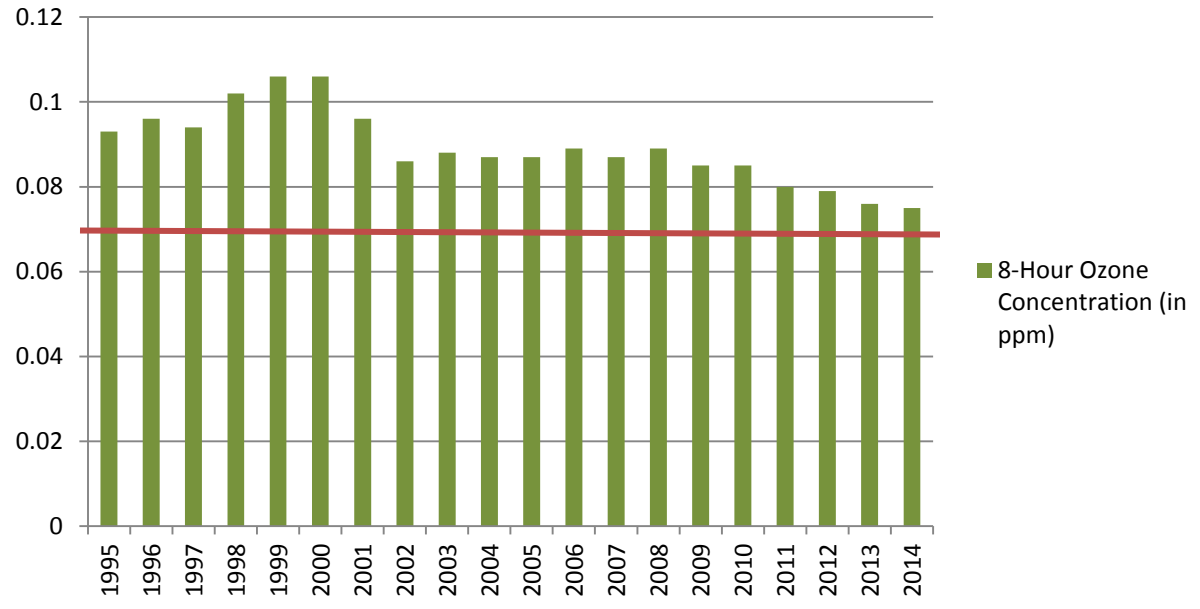


Figure 8: Expected Peak Day Concentration (EPDC), 8-hour Ozone, Vacaville Site



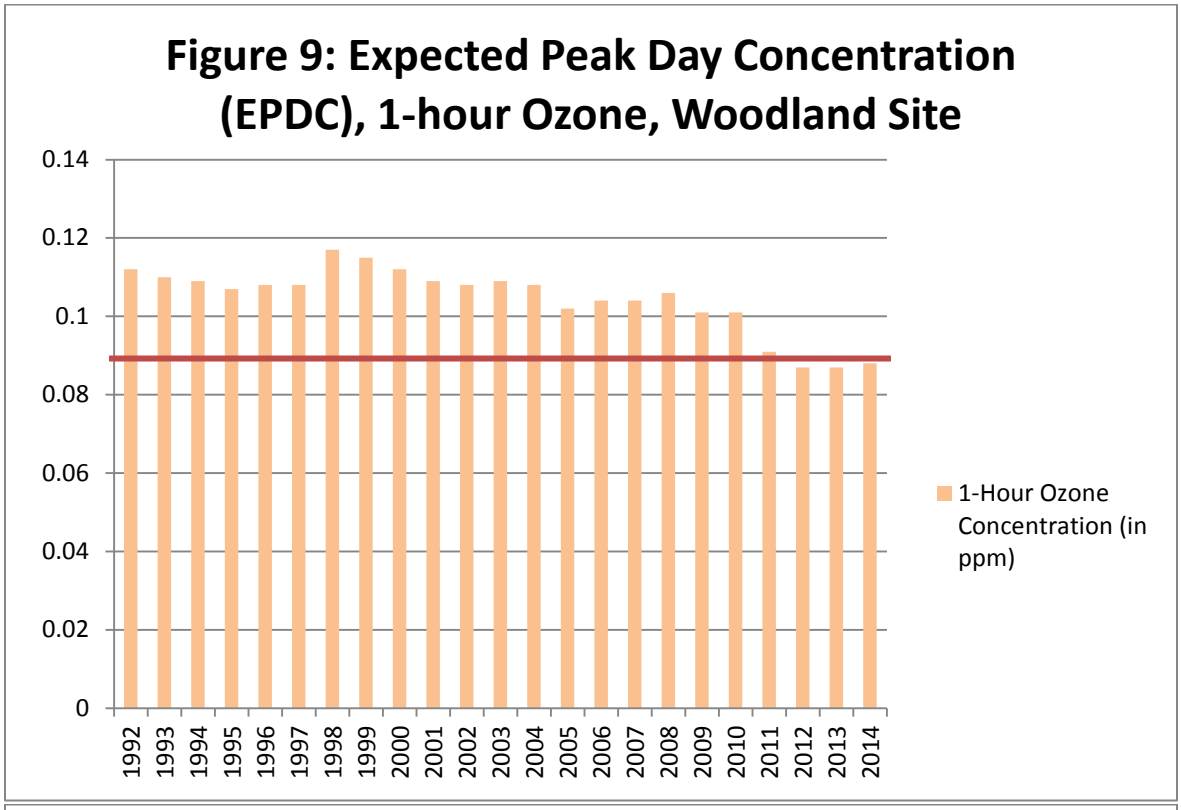


Figure 9: Expected Peak Day Concentration (EPDC), 1-hour Ozone, Woodland Site
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1992
1993
1994
1995
1996
1997
1998
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2002
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2004
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2006
2007
2008
2009
2010
2011
2012
2013
2014
1-Hour Ozone Concentration (in ppm)

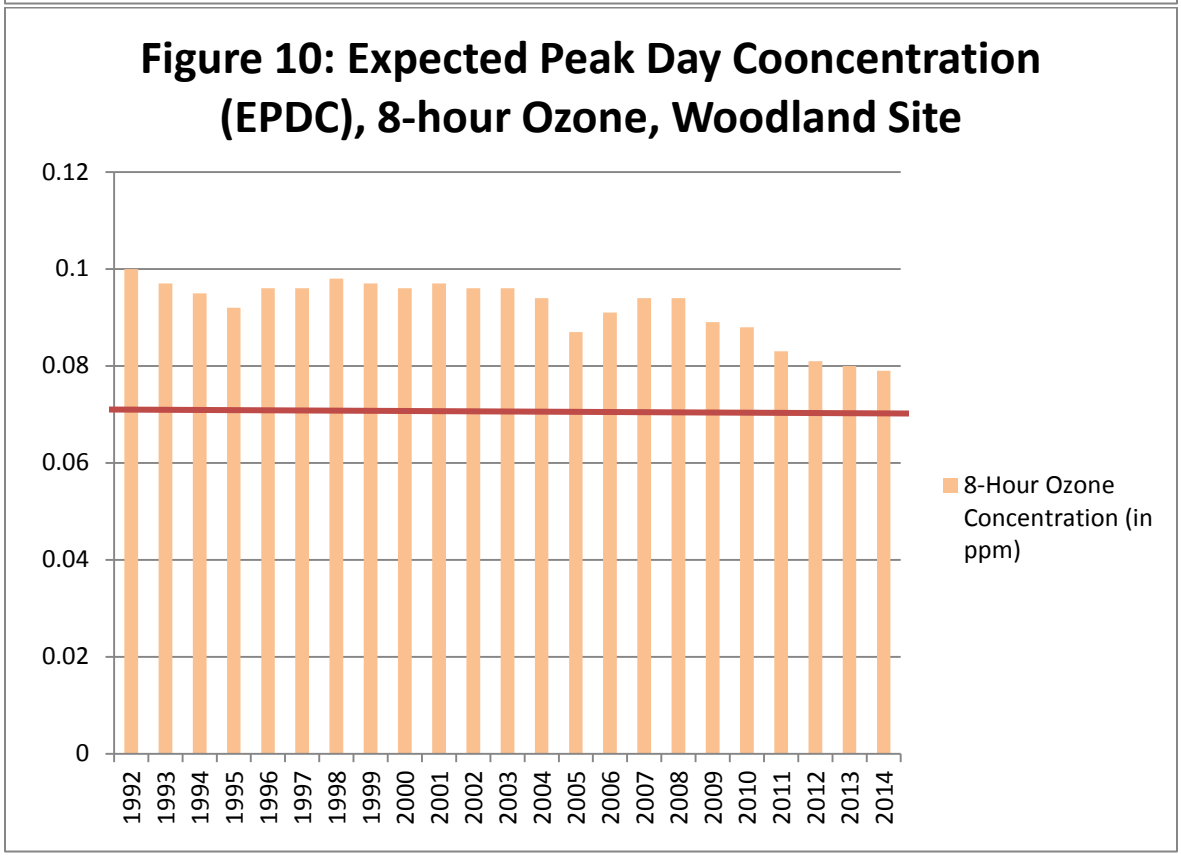


Figure 10: Expected Peak Day Cooncentration (EPDC), 8-hour Ozone, Woodland Site
0.12
0.1
0.08
0.06
0.04
0.02
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
8-Hour Ozone Concentration (in ppm)

3. EMISSION TRENDS

In order to forecast trends in emissions, the District and the ARB develop an emission inventory. The emission inventory is an estimate of ozone precursor pollutants (ROG and NOx) emitted by various sources. Trends in the emission inventory can be used to monitor progress the District is making toward attaining the California ambient ozone standards.

The emission inventory is divided into five major categories. These include stationary, area-wide, on-road mobile, other mobile, and natural source groupings. Stationary sources include facilities at fixed locations such as cogeneration plants or landfills, while "area" sources are composed of individually smaller sources which when aggregated have significant emissions. Architectural coatings (such as house paint) and consumer products are examples of area sources. On-road mobile sources consist of the numerous light and heavy-duty vehicles that travel the streets and highways. Other mobile sources include agricultural and construction equipment, trains, planes, and recreational vehicles. Natural sources include biological and geological sources, wildfires, windblown dust, and biogenic emissions from plants and trees. Within each of these major categories are a number of subcategories. Appendix A shows the inventory at a more detailed level.

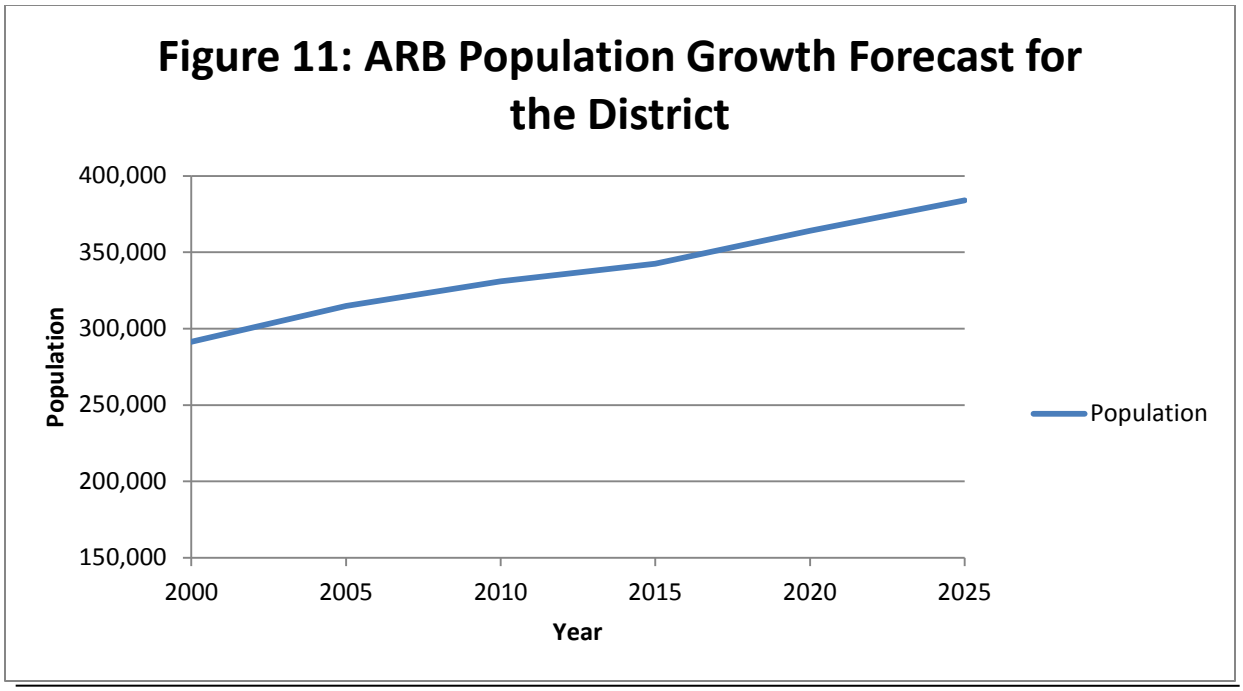
The emission inventory represents estimates of actual emissions that are calculated using reported or estimated process rates and emission factors. For example, motor vehicle emission estimates rely on calculations that include consideration of the fleet mix, vehicles miles traveled, trip starts, speeds, and vehicle emission factors. To derive future-year emission inventories, a current base-year inventory is projected forward in time, based on expected growth rates of population, travel, employment, industrial and commercial activity, and energy use. Reductions from control measures are also accounted for.

As shown in Appendix A, mobile sources are responsible for the majority of ozone precursors emitted in the District. Mobile source emissions are directly related to the overall population and the amount of vehicle miles traveled (VMT).

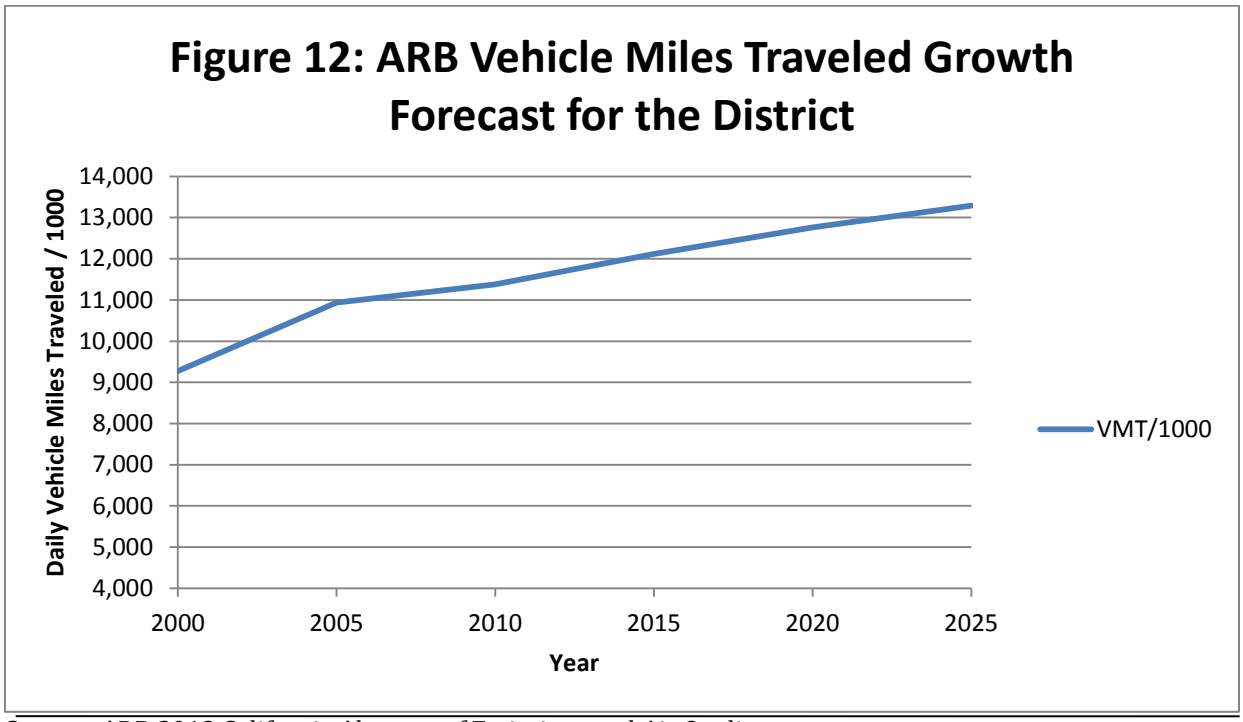
From 2012 to 2014, the District experienced a population growth of less than 1% annually. Population for the District in 2015 is expected to be 342,451. This is in conjunction with an growth in vehicle miles traveled to just under 12 million total miles traveled in 2014. [16]

Figures 11 and 12 show the forecasted growth in population and VMT in the District in future years. As shown, both population and VMT are expected to increase through 2025.

[16] District 2012-2014 estimates for population and vehicle miles traveled are from ARB 2013 California Almanac of Emissions and Air Quality

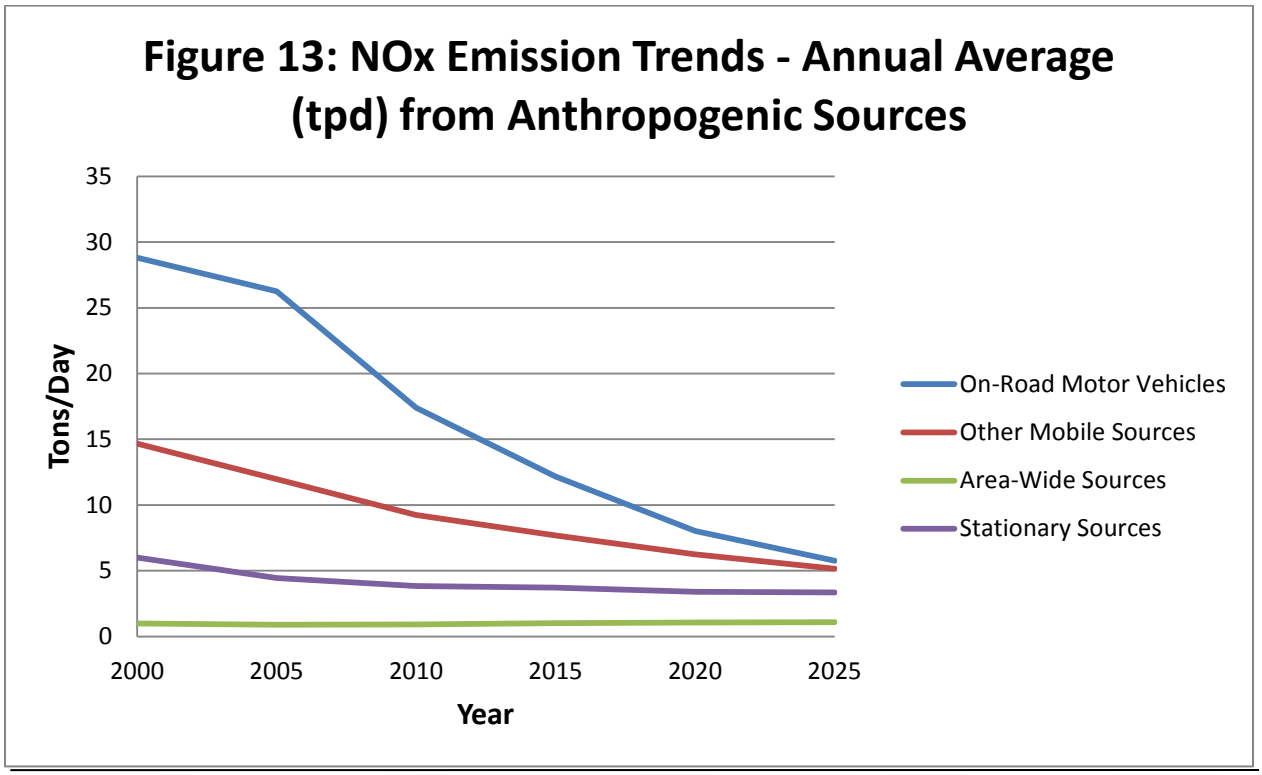


Source: ARB 2013 California Almanac of Emissions and Air Quality



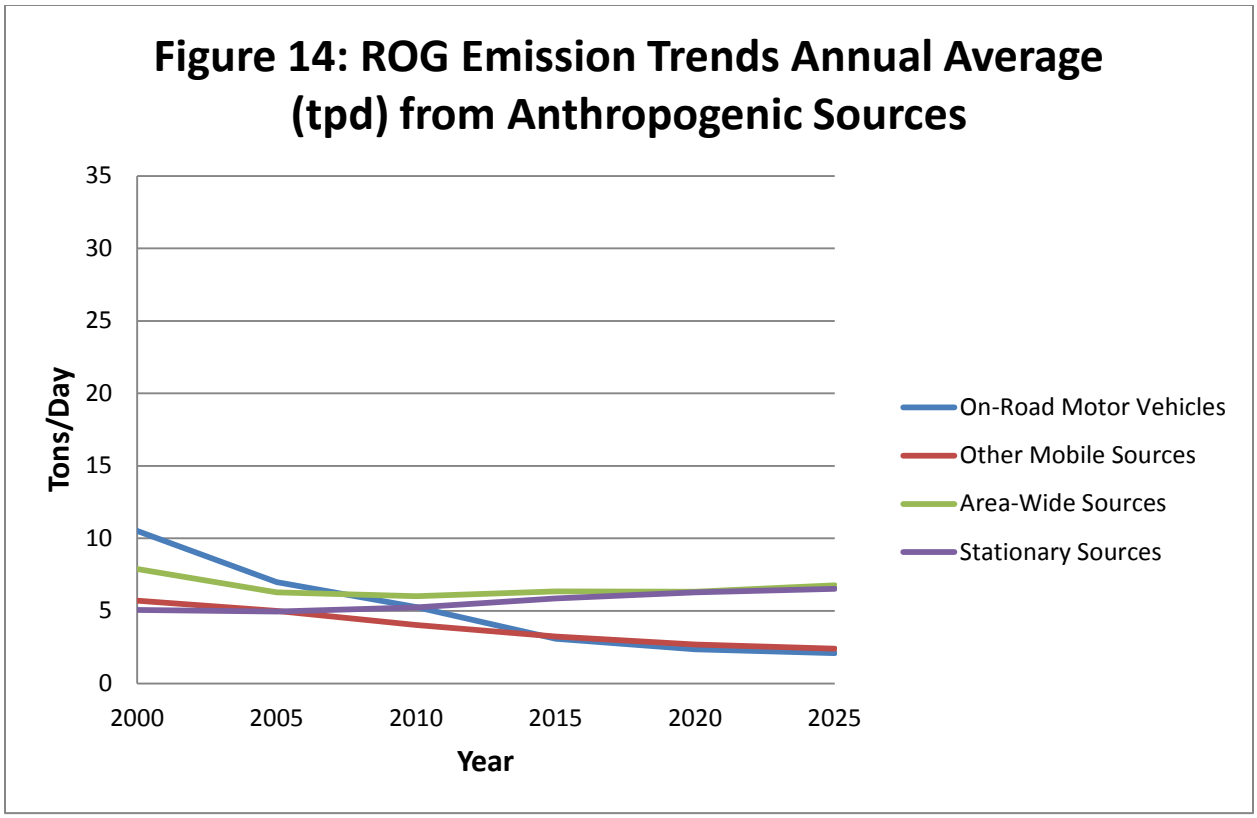
Source: ARB 2013 California Almanac of Emissions and Air Quality

Despite the increasing population and vehicle miles traveled as shown in Figures 11 and 12, the forecasted emission trends show decreases in the overall emission inventory. Figures 13 and 14 show the District's NOx and ROG emission trends, respectively, from anthropogenic (man-made) sources between 2000 and 2025.[17] These emission projections are based on currently adopted control measures and estimated growth forecasts.



Source: ARB's emission inventory website (page last updated 6/13/2013)

[17] Source: ARB's emission inventory website (6/13/2013).



Source: ARB's emission inventory website (page last updated 6/13/2013)

Using a 2000 baseline, ROG emissions are expected to decrease by roughly 40% and NOx emissions are expected to decrease by roughly 70% through 2025. These emissions decreases would occur even though the District's population and vehicle miles traveled are expected to increase roughly 32% and 43%, respectively, over the same time period. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the steady decline in NOx emissions. ROG emissions have been decreasing due to more stringent motor vehicle standards as well, but ROG emissions from cleaning and surface coatings, waste disposal operations and solvent evaporations from consumer products will slightly offset the decreased ROG emissions from motor vehicles.

ROG emissions from stationary sources are mainly due to operations at facilities that involve cleaning and surface coatings, the storage, dispensing, and transfer of petroleum, and industrial processes. The ROG emissions from the area-wide source category are primarily from consumer products and architectural coating solvents. NOx emissions are generated mostly through fuel combustion. The on-road emission estimates referred to in the tables above were developed by ARB using the EMFAC2011 emissions model. EMFAC estimates emissions from a wide variety of on-road motor vehicle types ranging from light duty passenger autos to heavy-duty urban buses. The most recent version of ARB's EMFAC model is EMFAC 2014. Emission estimates using this newer version will be available for the District's next Plan Update. ARB developed the other mobile emission estimates using the OFFROAD emission model. The OFFROAD model estimates average seasonal daily

emissions from many categories of off-road equipment. This equipment is generally diesel powered. ARB then develops forecasts based on anticipated growth and controls within each equipment category. For the Natural Sources category, ARB estimates emissions of biogenic volatile organic compounds (BVOCs) from vegetation for natural areas, crops, and urban vegetation. BVOC emissions are functions of a species leaf mass, emission factors, temperature, and light conditions.

4. STATIONARY AND AREA SOURCE EMISSION REDUCTION EFFORTS

Over the 2012 – 2014 period, the District has been working to reduce the emission inventory and improve air quality collectively with the other SFNA air districts, ARB, EPA, and local jurisdictions. These efforts have contributed to the SFNA's successful air quality improvements over the past decade. The District will continue to partner with these stakeholders and others to bring about permanent improvements towards cleaner air.

4.1 Reductions from Area-wide and Stationary Sources

The District does not have any direct regulatory control over the mobile source portion of its emission inventory. However, the District does have the authority to adopt rules regulating the stationary and area source portions of the inventory. ARB prepares emission inventories for select years for all emissions categories in their California Emission Projection Analysis Model (CEPAM) emissions inventory database. Table 3 is a comparison of the emissions inventories for area-wide and stationary sources in 2005, 2010 and 2012 for ROG and NOx as reported in CEPAM. Although it is important to reduce both ROG and NOx, NOx has historically been the more important precursor in the SFNA in that one ton of NOx reductions can lower ozone concentrations to a greater extent than one ton of ROG reductions.

Table 3: Emission Inventory Comparison
Area & Stationary Sources Only

	2005 (tons per day)	2010 (tons per day)	2012 (tons per day)
ROG	11.2	11.2	11.3
NOx	5.3	4.7	4.4
Total	**16.5**	**15.9**	**15.7**

The District's emissions inventory for its area and stationary sources indicates that as of 2012, ROG and NOx emissions from area-wide and stationary sources have decreased only slightly since 2005.

4.1.2 Adopted Rules Since the Last Triennial Assessment

Over the 2012 – 2014 time period covered by this triennial assessment, the District has amended Rule 2.22 – Gasoline Dispensing Facilities, Rule 2.21 – Organic Liquid Storage and Transfer, Rule 2.31 – Solvent Cleaning and Degreasing, and Rule 2.34 – Stationary Gas Turbines.

The District is proposing to amend three rules during the 2015 – 2017 time period. These proposed rule amendments are described in Section 8 – All Feasible Measures.

4.1.3 Agricultural Sources

To reduce air contaminant emissions from agricultural sources, California enacted Senate Bill (SB) 700 in 2003. SB 700 eliminated the agricultural operation permit exemption in the California Health and Safety Code. However, while the bill established guidance and required elements for permitting agricultural sources, individual air districts were to determine how to actually implement the provisions of the bill. The District adopted the following rules, shown in Table 4, consistent with SB 700.

Table 4: Senate Bill 700 (SB 700) Rule Adoptions

Rule No.	Control Category	Description	Adoption Date
11.1	Agricultural Operating Permit Program	Requires a District permit for any agricultural source with a potential to emit greater than one half of any applicable emission threshold for a major source	March 9, 2005
11.2	Confined Animal Facilities Permit Program	Requires a District permit for any large Confined Animal Facility (CAF)	June 16, 2006

The District has also adopted Rule 11.3 – Agricultural Engine Registrations to control emissions from agricultural operations. This rule was adopted as a result of the State's Airborne Toxic Control Measure for Stationary Compression Ignition Engines which required every agricultural engine to be registered. The rule applies to agricultural use engines rated at greater than 50 horsepower. Rule 11.3 was adopted in 2008 and revised in 2010.

5. MOBILE SOURCE EMISSION REDUCTION EFFORTS

As discussed in the previous section, the District does not have any direct regulatory control over the mobile source portion of its emission inventory. Nevertheless, providing financial incentives can encourage the accelerated introduction of lower emission mobile-source technologies into the SFNA. Incentive programs can also help to fund projects that reduce traditional vehicle trips and encourage alternative modes of transportation. Incentive programs are implemented either locally by the District, regionally, or sometimes at the State level. Descriptions of recent and ongoing incentive programs in the District are described below.

5.1 District Incentive Programs

The District administers several incentive programs that focus on reducing emissions from the mobile source sector. Programs assist with funding for projects that encourage cleaner on-road and off-road vehicles, alternative fuels, and alternative transportation.

5.1.1 Clean Air Funds Program

In June 1993, the District began its first year of funding outside agency projects using Clean Air Funds (CAF) Program criteria. Public or private agencies, groups, or individuals can apply for funding from the District under this program. Funding for the CAF program is generated through a vehicle registration surcharge of $4.00 per vehicle. In the Solano County portion of the District, AB 8 funds are also used to supplement the CAF program. AB 8 funds are property tax proceeds collected from the northeast portion of Solano County (Dixon, Rio Vista, and Vacaville).

The following list shows the CAF program categories under which projects can receive funding. Projects are funded based on their emission reduction potential, cost-effectiveness, community acceptance and potential for successful implementation.

- Clean Technologies/Low Emission Vehicles
- Alternative Transportation
- Transit Services
- Public Education/Information

5.1.2 Clean Agricultural Equipment and Public Fleet Program

This program was established by the District in 2014 to provide incentives to farmers and public fleet operators to replace older off-road equipment and on-road heavy duty vehicles with new vehicle and equipment using Assembly Bill 923 (AB 923) funds. Eligible project types include the following:

- Off-road, self-propelled agricultural equipment and off-road public and municipal fleet equipment with engines 25 horsepower or greater

- Agricultural and municipal equipment may include tractors, graders, mowers, pavers, rollers, harvesters, combines, balers, forklifts and more.
- On-road public and municipal fleet vehicles with a gross vehicle weight rating (GVRW) of at least 8,501 pounds are also eligible under this program including transit and school buses.

Projects are eligible for reimbursement for up to a maximum of 80 percent of total eligible equipment costs or the District's current cost-effectiveness threshold of $18,030 per ton of emissions reduced, whichever is less. Clean technologies and alternative fuels are encouraged under this program when feasible.

The Clean Agricultural Equipment and Public Fleet Program began at the end of 2014. One older agricultural tractor was replaced with a new tractor in 2014.

5.1.3 Clean School Bus Program

The purpose of the District's Clean School Bus Program is to reduce ROG and NOx, emissions from the operation of school buses in the District. This is accomplished through a combined approach of replacing and retrofitting older high-polluting school buses. The program also seeks to limit exposure of school children to cancer-causing diesel particulate produced by school buses through this same process.

The District's Clean School Bus Program was funded through Assembly Bill 923 (AB 923) and Proposition 1B monies, and was administered consistent with the ARB's Lower Emission School Bus Guidelines. During the 2012 through 2014 time period, the District replaced 10 older high-polluting school buses with new cleaner school buses.

5.2 Regional Incentive Programs

In addition to the incentive programs that are administered locally by the District, regional incentive programs can provide funding for projects within the District as well. Most regional programs are administered by the Sacramento Metropolitan Air Quality Management District (SMAQMD) on behalf of the SFNA. Descriptions of major regional incentive programs are provided below.

5.2.1 Carl Moyer Program

The SMAQMD receives and distributes Carl Moyer funds directly from the ARB on behalf of the SFNA with the exception of southern Sutter County. The SMAQMD provides the incentive money to companies, fleet operators and individuals who are willing to reduce emissions from their heavy-duty vehicles and mobile off-road equipment. The primary purpose of the program is to reduce NOx and PM emissions from heavy-duty diesel engines. Typical Carl Moyer projects include repowering agricultural water pumps, off-road construction and agricultural equipment and replacing, repowering or retrofitting heavy-duty diesel engines in on-road trucks. Projects must achieve an overall project cost effectiveness of no more than $18,262 per weighted ton of NOx, ROG and PM reduction,

calculated in accordance with the program cost effective methodology. Funds are allocated by ARB to air districts based on a combination of population and the district's SIP commitment to heavy-duty vehicle emission reductions.

5.2.2 Sacramento Emergency Clean Air Transportation (SECAT)

The SECAT Program is a partnership between the air districts of the SFNA and SACOG. The program's goal is to reduce harmful emissions from on-road heavy-duty vehicles operating in the SFNA. The program is administered by the SMAQMD.

Eligible types of projects include the following:

- Replacing older, higher polluting vehicles with newer, lower-emission vehicles (Fleet Modernization);
- Purchasing new, low or zero-emitting vehicles;
- Retrofitting existing heavy-duty vehicles with after-treatment systems to reduce NOx; and
- Implementing any other verifiable, enforceable, and cost-effective technology for reducing NOx emissions from heavy-duty on-road vehicles.

The SECAT Program is distinct from the Carl Moyer Program. The key difference is that the SECAT Program is not limited to financing the incremental capital costs of emission control measures, but can also pay for operating costs, facility modifications, out-of-cycle replacement, and financial incentives for participation. Also, the SECAT program may only fund on-road vehicle projects.

5.2.3 SACOG Regional Funding

The Sacramento Area Council of Governments (SACOG) conducts programming rounds every two years to allocate funds to projects based on available apportionments of regional funds. Project applications are solicited from public agencies and their partners located in the SACOG region. All funding programs except Regional Active Transportation Program (ATP) are limited to projects located within Sacramento, Sutter, Yolo and Yuba counties. Projects funded under these programs have helped to improve bicycle and pedestrian infrastructure and generally encourage alternative modes of transportation. Projects within the District that have been funded over the last several years include the following:

- Sacramento Metropolitan Air Quality Management District Bike Share – The project funds an initial bike share system in three cities (Davis, Sacramento, and West Sacramento).
- City of Woodland East Main Street Improvements – Improvements to East Main Street included the construction of sidewalks, Class II bike lanes, bus turnouts, and safety improvements.

- Madison Bus Stop Improvements – The Yolo County Transportation District, in cooperation with Yolo County, received funding to design and construct a relocated bus stop serving the town of Madison.

5.3 State and Federal Incentive Funding

Federal funds are also spent within the District on projects that are designed to accrue emission reductions from the mobile source sector. Federal funds are primarily distributed to jurisdictions and local agencies within the District through the Congestion Mitigation and Air Quality Improvement (CMAQ) program. CMAQ was created under the federal Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, continued under the Transportation Equity Act for the 21st Century (TEA-21), and reauthorized by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) through 2009. The current federal surface transportation act is known as MAP-21, which reauthorizes the CMAQ program.

The purpose of the CMAQ program is to fund transportation projects or programs that will contribute to attainment or maintenance of the national ambient air quality standards (NAAQS) for ozone, CO and PM. The CMAQ program supports two important goals: improving air quality and relieving congestion. CMAQ funds must be used for projects such as transit improvements, high-occupancy vehicle lanes, ridesharing services, public education and information, pedestrian and bicycle programs or technology-based programs that reduce emissions from on-road motor vehicle engines. CMAQ funds cannot be used for projects that increase the transportation system's capacity for single-occupant vehicles.

Federal CMAQ funds were allocated to states, and ultimately to local regions, based on population and air quality needs. As the federally designated Metropolitan Planning Organization, SACOG is responsible for determining which local projects receive CMAQ funding in Yolo County. For the District's portion of Solano County, CMAQ funds are distributed through a process administered by the Solano Transportation Authority (STA). The District participates in selecting projects that receive CMAQ funding during the applicable public review processes.

Much of the CMAQ funds allocated within the District were used as matching funds for a variety of air quality projects and programs, including those funded under the District's CAF program, as well as projects funded under the SECAT component of the SMAQMD Heavy Duty Low Emission Vehicle Incentive Program.

5.4 Transportation Control Measures

The CCAA defines transportation control measures (TCM's) as "… any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions."[18] The District coordinates with the regional

[18] H&SC §40717(g)

transportation agencies such as Yolo County Transportation District (YCTD), Solano Transportation Authority (STA), and Sacramento Area Council of Governments (SACOG) to implement reasonable measures to reduce emissions from vehicles. This coordinated effort is producing emission reductions that will help to achieve the State health-based ambient air quality standards and the mandates of the CCAA.

YoloBus (Yolo County), Unitrans (Davis), City Coach (Vacaville), Delta Breeze (Rio Vista) and Fairfield-Suisun Transit operate all the fixed route bus services in the District. Readi-Ride provides curbside bus service in Dixon. Collectively, these bus services provide opportunities for alternative travel by servicing school trips, commuter trips, and providing links to paratransit services, Capitol Corridor passenger rail, Bay Area Rapid Transit, Baylink ferry, and the Sacramento International Airport. Ridership has generally increased for these transit services over time.

The Yolo Transportation Management Association and Solano Napa Commuter Information implement Transportation Demand Management by offering personalized assistance for traveling around Yolo and Solano Counties and cities in neighboring counties. They proactively support programs that are intended to encourage alternative modes of transportation.

The District supports these programs as part of its overall mission to improve air quality. Examples of TCM programs for which the District has provided financial support over the past several years include:

- YoloBus Summer Sizzler (discounted youth transit passes)
- Solano Transportation Authority Safe Routes to School Education, Encouragement and Safety Program
- Woodland Bike Campaign Folding Bike Loan Program
- City of Davis Street Smarts Program
- City of Vacaville / League of American Bicyclists Smart Cycling Program

Examples of bicycle, pedestrian and alternative transportation projects for which the District provided financial supported include:

- Solano County Vacaville-Dixon Bikeway Phase 5
- City of Vacaville Safe Routes to School Improvement Project
- Solano County Putah Creek Road Bicycle Safety Improvement Project

5.5 Reductions Related to CEQA and Land Use

District staff works with land use jurisdictions to implement air quality mitigation measures for projects under the California Environmental Quality Act. Through this process, the District can realize ROG and NOx reductions by encouraging project design features that promote walking, biking, and transit and which can help to reduce total VMT. While mitigations that are implemented by land use projects as a result of the CEQA

process do reduce emissions of the ozone precursors, they are difficult to quantify with any real accuracy. Also, mitigations related to site design do not accrue large up-front benefits but do continue to accrue benefits over the entire life of a project.

6. PUBLIC OUTREACH PROGRAMS

As a required element under the District's AQAP, the District continues to support public outreach programs within Yolo and Solano counties. This includes a wide range of both regional and local efforts to reduce the emissions of ozone precursors and to make the public aware of air quality conditions on a daily basis. These efforts include:

- **The Sacramento Spare the Air Campaign:** The District participates in the regional "Spare the Air" campaign in coordination with the Sacramento Metropolitan AQMD and the other members of the SFNA. The campaign is an emission-reduction and public awareness initiative running in excess of two decades with the intent of affecting behavior change on a regional basis.

  There are major pieces of the Spare The Air message – a seasonal drive for residents and businesses to reduce vehicle trips during the peak ozone season to decrease total ozone precursor emissions generally, and a peak-day reduction call to action to reduce the number of exceedances of the federal 24-hour ozone standard.

  The seasonal campaign encouraged residents and businesses to reduce their emission throughout the peak ozone season by choosing clean transportation options. This includes promotion of bicycling, walking, carpools, transit and zero-emission vehicle adoption. According to survey data from the most recently completed season (2014), 31 percent of Sacramento region residents reduce their driving in the summer to help protect air quality.

  The peak-day reduction call to action makes a direct request to residents and businesses when ozone levels are forecast to be higher. Through media buys and other avenues of information dissemination, the campaign asks residents and businesses to reduce trips specifically to prevent unhealthy levels of air pollution on that day. Survey data from the 2014 campaign indicated that 0.12 tons of ozone precursors were prevented on average when a Spare The Air alert was called.

- **Clean Transportation:** In addition to funding mechanisms to boost adoption of low or zero-emission vehicles through the Clean Air Funds program and the Clean Agricultural Equipment and Public Fleet Program, the District employs public messaging to spread awareness and use of clean transportation methods. This includes participation in local Safe Routes to Schools programs; neighborhood, city-wide or regional bike and pedestrian drives (such as May is Bike Month); and participation on transportation demand management (TDM) efforts.

- **General Air Quality Awareness:** Through the U.S. EPA's EnviroFlash program, the District sends daily air quality forecasts and action-day alerts to more than 2,000 local residents or employers. This correspondence keeps air pollution front of mind and offers recipients information on how to ensure air quality remains safe for all.

  The District also uses social media to help boost awareness of air quality issues and to promote news and events related to low- or zero-emission transportation options.

7. TRANSPORT MITIGATION REGULATION

The following citation relating to ozone transport is from ARB's webpage:

> "The California Clean Air Act (CCAA or Act) requires the Air Resources Board (ARB or Board) to assess the contribution of ozone and ozone precursors from upwind regions on ozone concentrations that violate the State ozone standard in downwind areas. The Act also directs ARB to establish mitigation requirements for upwind districts designed to mitigate their impact on downwind districts.
>
> ARB originally established mitigation requirements in 1990 which are contained in Title 17, California Code of Regulations, Sections 70600 and 70601. These regulations were amended in 1993 and more recently in 2003. The Board adopted amendments on May 22, 2003, which were approved by the Office of Administrative Law on December 4, 2003, and became effective on January 3, 2004.
>
> These amendments added two new requirements for upwind districts. These amendments require upwind districts to (1) consult with the downwind neighbors and adopt "all feasible measures" for ozone precursors and (2) amend their "no net increase" thresholds for permitting so that they are equivalent to those of their downwind neighbors no later than December 31, 2004. The amendments clarify that upwind districts are required to comply with the mitigation requirements, even if they attain the State ozone standard in their own district, unless the mitigation measures are not needed in the downwind district."

For clarification, the California Health and Safety Code §39610 actually required the ARB no later than December 31, 1989, to identify each air basin in which transported air pollutants from upwind areas outside the air basin caused or contributed to a violation of the State ambient air quality standard for ozone and to identify the district of origin for the transported air pollutants. Under Title 17, Division 3, Chapter 1, Subchapter 1.5, Article 6, Section 70500, the State did not identify the origin of transport by air district, but by region. The ARB has identified the "Broader Sacramento Area" as transporting to the

Upper Sacramento Valley, the San Joaquin Valley, the San Francisco Bay Area, and the Mountain Counties. Included in the definition of "Broader Sacramento Area" is the Yolo-Solano AQMD.

The first requirement of all feasible measures was addressed during the consultation and creation of the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. In this plan, an extensive all feasible measures analysis for each district in the SFNA was completed and is discussed in further detail in the following section. The second requirement was implemented through District Rule 3.20, Ozone Transport Mitigation, which was adopted by the Governing Board on December 8, 2004. This rule implemented a 10 ton per year "no net increase" program for VOC and NOx.

8. ALL FEASIBLE MEASURES

The CCAA requires an air quality strategy to achieve a 5% average annual ozone precursor emission reduction when implemented or, if that is not achievable, an expeditious schedule for adopting every feasible emission control measure under air district purview.[19] The District, as part of the SFNA, has estimated a 1.6% per year precursor emission reduction through 2020. Since this is less than the required 5% annual emission reduction required by the CCAA, the District is obligated to adopt every feasible measure to reduce ozone precursors.

The District is committed to reviewing feasible measures adopted across the State to obtain future emissions reductions. The District, in conjunction with ARB and the other local districts that comprise the SFNA underwent a rigorous analysis of all feasible control measures during the development of the federal State Implementation Plan for Attainment of the 8-hour ozone standard. Any measure that was deemed to be feasible in our jurisdiction was identified, and further analysis of its cost-effectiveness and emissions reduction potential was conducted to determine if the measure could be slated for adoption/amendment into District Rules and Regulations. The District believes that the all feasible measure analysis conducted for the federal 8-hour plan provides an up-to-date and accurate evaluation of potential control measures.

8.1 Commitments

Table 5 on the following page shows the triennial update control measure commitments through 2020.

[19] H&SC §40914

Table 5: List of Proposed Triennial Commitments for 2015 - 2020					
Rule No.	**Control Category**	**Description**	**Proposed Action and Schedule**	**Expected Emission Reductions by 2018 (tpd)**	**Cost Effectiveness ($/ton)**
2.14	Architectural Coatings	Lowers VOC content in coatings	Adopt in 2016	ROG = 0.21	$10,400
2.27	Boilers, Steam Generators and Process Heaters	Lower NOx emission limits	Adopt in 2016	NOx = 0.29	$13,934 – $25,718
2.29	Graphic Arts	Lower rule exemption limit and lower solvent VOC content	Adopt in 2016	N/A	N/A

9. INTERAGENCY CONSULTATION

The District held an interagency meeting on 4-15-2016 to discuss the proposed plan with neighboring, upwind, and downwind air districts, as well as other interested state agencies. A list of the air districts and local agencies that received the document follows. Any comments submitted by these agencies will be included Section 10, Public Review and Workshop.

- Association of Bay Area Governments
- Amador County APCD
- Bay Area AQMD
- Butte County AQMD
- Calaveras County APCD
- California Air Resources Board
- Colusa County APCD
- El Dorado APCD
- Feather River AQMD
- Glenn County APCD
- Mariposa County APCD
- Northern Sierra AQMD
- Placer County APCD
- Sacramento Area Council of Governments
- Metropolitan Transportation Commission
- Sacramento Metropolitan AQMD
- San Joaquin Valley APCD
- Shasta County AQMD
- Tehama County APCD
- Tuolomne County APCD

10. PUBLIC REVIEW AND WORKSHOP

The District will hold a public workshop to discuss the proposed adoption of the Plan on 4-14-2016 at the District office. Notifications will be sent to surrounding air districts, City Managers within the District, building, planning, and community development departments within the District, all Board members and all permit or registration holders. The workshop notice will also be published in the local newspapers. A copy of the public workshop notice and draft Plan will be posted on the District's webpage.

The District held a public workshop to discuss the proposed adoption of the Plan on April 14, 2016 at the District office. Notifications were sent to City Managers within the District, building, planning, and community development departments within the District, and all permit or registration holders. The workshop notice was also published in the local newspapers. A copy of the public workshop notice and draft Plan were posted on the District's webpage. The workshop was attended by several members of the public affiliated with sources permitted by the District.

Participants at the public workshop had several questions. The only comments received during the workshop were administrative in nature and regarded VOC limits listed for the State Air Resources Board's Suggested Control Measure for Architectural Coatings. These changes were made to the final version of the Plan.

11. CONCLUSION

Air quality is gradually improving as the result of ozone precursors being removed from the emission inventory, and the overall exposure of District residents to ozone continues to decrease. The District has conducted an "all feasible measures" analysis as part of the federal planning process and has committed to adopting new rules over the next three year period to further reduce ozone precursor emissions. Further emission reductions must be obtained in order to meet federal air quality deadlines, meet and maintain State healthful air quality levels, and reduce public exposure to toxic air contaminants. Since mobile sources are a large part of the District's emission inventory, a large portion of the emission reductions needed to achieve the District's goals will necessarily come from this source category. The District does not have authority to directly regulate mobile sources. However, incentive programs such as the Carl Moyer Program and the District's Clean Air Fund and Clean Agricultural and Municipal Fleet incentive programs will further assist the District in achieving the emission reductions needed to meet state and federal ambient air quality standards.

Appendix A:

District's Emission Inventory Detail

Appendix A: District's ROG Emission Inventory Detail

Source Type	ROG[a] (tons/day)					
Category	2000	2005	2010	2015	2020	2025
Stationary Sources						
Cleaning and Surface Coatings	1.49	1.58	1.67	1.88	1.98	1.99
Petroleum Production/Marketing	1.57	1.76	1.82	2.02	2.10	2.10
Industrial Processes	1.65	1.04	1.17	1.37	1.61	1.85
Waste Disposal	0.08	0.15	0.17	0.19	0.21	0.21
Fuel Combustion	0.27	0.41	0.41	0.40	0.38	0.38
Stationary Subtotal	**5.06**	**4.95**	**5.24**	**5.87**	**6.28**	**6.53**
Area-Wide Sources						
Consumer Products	2.23	1.92	1.83	1.87	1.99	2.13
Architectural Coatings/Solvents	1.10	1.01	1.06	1.19	1.28	1.38
Pesticides/Fertilizers	1.25	0.65	0.61	0.67	0.65	0.65
Asphalt Paving/Roofing	0.13	0.13	0.13	0.14	0.14	0.14
Farming Operations	0.62	0.62	0.62	0.64	0.64	0.64
Residential Fuel Combustion	2.3	1.71	1.51	1.59	1.59	1.59
Miscellaneous	4.97	3.96	3.88	4.12	4.3	4.54
Area-Wide Subtotal	**7.89**	**6.29**	**6.01**	**6.35**	**6.53**	**6.77**
On-road Mobile Sources						
Automobiles	4.40	2.47	1.73	0.76	0.43	0.32
Light/Medium Duty Trucks	4.20	2.32	1.82	1.14	0.85	0.71
Heavy Duty Gas Trucks	0.62	0.65	0.51	0.32	0.24	0.18
Heavy Duty Diesel Trucks	0.78	0.90	0.63	0.42	0.39	0.39
Motorcycles	0.36	0.56	0.52	0.42	0.42	0.45
Buses	0.07	0.06	0.04	0.03	0.02	0.02
Motor Homes	0.07	0.03	0.02	0.01	0.01	0
On-road Mobile Subtotal	**10.50**	**6.98**	**5.27**	**3.1**	**2.36**	**2.07**
Other Mobile Sources						
Aircraft	0.04	0.04	0.04	0.04	0.04	0.04
Trains	0.17	0.18	0.12	0.11	0.09	0.08
Ships & Commercial/Recreational Boats	2.56	2.26	1.91	1.57	1.31	1.10
Off-Road Recreational Vehicles	0.08	0.12	0.13	0.12	0.13	0.13
Off-Road Equipment	1.37	1.20	0.92	0.77	0.69	0.69
Farm Equipment	1.05	0.91	0.71	0.48	0.31	0.24
Fuel Storage & Handling (Gas Cans)	0.43	0.31	0.19	0.15	0.13	0.11
Other Mobile Subtotal	**5.70**	**5.01**	**4.02**	**3.23**	**2.69**	**2.40**
Total (Anthropogenic) Sources	**29.15**	**23.23**	**20.54**	**18.55**	**17.86**	**17.77**
Natural (Non-Anthropogenic Sources)	**19.56**	**19.56**	**19.56**	**19.56**	**19.56**	**19.56**
GRAND TOTAL[b]	**48.71**	**42.79**	**40.1**	**38.11**	**37.42**	**37.33**

[a] Data source: ARB CEFS Version 2.12, downloaded 1/3/2013, for annual average data.

[b] Columns may not sum to totals due to rounding.

Appendix A: District's NOx Emission Inventory Detail

Source Type	NOx[a] (tons/day)					
Category	2000	2005	2010	2015	2020	2025
Stationary Sources						
Cleaning and Surface Coatings	0.02	0.03	0.03	0.04	0.04	0.04
Petroleum Production/Marketing	0.03	0.02	0.03	0.03	0.04	0.04
Industrial Processes	0.08	0.22	0.22	0.30	0.35	0.41
Waste Disposal	0.02	0.03	0.03	0.03	0.03	0.03
Fuel Combustion	5.86	4.15	3.52	3.32	2.94	2.84
Stationary Subtotal	**6.01**	**4.45**	**3.83**	**3.72**	**3.4**	**3.36**
Area-Wide Sources						
Consumer Products	0	0	0	0	0	0
Architectural Coatings/Solvents	0	0	0	0	0	0
Pesticides/Fertilizers	0	0	0	0	0	0
Asphalt Paving/Roofing	0	0	0	0	0	0
Farming Operations	0	0	0	0	0	0
Residential Fuel Combustion	0.81	0.73	0.72	0.82	0.86	0.89
Miscellaneous	0.29	0.17	0.19	0.2	0.2	0.2
Area-Wide Subtotal	**1.1**	**0.9**	**0.91**	**1.02**	**1.06**	**1.09**
On-road Mobile Sources						
Automobiles	5.37	2.88	1.87	1.02	0.64	0.44
Light/Medium Duty Trucks	7.07	4.25	3.01	1.98	1.31	0.9
Heavy Duty Gas Trucks	0.56	0.86	0.78	0.65	0.52	0.41
Heavy Duty Diesel Trucks	15.07	17.57	11.14	7.97	5.06	3.56
Motorcycles	0.06	0.13	0.15	0.15	0.16	0.16
Buses	0.48	0.46	0.35	0.32	0.28	0.25
Motor Homes	0.18	0.12	0.11	0.09	0.07	0.05
On-road Mobile Subtotal	**28.79**	**26.27**	**17.41**	**12.18**	**8.04**	**5.77**
Other Mobile Sources						
Aircraft	0.03	0.03	0.03	0.03	0.03	0.03
Trains	3.63	2.89	1.97	1.97	2.09	1.93
Ships & Commercial/Recreational Boats	2.52	2.34	1.95	1.37	1.17	1.08
Off-Road Recreational Vehicles	0	0	0	0	0	0
Off-Road Equipment	3.32	2.30	1.72	1.56	1.26	0.98
Farm Equipment	5.16	4.42	3.57	2.56	1.69	1.13
Fuel Storage & Handling (Gas Cans)	0	0	0	0	0	0
Other Mobile Subtotal	**14.66**	**11.98**	**9.24**	**7.49**	**6.24**	**5.15**
Total (Anthropogenic) Sources	**50.56**	**43.60**	**31.39**	**24.41**	**18.74**	**15.37**
Natural (Non-Anthropogenic Sources)	**0.09**	**0.09**	**0.09**	**0.09**	**0.09**	**0.09**
GRAND TOTAL[b]	**50.54**	**43.67**	**31.45**	**24.68**	**18.80**	**15.45**

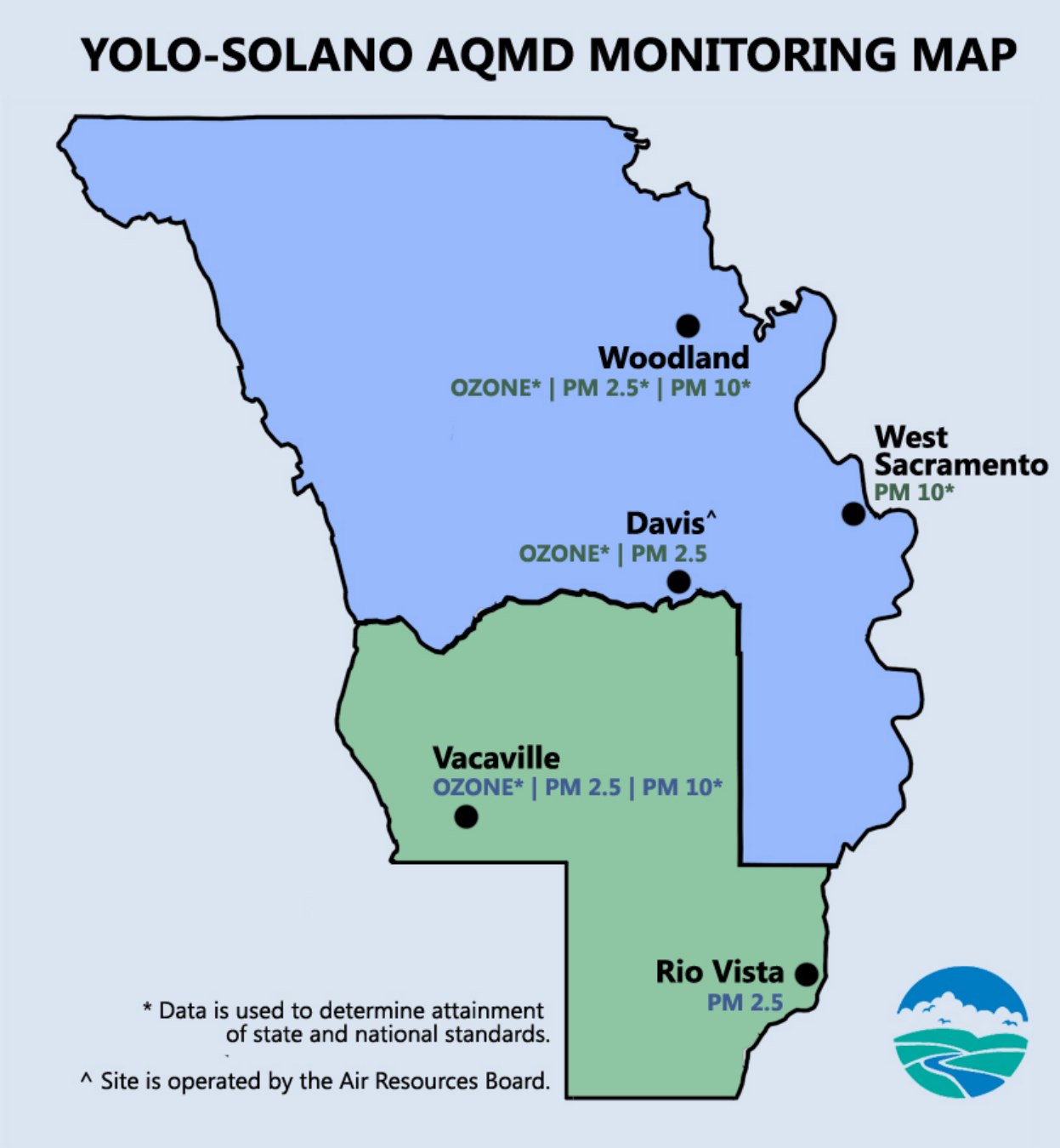
[a] Data source: ARB CEFS Version 2.12, downloaded 1/3/2013, for annual average data.

[b] Columns may not sum to totals due to rounding.

Appendix B:

District Monitoring Stations

District Monitoring Stations



Appendix C:

Proposed Control Measures

Control Measure Number: YSAQMD – Rule 2.14

Control Measure Title: Architectural Coatings

Control Measure Description

This control measure regulates the volatile organic compound (VOC) content in coatings applied to stationary structures and their appurtenances (e.g., general use flats, general use non-flats, and specialty coatings such as industrial maintenance coatings, lacquers, floor coatings, roof coatings, stains, etc.). The strategy also regulates the sale of coatings within the district by prohibiting manufacturers and suppliers of coatings from selling coatings that do not comply with the strategy.

The Yolo-Solano AQMD's architectural coating rule (Rule 2.14) was originally adopted in 1979 with the most recent amendment occurring in November 2001. The amendment in November 2001 adopted ARB's 2000 Suggested Control Measure (SCM) for this category. On October 25, 2007, ARB adopted a new SCM for Architectural Coatings that established lower VOC limits for some coating categories.

The table below shows a comparison between the VOC limits in the current Rule 2.14 and the new SCM; coating categories that do not have lower VOC limits are not included.

Category	YSAQMD Rule 2.14 (g/l)	ARB SCM (g/l)
Flat Coating	100	50
Nonflat Coating	150	100
Nonflat – High Gloss	250	150
Antenna Coating	530	N/A
Anti-fouling Coatings	400	N/A
Bituminous Roof Coatings	300	50
Clear Wood Coatings: Clear Brushing Lacquer Lacquers (including lacquer sanding sealers) Sanding Sealers (other than lacquer sanding sealers) Varnishes	 550 550 350 350	N/A
Concrete/Masonry Sealer (was Waterproofing)	400	100
Concrete/Masonry Sealer Reactive Penetrating Sealer	400	350
Dry Fog Coatings	400	150
Fire Retardant Coatings: Clear Opaque	 650 350	350
Floor Coatings	250	100
Flow Coatings	420	N/A
Mastic Texture Coatings	300	100
Primers, Sealers, and Undercoaters	200	100

Quick Dry Enamels	250	N/A
Quick Dry Primers, Sealers, Undercoaters	200	N/A
Roof Coatings	250	50
Rust Preventative Coatings	400	250
Specialty Primers, Sealers, and Undercoaters	350	100
Temperature-Indicator Safety Coating	550	N/A
Traffic Marking Coatings	150	100

Emission Inventory – 2018

EIC Code	EIC Description	ROG Inventory (tpd)
520-520-9100-0000	Oil-Based (Organic Solvent Based) Coatings (Unspecified)	0.0201
520-520-9105-0000	Oil-Based Primers, Sealers, and Undercoaters	0.0382
520-520-9106-0000	Oil-Based Quick Dry Primers, Sealers, and Undercoaters	0.0226
520-520-9108-0000	Oil-Based Specialty Primer, Sealer, and Undercoaters	0.0012
520-520-9109-0000	Oil-Based Bituminous Roof Primer	0.0037
520-520-9113-0000	Oil-Based Waterproofing Sealers	0.0176
520-520-9118-0000	Oil-Based Waterproofing Concrete/Masonry Sealers	0.0123
520-520-9122-0000	Oil-Based Faux Finishing	0.0004
520-520-9124-0000	Oil-Based Mastic Texture	0.0054
520-520-9126-0000	Oil-Based Rust Preventative	0.0088
520-520-9131-0000	Oil-Based Stains – Clear/Semitransparent	0.0696
520-520-9136-0000	Oil-Based Stains – Opaque	0.0066
520-520-9141-0000	Oil-Based Varnish – Clear/Semitransparent	0.0463
520-520-9153-0000	Oil-Based Quick Dry Enamel Coatings	0.0159
520-520-9157-0000	Oil-Based Lacquers (Unspecified)	0.0172
520-520-9159-0000	Oil-Based Flat Coatings	0.0006
520-520-9160-0000	Oil-Based Nonflat – Low Gloss/Medium Gloss	0.0256
520-520-9161-0000	Oil-Based High Gloss Nonflat Coatings	0.0276
520-520-9164-0000	Oil-Based Bituminous Coatings	0.0521
520-520-9165-0000	Oil-Based Concrete Curing Compounds	0.0011
520-520-9166-0000	Oil-Based Dry Fog Coatings	0.0103
520-520-9169-0000	Oil-Based Floor Coatings	0.0029
520-520-9170-0000	Oil-Based Form Release Coatings	0.0073
520-520-9172-0000	Oil-Based Industrial Maintenance Coatings	0.1067
520-520-9173-0000	Oil-Based Metallic Pigmented Coatings	0.0333
520-520-9174-0000	Oil-Based Roof Coatings	0.0025
520-520-9176-0000	Oil-Based Traffic Coatings	0.0091
520-520-9177-0000	Oil-Based Wood Preservatives	0.0083
520-520-9200-0000	Water-Based Coatings (Unspecified)	0.0026
520-520-9205-0000	Water-Based Primers, Sealers, and Undercoaters	0.0403
520-520-9206-0000	Water-Based Quick Dry Primers, Sealers, and Undercoaters	0.0031
520-520-9208-0000	Water-Based Specialty Primer, Sealer, and Undercoaters	0.0025
520-520-9209-0000	Water-Based Bituminous Roof Primer	0.0006
520-520-9213-0000	Water-Based Waterproofing Sealers	0.0023
520-520-9218-0000	Water-Based Waterproofing Concrete/Masonry Sealers	0.0033
520-520-9222-0000	Water-Based Faux Finishing	0.0022
520-520-9223-0000	Water-Based Form Release Coatings	0
520-520-9224-0000	Water-Based Mastic Texture	0.0028
520-520-9226-0000	Water-Based Rust Preventative	0.0003

520-520-9231-0000	Water-Based Stains – Clear/Semitransparent	0.0039
520-520-9236-0000	Water-Based Stains – Opaque	0.0061
520-520-9241-0000	Water-Based Varnish – Clear/Semitransparent	0.0062
520-520-9257-0000	Water-Based Lacquers (Unspecified)	0.0012
520-520-9259-0000	Water-Based Flat Coatings	0.1538
520-520-9260-0000	Water-Based Nonflat – Low Gloss/Medium Gloss	0.1832
520-520-9261-0000	Water-Based High Gloss Nonflat Coatings	0.0166
520-520-9264-0000	Water-Based Bituminous Coatings	0.0003
520-520-9265-0000	Water-Based Concrete Curing Compounds	0.0035
520-520-9266-0000	Water-Based Dry Fog Coatings	0.0030
520-520-9269-0000	Water-Based Floor Coatings	0.0077
520-520-9272-0000	Water-Based Industrial Maintenance Coatings	0.0087
520-520-9273-0000	Water-Based Metallic Pigmented Coatings	0.0008
520-520-9274-0000	Water-Based Roof Coatings	0.0044
520-520-9276-0000	Water-Based Traffic Coatings	0.0276
520-520-9277-0000	Water-Based Wood Preservatives	0
Total		**1.0603**

Emission Reductions

EIC Description	Adoption Date	Implementation Date	ROG Emission Reduction tpd 2018
Architectural Coating Categories	2016	2018	0.2144

Cost Effectiveness

The cost effectiveness calculations were based upon economic analyses conducted by the South Coast Air Quality Management District for amendments to its Rule 1113. The specific economic analyses used are listed below:

- December 6, 2002 Amendments (based on vacated May 14, 1999 Amendments) (1998 economic data) – industrial maintenance coatings; rust preventative coatings; floor coatings; non-flats; primers, sealers, and undercoaters; quick-dry primers, sealers, and undercoaters; and quick-dry enamels.
- December 5, 2003 Amendments (2003 economic data) – clear wood finishes (including sanding sealers and varnish); roof coatings; stains; and waterproofing sealers (including concrete and masonry sealers). Range of cost effectiveness was $4,229 - $11,405/ton.
- June 9, 2006 Amendments (2006 economic data) – concrete-curing compounds; dry-fog coatings; and traffic coatings. Range of cost effectiveness was $4,882/ton.

It was assumed that the economic relationships between Yolo-Solano and South Coast suppliers and users of architectural coatings do not differ significantly. Therefore, the estimated South Coast cost-effectiveness values were assumed to be transferable to Yolo-Solano.

The cost effectiveness values calculated from the December 6, 2002 and December 5, 2003 amendments were adjusted to 2006 dollars (from 1998 and 2003 dollars, respectively) using the Bureau of Labor Statistics' Consumer Price Index for West Urban consumers. The estimated overall cost effectiveness for this proposed measure is $10,387/ton.

Authority

Authority to implement this control measure by the YSAQMD is in accordance with California Health and Safety Code, Sections 40000, 40001, and 41010.

References

1. Yolo-Solano Air Quality Management District, Rule 2.14, Architectural Coatings; November 14, 2001.
2. California Environmental Protection Agency – Air Resources Board, Suggested Control Measure for Architectural Coatings, June 22, 2000.
3. South Coast Air Quality Management District, Rule 1113, Architectural Coatings; June 9, 2006.
4. California Environmental Protection Agency – Air Resources Board, Forecasted Emissions by Summary Category Ozone SIP Planning Projections – V1.06 RF#980; Date of Last Update: November 16, 2006.
5. South Coast Air Quality Management District, Staff Report for Proposed Amendment Rule 1113 (Architectural Coatings). May 14, 1999.
6. South Coast Air Quality Management District, Staff Report for Proposed Amendment Rule 1113 (Architectural Coatings). December 6, 2002.
7. South Coast Air Quality Management District, Staff Report for Proposed Amendment Rule 1113 (Architectural Coatings). December 5, 2003.
8. South Coast Air Quality Management District, Staff Report for Proposed Amendment Rule 1113 (Architectural Coatings). June 9, 2006.
9. U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index 1996-2006.
10. Control Measure, YSAQMD – 2.14, February 2, 2007.
11. California Air Resources Board Suggested Control Measure for Architectural Coatings, October 25, 2007.
12. Control Measure 2.14 Calculation Spreadsheet, SMAQMD, May 20, 2008.

Control Measure Number: YSAQMD – 2.29

Control Measure Title: Graphic Arts

Control Measure Description

VOC emissions from graphic art operations result from the evaporation of organic solvents in the inks, fountain solutions, and solvents used in the various types of printing processes. These operations produce a wide variety of printed products that include books, magazines, newspapers, fliers, posters, and packaging materials. These various types of products require that facilities use very specific materials and printing methods. The different types of printing methods include lithography, flexography, gravure, and letterpress. Although the District's graphic arts rule (Rule 2.29) contains specific screen printing requirements, for the purposes of the SIP, the screen printing category will be grouped into the paper, fabric, and film coating category.

For certain lithographic and flexographic printing operations heatset inks are used. These viscous inks are cured using indirect hot air dryers that evaporate the ink solvents immediately after printing. In the Yolo-Solano AQMD, smaller heatset presses are equipped with electric hot air or UV light dryers. However, the larger heatset presses are equipped with natural gas fired dryers. Currently, only a single flexographic printing facility is permitted to use a Regenerative Thermal Oxidizer (RTO) to control the ROG emissions from its operation. Because no additional NOx controls are currently available for combustion devices being used as air pollution control equipment, NOx reductions associated with graphic arts operations will not be addressed in this control strategy.

The first proposed control measure in reducing the ROG emissions would be to lower the District's current rule exemption limit from 400 pounds per month to 60 pounds per month. The second proposed control measure is to revise the Districts' various cleaning solvent ROG limits to match the current Sacramento Metropolitan AQMD standards. The District's ROG emission exemption is contained in Rule 2.29, Graphic Arts Printing Operations, while the allowable solvent limits are contained in District Rule 2.31, Solvent Preparation and Cleanup.

Emission Inventory –2018

EIC Code	EIC Description	ROG Inventory (tpd)
		2019
24099580000000	Solvent	0.125

Emission Reductions

EIC Description	Adoption Date	Implementation Date	ROG Emission Reduction (tpd)
			2019
Solvent	2017	2019	Not available

Yolo Solano Air Quality Management District does not have enough data to quantify the emission reduction.

Cost Effectiveness

Because of the various types of solvents currently used in this wide source category and the unavailability of specific usage data, the District cannot perform a cost effectiveness calculation for this control measure. However, it is expected that because of the availability of the compliant products in the Sacramento Metropolitan Air Quality Management District, the added costs associated with purchasing and disposing of the ROG compliant materials will not greatly differ from the cost of the currently compliant ROG products.

Authority

The District is authorized to adopt and amend rules and regulations by Health and Safety Code Sections 40001, 40702, and 41010.

Implementation

This control measure will be implemented by the YSAQMD.

References

California Environmental Protection Agency – Air Resources Board, Forecasted Emissions by Summary Category Ozone SIP Planning Projections - V1.06 RF#980; Date of Last Update: November 16, 2006.

Sacramento Metropolitan Air Quality Management District, Rule 450, Graphic Arts Operations; March 24, 2000.

Yolo-Solano Air Quality Management District, Rule 2.29, Graphic Arts Printing Operations; August 13, 1997.

Rule 2.31, Solvent Preparation and Cleanup; August 13, 1997.

Control Measure Number: YSAQMD – 2.27

Control Measure Title: Boilers, Steam Generators, and Process Heaters/Space Heaters

Control Measure Description

Boilers and steam generators are used to provide hot water and steam for a variety of industrial and commercial applications. These applications include space heating, food processing, garment laundering, and equipment sterilization. Manufacturing operations use process heaters to heat materials or equipment during the manufacturing process. The equipment burners can be fired on solid, liquid or gaseous fuels. A unit's maximum input rating can be calculated from the fuel heat input value over an hour's time and is reported in British Thermal Units per hour (MMBTU/hr). Per regulatory convention, the emissions from these types of units are reported in parts per million (ppm) corrected to 3% oxygen (O_2).

The proposed control measure consists of the District amending Rule 2.27 (Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) to incorporate a multi-tiered NOx emission limit.

Emission Inventory - 2020

EIC Code	EIC Description	NOx Inventory (tpd)
		2020
5000501100000	Manufacturing and Industrial Boilers, Natural Gas Fuel	0.015
5001001100000	Manufacturing and Industrial Boilers, Propane Fuel	0.015
5099501100000	Manufacturing and Industrial Process Heaters, Natural Gas Fuel	0.552
5200501100000	Manufacturing and Industrial Process Heaters, Distillate Oil Fuel	0.067
5201001100000	Manufacturing and Industrial Oven Heaters (Forced Drying Surface Coatings), Natural Gas Fuel	0.021
6000501100000	Manufacturing and Industrial, Other, Natural Gas Fuel	0.149
6001001100000	Manufacturing and Industrial, Other, LPG Fuel	0.008
6099501100000	Food and Agricultural Process Boilers, Natural Gas Fuel	0.821
Total		**1.648**

Emission Reductions

EIC Description	Adoption Date	Implementation Date	NOx Emission Reduction Tons/day
			2020
Boilers	2017	2020	0.244

Cost Effectiveness

From an analysis performed by the Sacramento Metropolitan AQMD in 2003[2], the cost for boiler retrofits will vary on the size, the type, and the age of an individual unit. It is expected that some of the older units that have reached the end of their service lives may be replaced instead of being retrofitted with low-NOx equipment or post-combustion controls. Based on this analysis, the cost of equipment modifications ranged from $12,664 - $23,359 per ton of NOx reduced. Adjusted for inflation, the expected cost in 2007 will be $13,934 - $25,718.

Total Cost: $17,924,227 - $33,061,593 over a 15 year equipment useful life (2007).

Authority

The District is authorized to adopt and amend rules and regulations by Health and Safety Code Sections 40001, 40702, and 41010.

Implementation

This control measure will be implemented by the YSAQMD through Rule 2.27.

References

1. California Environmental Protection Agency – Air Resources Board, Forecasted Emissions by Summary Category Ozone SIP Planning Projections - v1.06 RF#980; Date of Last Update: November 16, 2006.
2. Sacramento Metropolitan Air Quality Management District, Final Draft – Sacramento Off-Road Measures: Boilers, Steam Generators, and Process Heaters/Space Heaters, October 14, 2003.