

# Chapter 4

## Demonstration of Federal Requirements

*2013 Plan for the Revoked 1-Hour Ozone Standard*  
SJVUAPCD

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## **CHAPTER 4: DEMONSTRATION OF FEDERAL REQUIREMENTS**

The federal Clean Air Act (CAA), Title 1, Part D, Subparts 1 and 2, requires California to submit the following documentation specific to the San Joaquin Valley (Valley) to address the 1-hour ozone National Ambient Air Quality Standards (NAAQS):

1. An attainment demonstration meeting the requirements of CAA sections 182(c)(2) and 172(a)(2);
2. A reasonably available control measures (RACM) demonstration meeting the requirements of CAA section 172(c)(1);
3. A rate of progress (ROP) demonstration meeting the requirements of CAA sections 172(c)(2) and 182(c)(2);
4. Contingency measures for ROP milestone years and the attainment year, meeting the requirements of CAA Section 172(c)(9) and 182(c)(9);
5. Provisions satisfying the requirements for clean fuels and clean technologies for boilers in CAA 182(e)(3); and
6. Provisions satisfying the vehicle miles traveled (VMT) provisions of CAA section 182(d)(1)(A).

This chapter demonstrates or discusses each of these requirements.

### **4.1 ATTAINMENT DEMONSTRATION**

As discussed in Chapter 2, the California Air Resources Board (ARB) used a modeled attainment test consistent with U.S. Environmental Protection Agency (EPA) guidelines to predict future 1-hour ozone concentrations at each monitoring site in the Valley and to demonstrate attainment. A photochemical model simulates the observed ozone levels using precursor emissions and meteorology in the region. The model also simulates future ozone levels based on projected changes in emissions while keeping the meteorology constant. This modeling is used to identify the relative benefits of controlling different ozone precursor pollutants and the most expeditious attainment date. Appendix E contains the modeling protocol for this plan. Appendix F contains a summary of the modeling process and results.

As discussed in Chapter 1, the revoked 1-hour ozone standard is 124.0 parts per billion (ppb). Modeling shows that the Valley will attain the 1-hour ozone standard by 2017 based on implementation of the ongoing control measures. As illustrated in Table 4-1, the monitoring site with the highest predicted ozone concentration is Edison with a predicted design value at 119.3, which is 4.7 ppb below the standard, and the two sites with the second and third current highest ozone concentrations are predicted to be 15 to 30 ppb below the standard.

**Table 4-1 Base-Year and Future-Year 1-Hour Ozone Design Values (DV)**

<b>Monitoring Station</b>	<b>DV (2005-07)</b>	<b>DV (2015-17)</b>
Edison	135	119.3
Arvin-Bear_Mountain_Bldv	131	107.4
Fresno-1st_Street	130	103.7
Clovis-N_Villa_Avenue	125	104.1
Fresno-Sierra_Skypark_#2	124	98.8
Parlier	121	97.4
Sequoia_and_Kings_Canyon	118	102.4
Bakersfield-5558_Califor	117	98.0
Sequoia_Natl_Park-Lower	113	98.5
Visalia-N_Church_Street	112	94.5
Oildale-3311_Manor_Stree	112	95.2
Fresno-Drummond_Street	110	93.0
Hanford-S_Irwin_Street	110	92.6
Modesto-14th_Street	109	95.9
Shafter-Walker_Street	105	87.7
Turlock-S_Minaret_Street	104	91.8
Merced-S_Coffee_Avenue	102	85.4
Stockton-Hazelton_Street	101	86.3
Maricopa-Stanislaus_Stre	100	83.5
Madera-Pump_Yard	95	82.4

#### **4.2 REASONABLY AVAILABLE CONTROL MEASURES (RACM) DEMONSTRATION**

CAA Section 172(c)(1) requires attainment plans to provide for the implementation of RACM as expeditiously as practicable (including emissions reductions from existing sources in the areas as may be obtained through the adoption of at least reasonably available control technology) and shall provide for attainment of the standard.

Put another way, the total of all potential emissions reductions opportunities that are *not* included as plan commitments must not advance attainment by one year. Measures that are not necessary to satisfy Rate of Progress (ROP) or expeditious attainment are also not required RACM for the area.

To advance attainment by at least one year, the collective emissions reductions that could be achieved through unused but reasonably available controls would have to achieve the 2017 emissions levels by 2016. As noted in Chapter 2, modeling for this

and other ozone plans has shown that the Valley is very much NO<sub>x</sub> limited, especially in future years; as such, NO<sub>x</sub> emission reductions are most effective in reducing Valley ozone concentrations, whereas Valley ozone is not as responsive to VOC emission reductions and therefore, VOC emission reductions have minimal impact on advancing attainment. Advancing attainment by one year would therefore depend on expediting NO<sub>x</sub> emission reductions.

Valley NO<sub>x</sub> emissions are already being significantly reduced as adopted regulations are fully implemented through fleet turn-over and normal equipment replacement. As illustrated in Appendix B to this plan, about 89% of NO<sub>x</sub> emission reductions occurring between the 2007 base year and the 2017 attainment year come from mobile sources. These reductions cannot be expedited through additional stationary and area source regulations, for which the District has regulatory authority. Based on the difference between 2017 and 2016 NO<sub>x</sub> emissions levels, unused control measures would have to achieve 12.1 tons per day (tpd) of NO<sub>x</sub> emission reductions to advance attainment by one year. However, as previously discussed, there are no unused control measures in this plan because every reasonable control measure is used in this plan.

This is not to say that attainment before 2017 is not possible. In fact, the Valley's 1-hour ozone air quality has greatly improved over the past several years through the implementation of already-adopted control measures. As of the posting of this plan, attainment could be possible as early as 2013. On the other hand, it takes as little as four hours over a three-year period (where those four hours occur on four separate days at a single air monitoring site) to keep an area out of attainment, and a single episode of ozone build up could prolong nonattainment past 2013. Therefore, 2017 is the official attainment year for this plan, per the modeling and other analyses conducted as part of this planning effort. The 2017 attainment year is consistent with the five-year attainment timeframe of CAA §172(a)(2)(A); in addition, this plan is not using the full 10-year attainment timeframe allowed under CAA §172(a)(2), nor does it rely on yet-to-be-identified "black box" reductions under CAA §182(e)(5).

RACM are, by definition, reasonable. Although an air quality attainment plan must include a thorough analysis of reasonably available measures, it need not analyze every conceivable measure; reasonability must drive the analysis. Any measure that is absurd, unenforceable, impractical, or would cause severely disruptive socioeconomic impacts is unreasonable. This analysis must consider all agencies' opportunities together, but the starting point is the separate analyses of each agency.

#### **4.2.1 District RACM Opportunities**

As discussed in Appendix C, all reasonable control measures under the District's jurisdiction are being implemented. The District has adopted many of the toughest stationary and area sources rules in the nation. There are no reasonable regulatory control measures excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures.

#### 4.2.2 ARB RACM Opportunities

As discussed in Chapter 3, all reasonable control measures under ARB's jurisdiction for mobile sources are being implemented. Given the significant emissions reductions needed for attainment in California, ARB has adopted some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them. There are no reasonable regulatory control measures excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures.

#### 4.2.3 Metropolitan Planning Organizations (MPOs) RACM Opportunities

As discussed in Appendix C of the recently adopted *2012 PM<sub>2.5</sub> Plan*, all reasonable control measures under MPO jurisdiction are being implemented. There are no reasonable regulatory control measures excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures.

There are no reasonable regulatory control measures from any agency's jurisdiction that have been excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures.

### 4.3 RATE OF PROGRESS (ROP)

This section explains and demonstrates ROP and quantitative milestones that are required until the District reaches attainment of the revoked federal 1-hour ozone air quality standard. The data in this section is based on information that has been provided in other chapters and appendices of this plan. The information and conclusions presented here are based on the best available information as of August 2013 but are subject to change.

#### 4.3.1 ROP Requirements

Nonattainment areas that have already met the 15% VOC emissions reduction requirement for the revoked 1-hour ozone standard are subject to the ROP requirement to obtain an average of 3% annual reductions of VOC or NO<sub>x</sub> in milestone years (every three years) after the baseline year until the attainment year. EPA approved the District's *1994 Ozone Attainment Demonstration Plan* and its 15% ROP demonstration in the Federal Register on January 8, 1997.<sup>1</sup> The District has submitted periodic milestone compliance demonstrations to show retrospectively that the required ROP emissions reductions have occurred in the District.

The District must now obtain an average of 3% annual reductions of VOC or NO<sub>x</sub> emissions every 3-year period until the attainment year. The baseline year for this plan is 2007, so the milestone years are 2010, 2013, 2016, and 2017.

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<sup>1</sup> Approval and Promulgation of Implementation Plans; California—Ozone, 62 Fed. Reg. 5, pp. 1150–1187. (1997, January 8). (to be codified at 40 CFR pt. 52)

### 4.3.2 ROP Calculations and Demonstration

The CAA specifies the baseline from which each milestone's emissions reduction is calculated.<sup>2</sup> It is defined as "the total amount of actual VOC or NOx emissions from all anthropogenic sources in the area, minus the non-creditable emissions reductions associated with the pre-1990 motor vehicle control program (MVCP) regulations, and Reid Vapor Pressure (RVP) regulations promulgated by the time of enactment."<sup>3</sup> Non-creditable pre-1990 MVCP and RVP emissions reductions must be removed from the base year and milestone year emissions in order to develop an inventory of creditable emissions for the ROP demonstration.

ARB staff estimated the non-creditable pre-1990 MVCP and RVP emissions reductions in accordance with EPA technical guidance, using an EMFAC<sup>4</sup> simulation. This simulation, following EPA guidance, is designed to estimate the benefits of the pre-1990 motor vehicle and fuels regulations today and into the future without consideration of more stringent regulations adopted and implemented since 1990. The EMFAC model simulates motor vehicle fleet turnover while fleet activity is kept constant at the base-year level. In addition, new vehicles entering the fleet after the base year are assumed to be equipped with emission control equipment required of new 1990 vehicles. This simulation yields the non-creditable California pre-1990 MVCP/RVP adjustment for each ROP year. Table 4-2 shows the ROP calculations for VOC and NOx.

The ROP demonstration in Table 4-2 shows that VOC and NOx emission reductions are more than sufficient to meet the required ROP in all milestone years. The required 3% contingency was secured by the first milestone year (2010) and carried through to the attainment year (2017).

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<sup>2</sup> Clean Air Act, Title 1, Part D, Section 182 (b)(1)(C) and (D).

<sup>3</sup> Clean Air Act, Title 1, Part D, Section 182 (b)(1).

<sup>4</sup> EMFAC is California's model for estimating emissions from on-road vehicles operating in California; EMFAC2011 is the most recent update.

**Table 4-2 ROP Demonstration**

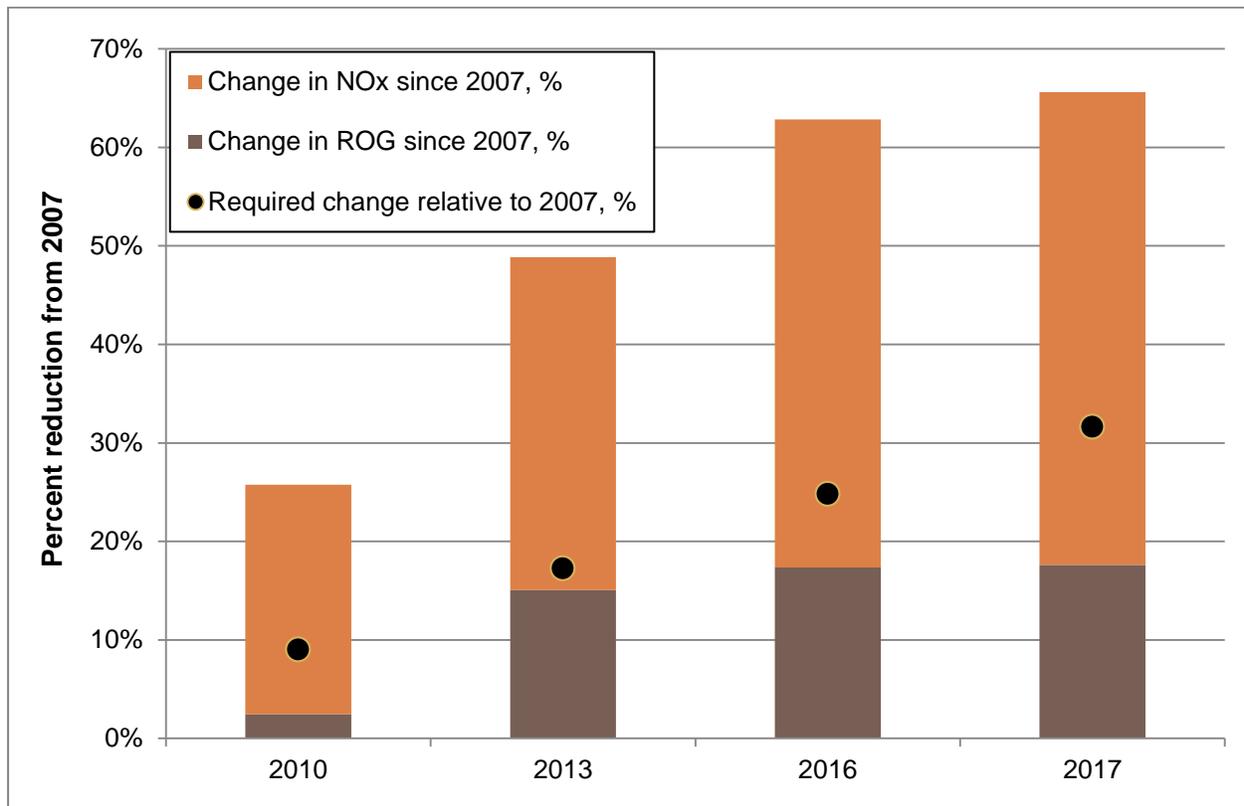
	2007	2010	2013	2016	2017
Baseline ROG	457.2	440.5	380.5	368.0	366.3
CA MVCP/RVP Adjustment	0.0	5.6	9.3	12.0	12.7
RACT Corrections	0	0	0	0	0
Adjusted 2007 Baseline ROG in milestone year <sup>5</sup>	457.2	451.7	448.0	445.2	444.5
RFP commitment for ROG reductions from new measures		0	0	0	0
Milestone Year ROG with existing and proposed measures		440.5	380.5	368.0	366.3
Required % change since previous milestone year (ROG or NOx) relative to 2007		9%	9%	9%	3%
Target ROG levels		411.0	370.7	334.8	324.1
Apparent shortfall in ROG		29.5	9.9	33.2	42.2
Apparent shortfall in ROG, %		6.5%	2.2%	7.5%	9.5%
ROG shortfall previously provided by NOx substitution, %		0%	6.5%	6.5%	7.5%
Actual ROG shortfall, %		6.5%	-4.3%	0.9%	2.0%
	2007	2010	2013	2016	2017
Baseline NOx	484.9	368.2	316.0	259.2	247.1
CA MVCP Adjustment	0.0	4.9	7.7	9.3	9.7
Adjusted 2007 Baseline NOx in milestone year <sup>6</sup>	484.9	480.0	477.2	475.6	475.2
RFP commitment for NOx reductions from new measures	0	0	0	0	0
Change in NOx since 2007		111.8	161.2	216.4	228.2
Change in NOx since 2007, %		23.3%	33.8%	45.5%	48.0%
NOx reductions since 2007 already used for RFP substitution and contingency through last milestone year, %		0.0%	9.5%	9.5%	10.5%
NOx reductions since 2007 available for RFP substitution and contingency in this milestone year, %		23.3%	24.3%	36.0%	37.6%
Change in NOx since 2007 used for ROG substitution in this milestone year, %		6.5%	0.0%	0.9%	2.0%
Change in NOx since 2007 available for contingency in this milestone year, %		3.0%	3.0%	3.0%	3.0%
Change in NOx since 2007 surplus after meeting substitution and contingency needs in this milestone year, %		13.8%	24.3%	35.0%	35.5%
RFP shortfall, if any		0.0%	0.0%	0.0%	0.0%
RFP Met?		YES	YES	YES	YES
Contingency Met?		YES	YES	YES	YES

<sup>5</sup> The "Adjusted 2007 Baseline in milestone year" is derived by subtracting the CA MVCP/RVP adjustment from the base year (2007) baseline.

<sup>6</sup> The "Adjusted 2007 Baseline in milestone year" is derived by subtracting the CA MVCP/RVP adjustment from the base year (2007) baseline.

Figure 4-1 shows the percentage reductions in creditable VOC and NOx along with the required percent reduction targets relative to 2007. The combined VOC and NOx percent reductions far exceed the required ROP percent change targets.

**Figure 4-1 Creditable Emissions Reductions Relative to ROP Targets**



#### 4.4 CONTINGENCY REDUCTIONS

Contingency measures are commitments for extra measures to reduce emissions that go into effect without further regulatory action. In an attainment plan, the measures must be *extra* in the sense that the reductions are not accounted for in ROP or in the attainment demonstration. Contingency reductions must be implemented automatically if either of the following scenarios occurs:

- **ROP contingencies:** Used if planned emissions controls fail to reach the emissions targets specified in the attainment plan for ROP. The need to implement ROP contingencies is based on the emissions inventory in the ROP milestone years.
- **Attainment contingencies:** Used if a region fails to attain a federal standard by the final attainment date. The need to implement attainment contingencies is based on ambient air quality data as of the end of the attainment year. If EPA finds that an area fails to attain a standard on time, contingency reductions must be implemented automatically. Depending on the requirements associated with

the standard in question, an area may have to adopt a new attainment plan or incur other penalties.

The contingency years for this plan are the ROP milestone years (2010, 2013, and 2016) and the attainment year (2017). The total emissions reductions available from contingency measures should be equivalent to about one year of reductions needed for ROP.<sup>7</sup>

Table 4-2 includes a deduction of emissions reductions reserved for contingency and not relied upon in the ROP demonstration. This shows that there are sufficient contingency reductions for each ROP milestone year. Thus, the ROP contingency requirement has been met in this plan.

Attainment year contingency reductions can use additional reductions occurring between the attainment year and the following year—in this case, the reductions between 2017 and 2018. These reductions occur through continued implementation of adopted regulations. Similar to ROP, the 3% reduction from the 2007 baseline can come from either VOC or NO<sub>x</sub>. Since VOC emissions are not further reduced in 2018, this analysis shows that NO<sub>x</sub> emission reductions satisfy the attainment year contingency needed. A 3% reduction from the 2007 baseline is equivalent to 14.5 tpd of NO<sub>x</sub>.

Areas with significant nonattainment challenges, such as the Valley, have developed several generations of aggressive, far-reaching emissions reduction measures to meet various CAA requirements. This no-stone-left-unturned policy ensures that as viable emissions reductions are identified, they are implemented, rather than held in reserve, to contribute to expeditious attainment. For this reason, Valley contingency measure demonstrations in have been a challenge.

Table 4-3 shows that the NO<sub>x</sub> emission reductions achieved from previously adopted prohibitory regulations provide a significant component of the needed contingency, but not the full amount.

**Table 4-3 Attainment Contingencies from Adopted Regulatory Reductions\***

	2017 emissions (tpd)	2018 emissions (tpd)	Attainment Contingency (tpd)
NO <sub>x</sub> (adopted measures only)	247.1	236.1	11.0

\*based on Appendix B emissions inventories

Another source of additional reductions not already relied upon in the SIP are provided by SIP-creditable, incentive-based emissions reductions. As discussed in Chapter 3 of this plan, incentive programs achieve emissions reductions beyond those achieved by regulations alone. Incentive programs accelerate the adoption of cleaner technologies

<sup>7</sup> Clean Air Fine Particle Implementation Rule [PM<sub>2.5</sub> Implementation Rule], 72 Fed. Reg. 79, pp. 20586–20667. At 20642-43. (2007, April 25). Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2007-04-25/pdf/E7-6347.pdf#page=1>

and encourage the use of such technologies by those not yet subject to air quality regulations. Incentives allow the District to reduce emissions from source categories outside of the District's traditional regulatory authority, as well as source categories where socioeconomic impacts would otherwise prevent traditional control strategies from being implemented.

As discussed in Chapter 3, the District adopted new Rule 9610 (State Implementation Plan Credit for Emission Reductions Generated through Incentive Programs) to provide the District with a mechanism to claim SIP credit for SIP-creditable incentive-based emission reductions achieved in the Valley. Both ARB and the District are committed to continuing to seek opportunities for additional incentive-based emissions reductions Valley-wide to meet contingency requirements, which will also expedite public health benefits.

At this time, the District proposes to claim **3.5 tpd of NOx emission reductions** through Rule 9610 and related incentive programs to use as attainment-year contingency reductions. This amount is only slightly higher than the 1.9 tpd NOx commitment for the 2019 attainment year already included in the District's recently adopted *2012 PM2.5 Plan*. Both commitments are limited to projected emissions reductions achieved through secured or reasonably anticipated incentive program funding, estimated availability of emissions reductions projects, and willing participants, and based on historical participation and estimates of remaining equipment. The total reductions achieved through Rule 9610 and associated incentive programs are very likely to be much higher than these contingency commitments.

Based the ROP demonstration in Table 4-2, this plan meets the ROP milestone year contingency requirement. Also, based on Rule 9610 and the contingency reductions already available through adopted regulations (Table 4-3), this plan satisfies the attainment year contingency commitment (Table 4-4). Furthermore, as shown in Table 4-1, projected 2017 design values are actually 4.7 ppb or more below the standard, providing added confidence that attainment will be met in 2017 and attainment-year contingency reductions will not be needed.

**Table 4-4 Demonstration of Sufficient Attainment-Year Contingency Reductions**

	NOx Reductions (tpd)
<i>Surplus from adopted regulations (Table 4-3)</i>	11.0
<i>SIP-creditable incentives</i>	3.5
Total NOx contingency	14.5
Contingency reductions required	14.5
<b>Contingency need met?</b>	<b>Yes</b>

#### 4.5 CLEAN FUELS AND CLEAN TECHNOLOGIES FOR BOILERS

CAA §182(e)(3) directs extreme nonattainment areas to require each new, modified, or existing electric utility, industrial, or commercial boiler that emits more than 25 tons per year of NO<sub>x</sub> to use natural gas, methanol, or ethanol (or comparably low polluting fuel) as its primary fuel (used 90% or more of the operating time); or use advanced control technology, such as catalytic control technology or other comparably effective control methods, for reduction of NO<sub>x</sub> emissions.

District Rules 4306 and 4352 address NO<sub>x</sub> emissions limits for the boilers in this category. These boilers generally use natural gas and therefore satisfy the first requirement of CAA §182(e)(3). Liquid-fuel fired boilers are also addressed by those rules and the applicable NO<sub>x</sub> emission limits satisfies the second requirement of CAA §182(e)(3). Solid-fuel fired boilers are addressed by Rule 4352 and the applicable NO<sub>x</sub> emissions limit satisfies the second requirement as well. Therefore, the District already complies with CAA §182(e)(3).

#### 4.6 VEHICLE MILES TRAVELED (VMT) DEMONSTRATION

Based on ARB modeling and analysis, the District prepared a VMT emissions offset demonstration for the 1-hour (revoked) and 8-hour ozone NAAQS pursuant to CAA §182(d)(1)(A) and in accordance with the EPA's August 2012 guidance entitled *Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Traveled*.<sup>8</sup>

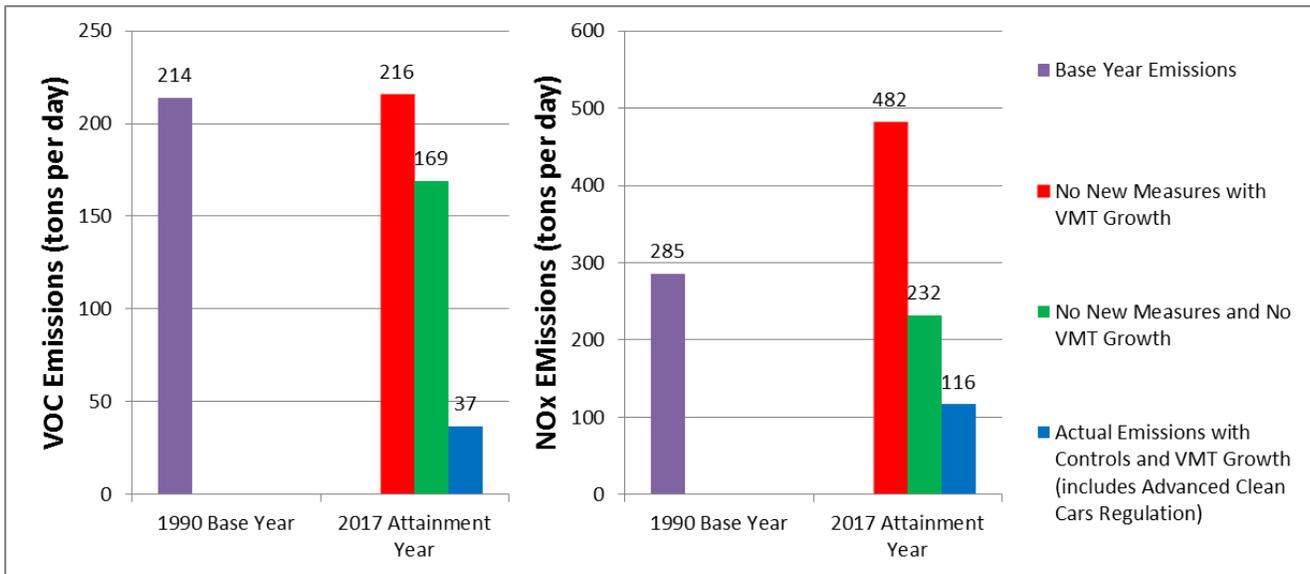
ARB used the EMFAC2011 model<sup>9</sup> to calculate two base-year/attainment-year scenarios: one for the revoked 1-hour ozone standard using 1990 as the base year and 2017 as the attainment year, consistent with the *2013 Plan for the Revoked 1-hour Ozone Standard*; and one for the 8-hour ozone standard using 1990 as the base year and 2023 as the attainment year, consistent with the *2007 Ozone Plan*. The scenarios include emissions estimates for the attainment year with no new additional motor vehicle controls, but with increases in VMT; with no new motor vehicle controls and no VMT growth; and with full motor vehicle controls and projected VMT growth. The motor vehicle controls used in the analysis include state-implemented transportation control strategies and locally implemented transportation control measures. Figures 4-2 and 4-3 show the results for the 1-hour and 8-hour ozone plan scenarios, respectively.

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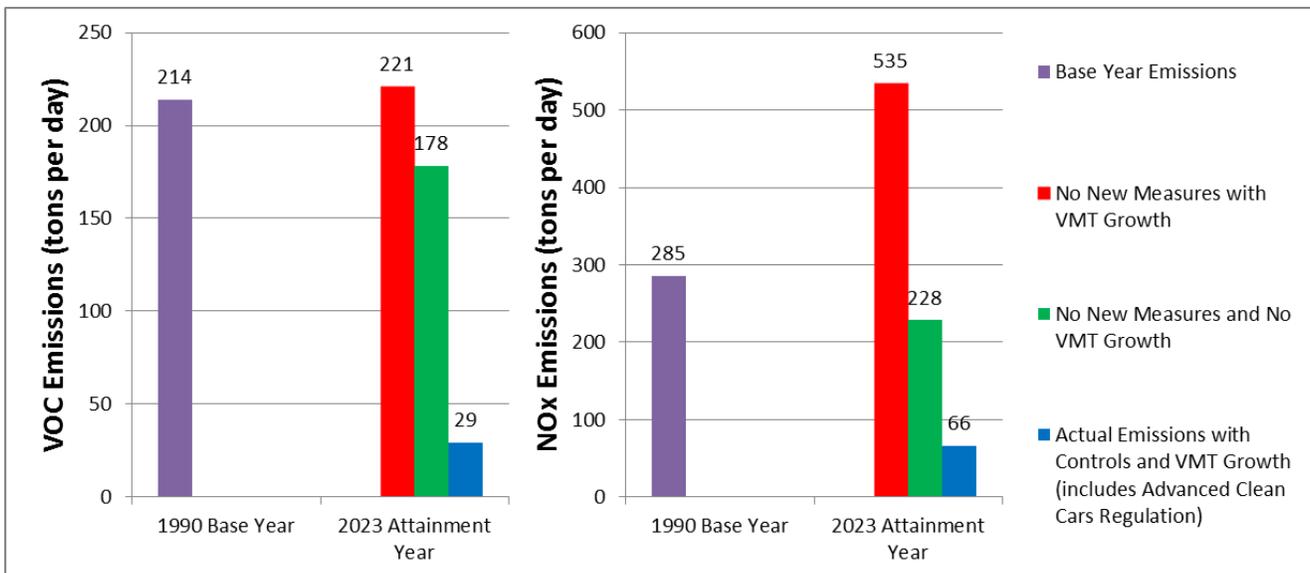
<sup>8</sup> U.S. Environmental Protection Agency [EPA]: Office of Transportation and Air Quality. (2012, August). *Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Traveled* (EPA-420-B-12-053). Retrieved from <http://www.epa.gov/otaq/stateresources/policy/general/420b12053.pdf>

<sup>9</sup> EMFAC is California's model for estimating emissions from on-road vehicles operating in California; EMFAC2011 is the most recent update. All model runs were for the San Joaquin Valley Air Basin using average summer emissions.

**Figure 4-2 VOC and NOx Emissions Using Valley “2013 FTIP” VMT for 1-Hour Ozone Planning**



**Figure 4-3 VOC and NOx Emissions Using Valley “2013 FTIP” VMT for 8-Hour Ozone Planning**



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