Chapter 3

What is Needed to Demonstrate Attainment?

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Chapter 3: What is Needed to Demonstrate Attainment?

3.1 INTRODUCTION

This chapter describes what is needed to demonstrate that the San Joaquin Valley can attain the federal air quality standards for 8-hour ozone by the statutory attainment date. To understand the scope of this effort, it is helpful to consider local challenges, such as the San Joaquin Valley's natural conditions, population growth, and jurisdictional limitations. Computer modeling is used to determine the quantity of emissions reductions that the District will need to demonstrate attainment of the standards.

3.2 CHALLENGES

3.2.1 Natural Conditions

The topography and climate in the San Joaquin Valley create ideal conditions for generating and trapping ozone precursors, and then creating and retaining ozone air pollution. Comprising nearly 25,000 square miles, the San Joaquin Valley Air Basin (SJVAB) is a continuous inter-mountain valley (Figure 3-1). On the western edge is the Coast Mountain range, with peaks reaching 5,020 feet, and on the east side of the Valley is the Sierra Nevada range with some peaks exceeding 14,000 feet. The Tehachapi Mountains form the southern boundary of the Valley. This mountain range includes peaks over 6,000 feet and contains mountain passes to the Los Angeles basin and the Mojave Desert.

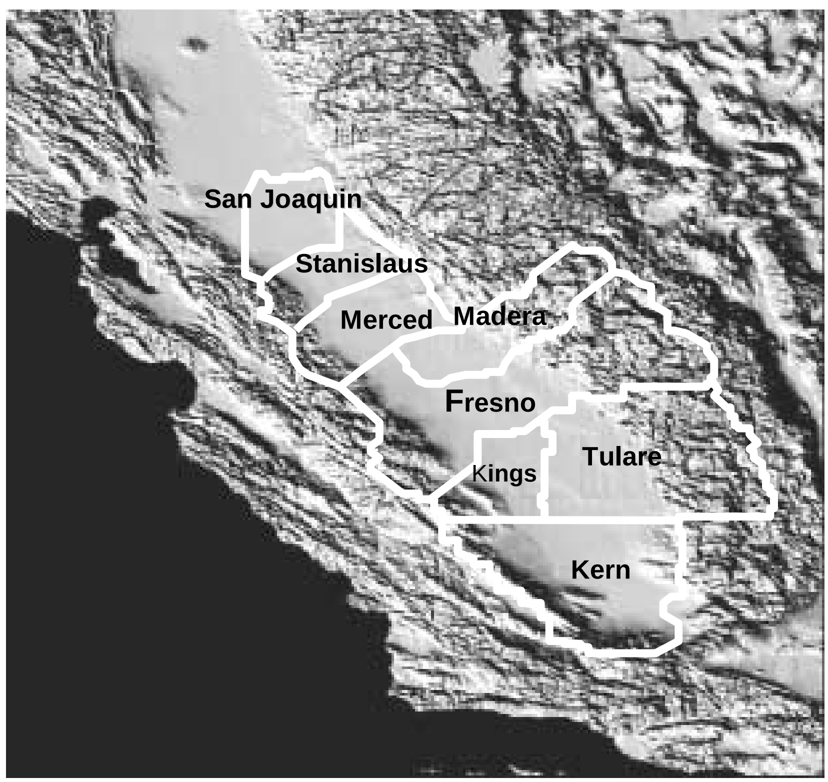


Figure 3-1 San Joaquin Valley Topography

Low precipitation levels, high temperatures, and light winds in the SJVAB are conducive to elevated ozone levels. The SJVAB averages over 260 sunny days per year. Nearly 90 percent of the annual precipitation in the SJVAB falls between the months of November through April, although average annual rainfall for the entire SJVAB is about 10 inches on the valley floor. Annual rainfall totals vary from north to south, with northern counties experiencing as much as 11 inches of rainfall and southern counties experiencing as little as four inches per year (District 2003). The eastern SJVAB experiences more rainfall than western areas.

The Valley floor experiences hot, dry summers and foggy winters. The average temperature for Fresno from 1948 to 2004 was 63.3°F. Over the same time period, Fresno averaged 106.3 days per year with temperatures over 90°F. Daily high temperature readings in July averaged 98°F. Fresno averages 36 days per year with temperatures 100°F or hotter (Western Regional Climate Center 2005).

Inversion layers and vertical mixing can also influence ambient air quality. Whereas temperatures in the atmosphere usually decrease with height above the surface, a temperature inversion is when temperature increases with height in part of the atmosphere (Figure 3-2). The base of the inversion, which is also known as the mixing height, acts as a lid on the atmosphere, trapping pollution by limiting vertical dispersion. During inversion events, air pollutant emissions build up, ozone precursors then react to form ozone, and ozone levels increase from day to day.

Winds (at ground level or at higher altitudes) transport pollutants from other basins into the Valley, within the Valley to areas downwind, and from the Valley into other regions. Figure 3-3 depicts typical wind flow patterns for day and night during the ozone season in the SJVAB.

Figure 3-2 Vertical Dispersion, With and Without Temperature Inversion

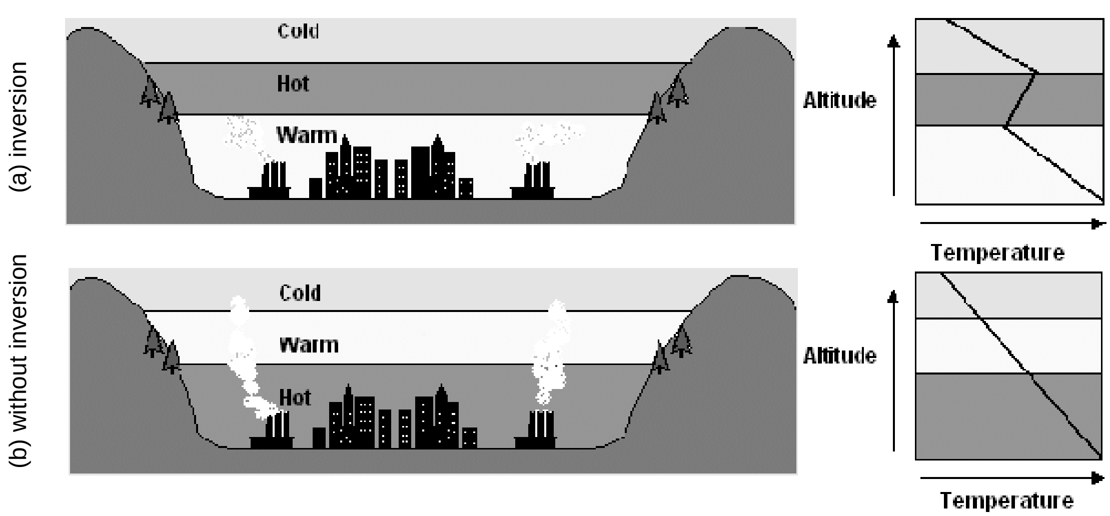
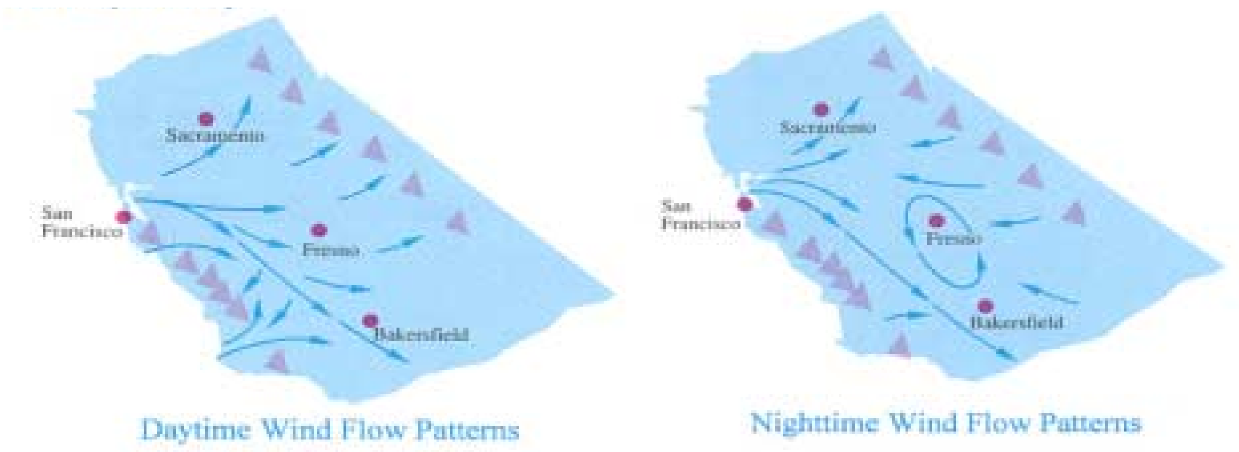


Figure 3-3 San Joaquin Valley Wind Patterns During Ozone Season
Source: SJVAQSPC 1996



The amount of pollution transported from other areas into the Valley varies. During the daytime, surface winds pick up ozone precursors emitted in the Bay Area and transports them down the SJVAB where they can eventually form ozone. The impact of pollutants transported from other air basins into the Valley generally declines from north to south (ARB 2001).

Precursors originating in the SJVAB are also transported within the Valley. Local emissions are thought to be more responsible for the Valley's worst ozone air quality. Transport moves precursor emissions from Valley source areas (Stockton, Modesto, Merced, etc.) south towards areas southeast of Fresno and around Bakersfield, where they are converted to ozone. Monitoring locations for Parlier, Edison, and Arvin (see Figure 1-3) often experience the highest ozone levels in the SJVAB.

Transport can also move Valley pollution into other air basins. During the daytime, heated air rises into the mountains and transports ozone and other pollutants up the Sierra Nevada, Tehachapi, and Coastal Mountains. According to the ARB, the Valley's pollution can affect ozone air quality in the broader Sacramento area, the Great Basin valleys, the mountain counties, the Mojave Desert, and the north central and south central coasts, depending on meteorological conditions (ARB 2001).

However, some pollution is not transported into other basins, but back into other parts of the Valley. At night, the air is no longer able to exit the southern end of the SJVAB because it encounters cooler drainage winds from the surrounding mountains, so it is forced back north in a circular flow pattern (Figure 3-3) known as the Fresno eddy. The eddy circulates pollutants in a counterclockwise pattern and returns polluted air to urban areas where more precursors are added the next day. Throughout the Valley, some of the pollutants transported to higher altitudes from daytime heating return to the Valley floor at night because of drainage winds from the mountains.

Transport studies increase understanding of how pollution from other areas may impact the Valley as well as how pollution originating in Valley areas may impact other places both within and beyond the Valley. Improved emissions inventories, improved databases on meteorological behavior and atmospheric chemistry, and improved grid-based photochemical models all contribute to ongoing studies that will enhance our understanding of pollutant transport. Future District plans will incorporate any significant advances in knowledge regarding transport as it becomes available from ARB and other agencies.

3.2.2 Population Growth

Increased population, which results in increased vehicle activity and more consumer product use, leads to increased emissions of ozone precursors, undermining the progress made by regulations. Table 3-1 shows population estimates for the eight counties of the SJVAB by county, including projections to 2020. In 2006, 9.9% of California's population resided in the SJVAB (California Department of Finance 2005). This is projected to grow slightly, with 11% of California's total population residing in the San Joaquin Valley in 2020. Between 2002 (the base year for 8-hour ozone planning purposes) and 2020, the population of the San Joaquin Valley will grow by 43%. In contrast, the total population for the State of California will grow 24% over the same time period.

Table 3-1 SJVAB Population by County

County	2002	2008 Projection	2014 Projection	2020 Projection	% Change, 2002-2020
Fresno	837,459	925,588	1,015,838	1,114,654	33
Kern [a]	580,794	653,864	718,656	789,068	36
Kings	135,218	152,181	167,701	184,751	37
Madera	129,728	146,654	163,753	183,966	42
Merced	224,488	264,195	310,961	360,831	61
San Joaquin	608,594	713,435	844,074	989,462	63
Stanislaus	479,203	539,425	596,967	653,841	36
Tulare	384,650	433,356	485,889	543,749	41
TOTAL	3,380,134	3,828,698	4,303,839	4,820,322	43

[a] Valley portion; Kern County has portions located outside of the San Joaquin Valley Air Basin.

Source: Developed using Population Trends Reports, California Department of Finance (2005)

3.2.3 Jurisdictional Limits and Regulatory Authority

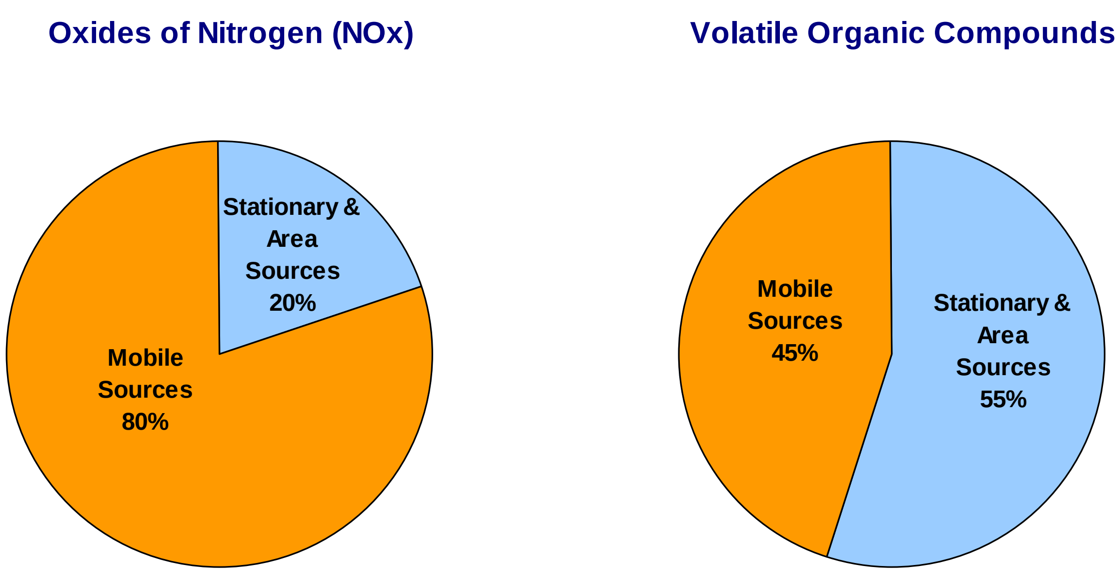
Attainment of air quality standards for 8-hour ozone and the reduction of precursor emissions in the SJVAB require the cooperation of local and/or regional, state, and federal governments. At the federal level, the EPA is responsible for establishing federal motor vehicle emission standards. The EPA is also responsible for reducing emissions from locomotives, aircraft, heavy duty vehicles used in interstate commerce, and other sources such as off-road engines that are either preempted from state control or best regulated at the national level.

The ARB establishes emission standards for on-road motor vehicles and some off-road sources. The ARB also establishes fuel specifications and develops consumer product standards for meeting air quality goals in California. Other state agencies such as the Department of Pesticide Regulation (DPR), California Department of Transportation (CalTrans), and the Bureau of Automotive Repair also have responsibility for certain emissions sources.

Districts like the San Joaquin Valley Air Pollution Control District have authority to regulate stationary sources and some area sources of emissions. Districts cooperate with Regional Transportation Planning Agencies (TPAs) to develop measures affecting local transportation activity that are included in a SIP. In turn, the TPAs coordinate the process to identify and evaluate potential control measures and compile local government commitments that will be included in the local or regional air quality plan.

The primary jurisdiction of the District is therefore limited to just part of the total emissions inventory (Figure 3-4). Based on summer-average 2005 inventories developed for this plan, 20% of the total NOx inventory for the SJVAB is under the primary regulatory jurisdiction of the District, and 55% of the total VOC inventory for the SJVAB is under the primary regulatory jurisdiction of the District.

Figure 3-4 Ozone Precursors by Source Type[1]
(Based on Summer Emissions Inventories, O3 SIP (v1.06_RF980))



[1] Please note that Mobile Sources includes on-road and off-road sources. For NOx, 67% of the total mobile source emissions in 2005 come from on-road sources, and 33% of the total mobile source emissions come from other mobile sources. For VOC, 57% of the total mobile source emissions come from on-road sources, and 43% of the total mobile source emissions comes from other mobile sources.

Although the responsibility for establishing the tailpipe emissions standards for the mobile sources belongs to state and federal governments, additional reductions are needed to reach attainment. Therefore, the District is also proposing measures, such as trip reduction, green contracting, and enhanced indirect source review, to provide additional mobile source emissions reductions for this plan and will continue to use incentive programs to accelerate mobile source emissions reductions.

3.3 MODELING

Air quality models simulate the formation, transport, and removal of ozone from the lower atmosphere to predict ozone concentrations in future years. The models are computer programs that estimate the contribution of ozone from emissions, natural conditions, and chemical changes. Modelers used state of the art procedures to perform modeling for this plan, including implementing a comprehensive measurement program, formulating and formatting model ready data inputs, running the model, comparing the model prediction to the base case, developing future year emissions scenarios, and running those with the model to predict future ozone levels. The goal of these modeling exercises is to formulate a controlled emissions scenario where ozone levels will achieve the federal 8-hour ozone standards. Appendix F provides more information on the modeling conducted for this plan.

3.3.1 Model Choice

The EPA-approved "Comprehensive Air Quality Model with Extensions" (CAMx) modeling system was chosen to estimate the amount of emissions reductions needed to achieve standards. A meteorological model, Mesoscale Model version 5 (MM5), was used to drive the transport and dispersion in the CAMx model. Modelers choose the [California] Statewide Air Pollution Research Center (SAPRC) chemical mechanism for final run, which is slower computationally than other mechanisms but treats the chemical production of ozone in more detail. The choice of the modeling system was a consensus among the modelers and stakeholders in Central California. Discussion of these choices in models occurred through the Central California Ozone Study (CCOS) and the Northern California SIP/Transport Working Groups. In addition to calculating ozone and other pollutant concentrations, this model also has the ability to diagnose problems with individual processes that simulate the creation, dispersion, and deposition of pollutants.

3.3.2 Base Case

Two modeling episodes were chosen for use in this plan: July 31-August 2, 2000 and July 11-12, 1999. Another episode in September 2000 was attempted, but to date, model performance has been poor and consequently this episode has not been used. Episodes in 2000 were partially chosen because they fall within the intensive CCOS monitoring period where a comprehensive data set to use in modeling is available. The 1999 episode was chosen because the Bay Area Air Quality Management District (BAAQMD) believed ozone was representative of their concentrations. In addition to selecting the model, the CCOS technical committee and Northern California SIP/Transport working group chose these episodes.

For both the 1999 and 2000 episodes, emissions and meteorological conditions simulated ozone levels that were near design values at key air monitoring sites. In general, modeling of these episodes met performance standards, but some concentrations were under-predicted at sites in the SJVAB. During the July – August 2000 episode, meteorology was unusually conducive to creating ozone. A comparison of this episode to historical cases indicates that some days of the episode were extreme meteorological and pollutant events. For July 1999, statistical analyses also showed that meteorology was unusually conducive for forming ozone. According to EPA guidelines, although unusual, these pollutant and meteorological characteristics are the average worst case, which make them good candidates for modeling. However, for these episodes, typical meteorological features that have been seen in the past, such as, slope, eddy, and marine flows were evident. The episodes did represent the transport and dispersion that have been observed historically in Central California. In accordance with EPA guidance, modelers now use a relative reduction factor (RRF), which scales the reductions required to achieve the standard to the present design value, to address issues regarding the representativeness of the ozone concentrations measured in the episodes (see Section 3.3.4 and Appendix F).

During the July 30-August 2, 2000 base case, a large wildfire produced ozone precursors that affected air quality in the San Joaquin Valley. Future year modeling was done with wildfires removed. Additional days were modeled to include the ramp up of ozone during these events.

3.3.3 Weight of Evidence

A weight of evidence approach compares conceptual descriptions, episode categorization techniques, adjusted air quality trends, and hydrocarbon analysis to modeling results. The purpose of these additional analyses is to provide additional (i.e. beyond photochemical modeling) insights into ozone behavior in the atmosphere. As noted in EPA's modeling guidance for 8-hour ozone, "Corroborative evidence should accompany all modeled attainment demonstrations" (EPA 2005). Please see Appendix F for more information on weight of evidence.

3.3.4 RRF

The relative reduction factor (RRF) is a monitor-specific value that is calculated by dividing the average simulated, future year daily peak 8-hour ozone concentration by the average simulated base year daily peak concentration. The baseline year monitored design values are then multiplied by the RRFs to predict future-year 8-hour design values for each monitor site. Use of RRF allows the output of photochemical models to be used in a relative, rather than absolute, sense. See Appendix F for more information on RRF.

3.4 CARRYING CAPACITY

Using the most recent emission inventory available, modelers ran various combinations of NOx and VOC emissions reductions. The combinations generated a data set of predicted ozone levels as a function of percentage reductions of anthropogenic NOx and VOC emissions. The data was plotted as carrying capacity diagrams, which shows the level of emissions that the atmosphere can "carry" and still demonstrate attainment. Planners looked at the combinations of VOC and NOx percentage reductions that are needed to attain the standard and then developed a corresponding control strategy.

The carrying capacity modeling runs were conducted with an episode-specific emission inventory based on O3SIP 1.06 (Table B-4). The 2020 baseline emission inventory values used in the modeling were 302 tons per day of NOx and 308 tons per day of VOC. The 2023 modeling recently provided by ARB used baseline values of 300 tons per day NOx and 415 tons per day VOC. For both modeling exercises, the baseline values were cut in 20% increments, and the Valley's NOx carrying capacity for ozone was estimated as ranging between 180 tons per day with a 50% anthropogenic VOC reduction, and approximately 160 tons per day with no VOC reductions.

Although all sites in the Valley must be within the standard for the Valley to be redesignated into attainment, some sites will be within the standard before others. As shown in Appendix F, carrying capacity diagrams show that approximately 49% reduction of NOx emissions from the 2020 baseline throughout the Central California modeling domain is needed to achieve the 8-hour average ozone NAAQS in the San Joaquin Valley. 2023 modeling indicates that a 47% reduction is needed from the baseline inventory used for 2023 modeling. This amount of control is driven by the reductions needed to achieve the NAAQS at the air quality monitor location near Arvin (see Figure 1-3 in Chapter 1 for the Arvin monitoring site location). Other sites will be within the standard earlier, with fewer reductions. For instance, a 15% domain-wide reduction of 2020 NOx emissions is needed to demonstrate concentrations within the 8-hour ozone NAAQS at Parlier, the monitoring site downwind of Fresno in the central portion of the Valley with historically the worst air quality in the Central San Joaquin Valley. By 2020, the carrying capacity diagrams suggest that the Fresno-Sierra Sky Park monitoring site will need the most reductions to achieve the NAAQS in the Central SJV. The details of the amount of reductions needed for Fresno-Sierra Sky Park are discussed below. Sites further north, such as Merced, Modesto, and Stockton are projected to be in attainment for the NAAQS by 2020.

Carrying capacity diagrams (available in Appendix F) also indicate qualitatively whether a strategy of reducing only VOC emissions, a NOx-only strategy, or a combination strategy is needed to achieve the NAAQS. When the lines on the diagrams are more horizontal, this indicates that more NOx control is needed. When they are more vertical, a control strategy requires more VOC control. For some areas that are still out of attainment in 2020, the attainment (85 ppb) lines on the carrying capacity diagrams are flat indicating a need for NOx control. However, the carrying capacity diagrams also show that the lines are curved in the upper right hand portion of the plots. This indicates VOC control would be advantageous in the beginning years of the control program.[2] Thus, for 2020, a strategy based on only NOx control is our principal interest. VOC controls are considered for the purpose of decreasing ozone levels faster in the initial stages of the control strategy.

Figures 3-5 and 3-6 show that for the sites near Arvin and at Fresno-Sierra Sky Park that are projected to have the worst air quality problems in 2020, reductions in VOC emissions will assist in reducing ozone levels early on in the control program, but will not change the NOx carrying capacity measurably. These carrying capacity diagrams are used to assess the amounts of NOx and VOC reductions needed to achieve the NAAQS. The x-axis is the percentage of anthropogenic VOC emissions that were run through the ozone model and y-axis is the percentage of anthropogenic NOx emissions. Lines on the plots represent equal concentrations of eight-hour averaged ozone in ppb. These lines are the projection of the design value for each pair of NOx and VOC emissions inventory percentages. The broad solid red line on the plots is 85 ppb, below which the NAAQS for eight-hour average ozone is attained; the other solid red lines indicate regions of emissions control that exceed the NAAQS. The dashed green lines represent areas on the plots where attainment is projected to be reached given that percentage of NOx and VOC inventories. Each point below on the bolded line would represent the amount of VOC and NOx needed to achieve the NAAQS. For instance, at Fresno-Sierra Sky Park, 75% of the NOx inventory would achieve attainment at VOC inventories of 75% or less. As an alternative, 80% of the NOx inventory and 60% of the VOC inventory would achieve attainment.

The carrying capacity diagrams show that as NOx reductions are first achieved VOC reductions are useful for control of ozone. This is indicated by the curved lines in the upper right hand corner of the graphs. However, as more NOx is reduced the curved lines transition to flat indicating that further VOC emissions reductions are not useful. For example, on the carrying capacity diagram for the Arvin monitoring location, starting from the top right hand corner, the fastest route to the next line (representing 98 ppb) would be to reduce both VOC and NOx by about 2% or 98% of the inventory. The lines on the curves become much straighter at about 80% indicating that at that point a NOx control strategy would be more advantageous.

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[2] Carrying capacity diagrams produced for the District's *2004 Extreme Ozone Attainment Demonstration Plan* (for 1-hour ozone) indicated a need for NOx and VOC emission reductions for demonstrating 2010 attainment of the 1-hour ozone NAAQS (using the Bakersfield location).

Figure 3-5 Arvin Monitoring Location Carrying Capacity, 2020

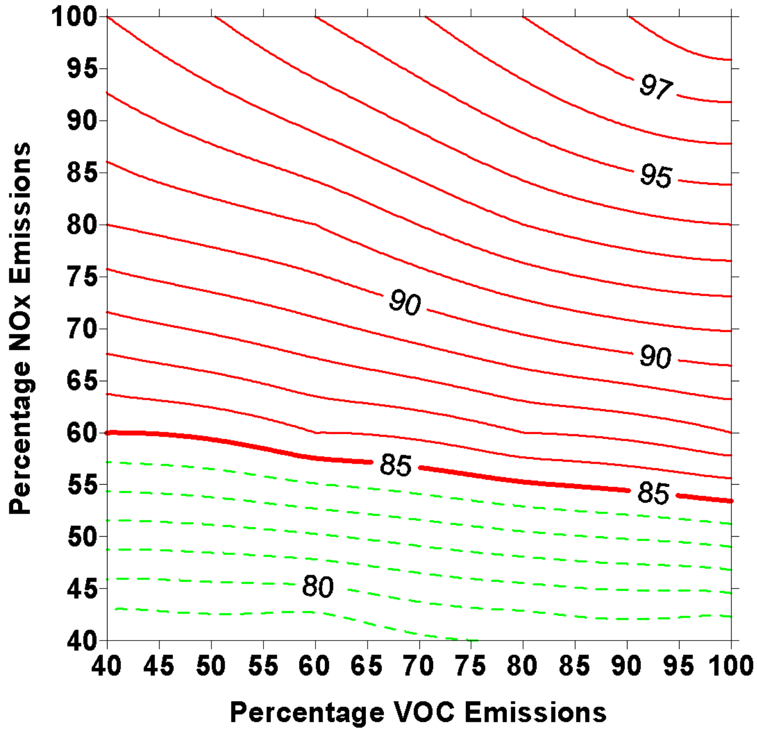
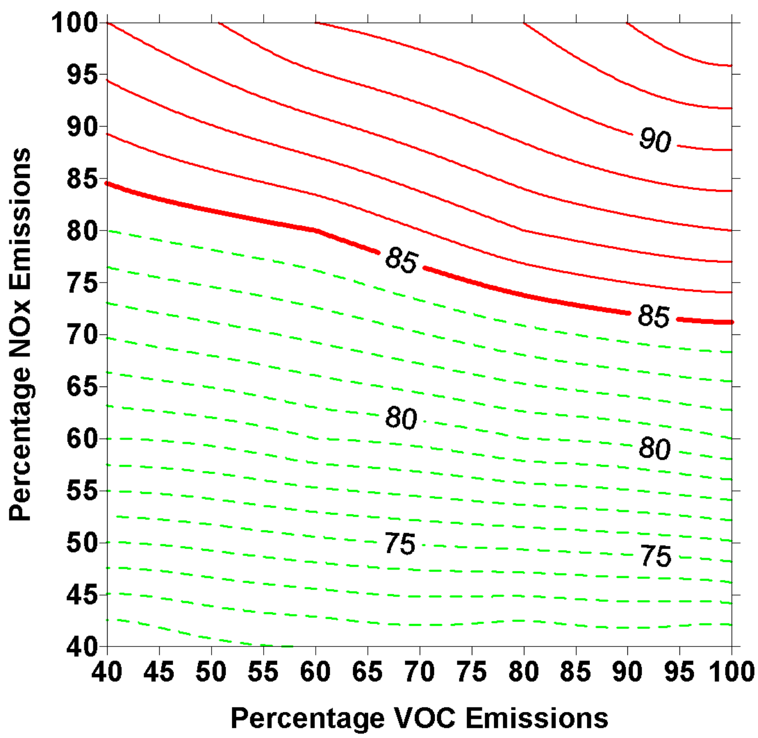


Figure 3-6 Fresno-Sierra Sky Park Carrying Capacity, 2020



For other sites in the SJV that are nearer attainment, NOx and VOC reductions are needed to achieve the NAAQS. Appendix F, shows that attainment lines for those sites that are projected to be in attainment by 2020 are curved or slanted in a way indicating that both NOx and VOC reductions are needed. Plots of nonattainment sites other than Arvin and Sierra Sky Park indicate that the region around the attainment line would benefit from both NOx and VOC controls. Using the RRF, and 40 ppb offset[3], the preferred method of calculating attainment, as shown in the lower right of the carrying capacity pages in Appendix F, one would conclude that for sites other than the highest ozone sites, a NOx and VOC reduction strategy would be the most expeditious route to attainment.[4] This would support the conclusion that VOC controls in early years would be beneficial to attaining the NAAQS. Recent modeling for 2023 confirms results established from 2020 modeling.

As described to this point, carrying capacity diagrams typically only show how ozone responds to percent reductions off of a particular emission inventory. These same graphs can also show absolute carrying capacities in tons per day of emissions. This type of carrying capacity diagram is created by multiplying percent reductions by the baseline emission inventory used for modeling. Figure 3-7 and Figure 3-8 show modeling responses for the monitoring site near Arvin with emission units in tons per day of VOC and NOx instead of percent. One item that becomes evident when looking at tonnage based carrying capacity diagrams is that the baseline emission totals play a critical role in establishing the range of emissions over which ozone concentration information can be obtained. For example, since 2020 is expected to have significantly fewer emissions than currently exist in the inventory, 2020 modeling results cannot be used to evaluate ozone responses at current emission levels near 600 tpd of NOx.

In order to compare changing emission levels at numerous sites, the attainment target (85 ppb 8-hour ozone line) can be extracted from site-specific carrying capacity diagrams and displayed on the same graph. Figure 3-9 and Figure 3-10 combine the attainment lines from the Arvin, Edison, Bakersfield-California, Fresno-Sierra Sky Park and Parlier carrying capacity diagrams of Appendix F onto one graph. Because many sites in the valley were modeled in attainment with the 2020 and 2023 inventories their carrying capacities cannot be determined because their attainment lines are at emission levels that are higher than those modeled. In order to show the attainment lines for sites in attainment in 2020 and 2023, the 85 ppb line was acquired from preliminary 2012 modeling. Merced, Visalia and Turlock were selected from the preliminary 2012 modeling to add to the graph. Because the attainment lines for these locations are based on preliminary modeling using older inventories and a different modeling year their carrying capacities have been used as guidance only.

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[3] The lower right hand corner plots shown in Appendix F use the RRF and a 40 ppb offset to predict the future design value ozone concentration. This method was agreed to by ARB and District modelers to be the best representation of the amount of ozone precursor emission reduction needed to achieve the NAAQS. This method of estimation subtracts 40 ppb background levels from the RRF calculation and then adds it back in again after the design value is scaled by the RRF. In this manner, the background in the model is correctly not affected by the control of anthropogenic emissions. Modelers generally consider 40 ppb to be a viable background ozone concentration.

[4] Carrying capacity diagrams in Appendix F that have ozone isopleths (plots for sites in attainment have no isopleths), other than Arvin or Fresno Sierra-Skypark, show isopleths that are not completely horizontal.

Figure 3-7 Arvin Monitoring Location Carrying Capacity (TPD), 2020

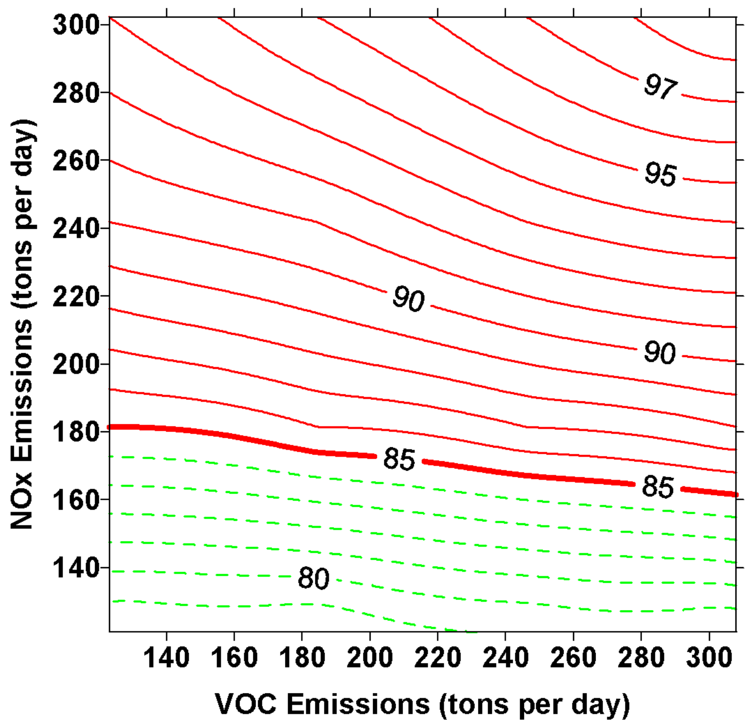
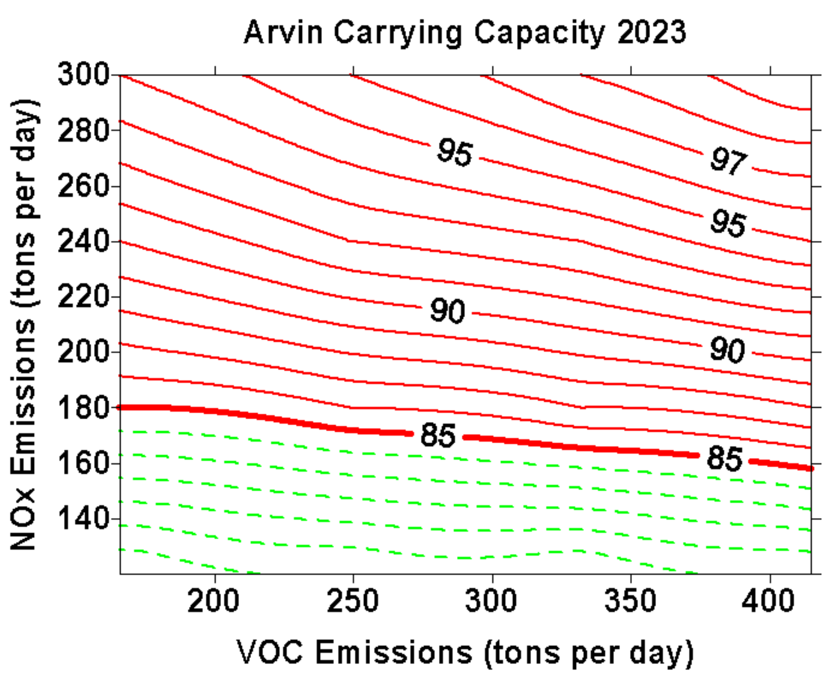


Figure 3-8 Arvin Monitoring Location Carrying Capacity (TPD), 2023



To evaluate the effectiveness of attainment strategies, the baseline emission inventory and the proposed SIP strategy were also plotted on Figure 3-9 and Figure 3-10. The SIP Strategy is shown in black and the baseline emissions inventory is gray. The SIP Strategy emission line from 2020 and 2023 is shown as a dashed line to indicate Advanced Technology as described in other parts of this plan. By following the emission inventory projections on the graph, one can determine which sites will be in attainment for a given year and how variations in the control strategy can produce different attainment results. This type of analysis assumes that the atmosphere can only hold a limited about of VOC and NOx before enough ozone is produced to exceed the attainment standard. The amounts of emissions dictate the attainment status, not the year. The year is only important because it is used to estimate the level of emissions for that year. For example, the site near Arvin can only hold about 160 tons per day of NOx before the standard is exceeded. It does not matter what year 160 tons per day is reached, only that attainment will not occur until NOx emissions drop to near 160 tons per day.

To utilize this type of analysis, it is assumed that emission patterns, VOC reactivity and other modeling parameters hold constant over time. This assumption implies that controls are applied evenly throughout the Valley and that similar types of anthropogenic emissions exist in years leading up to and including the modeling year. For example, if transportation patterns in 2008 are extremely different from those of 2020 (the modeling year) it might not be reasonable to assume that 300 tons per day of NOx in 2008 would produce that same ozone concentration at the same site in 2020. When considering all uncertainties in modeling, however, this variation is considered minor.

Figure 3-9 Attainment Carrying Capacities for Selected Sites, 2020 Modeling

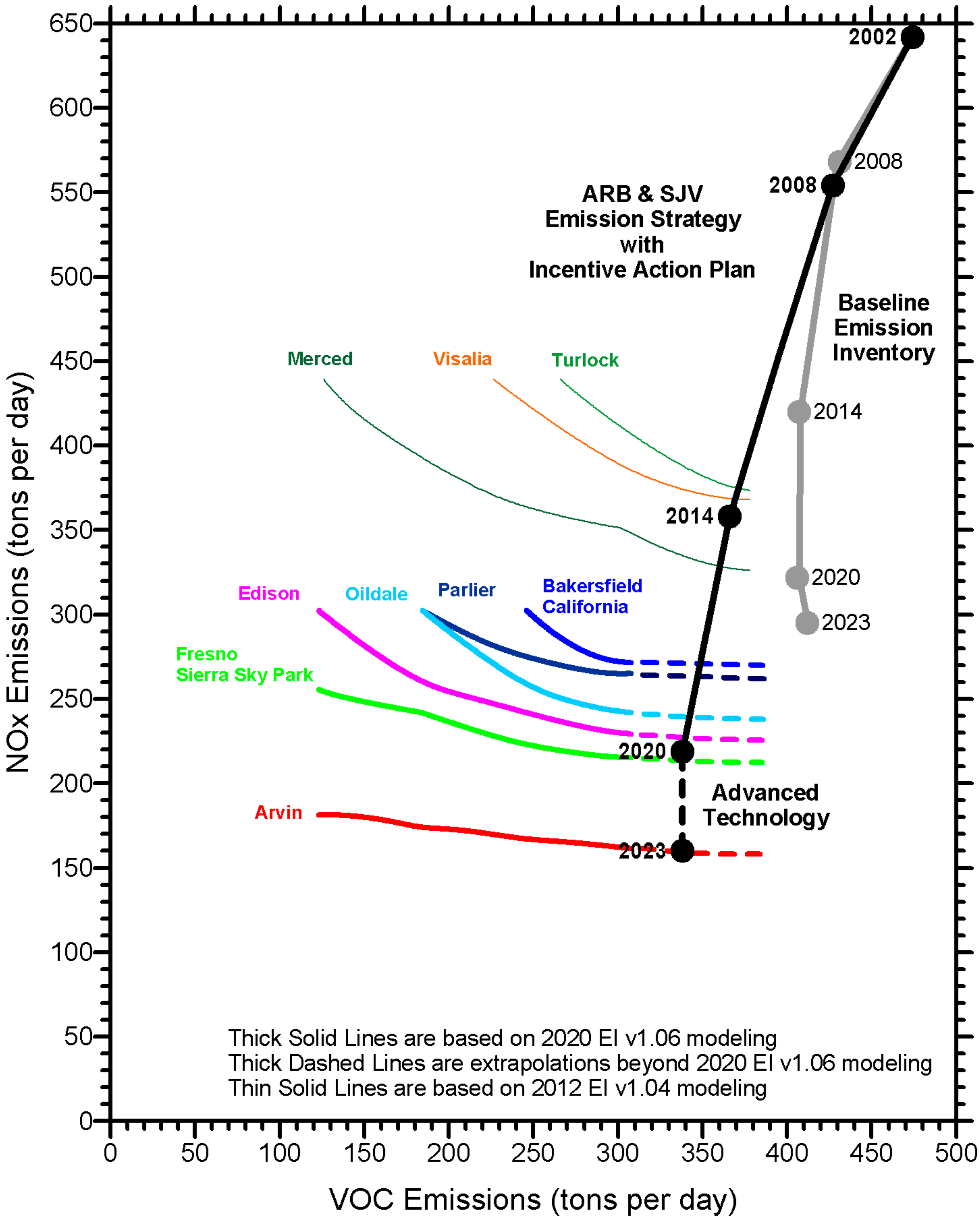
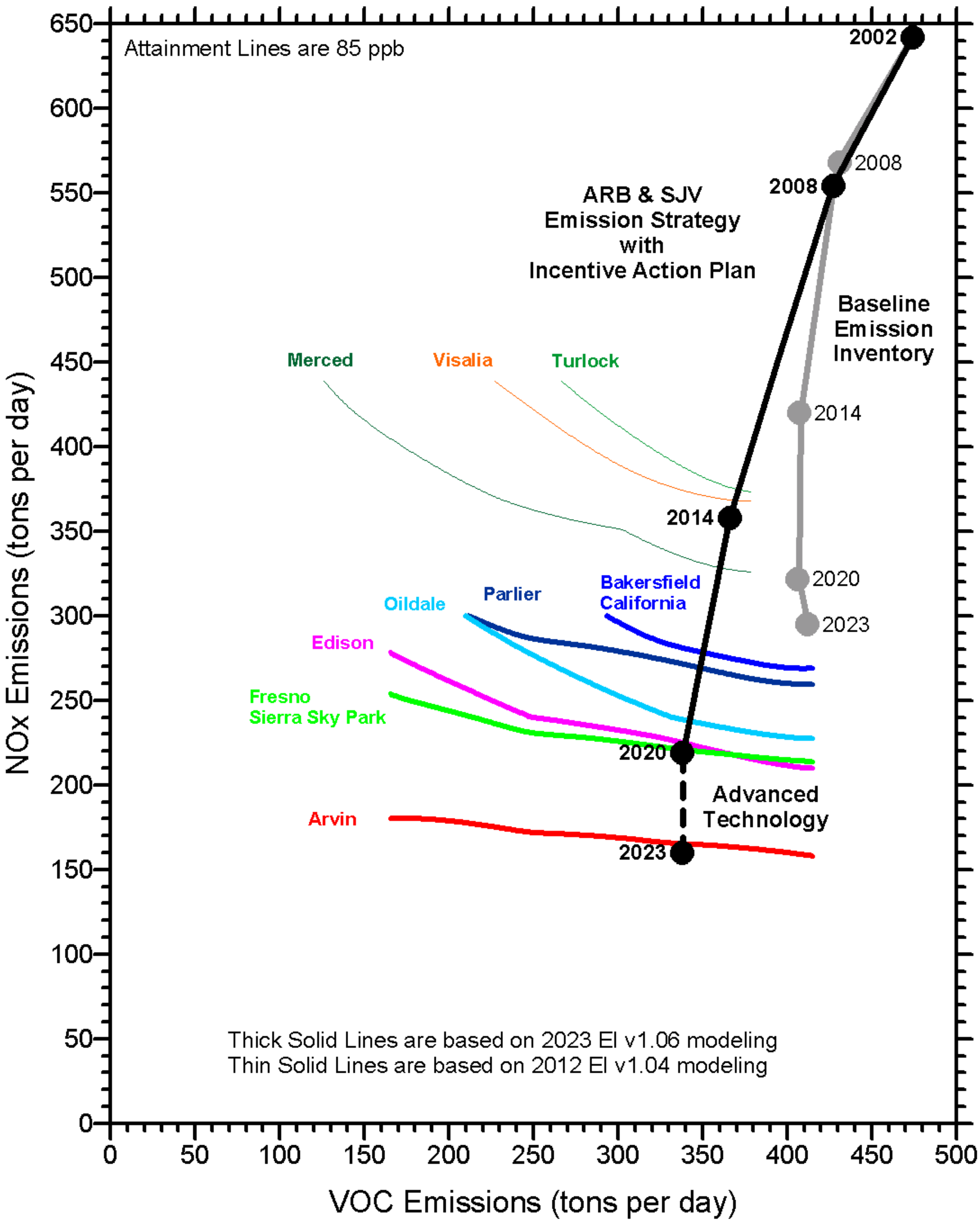


Figure 3-10 Attainment Carrying Capacities for Selected Sites, 2023 Modeling



3.5 PM2.5 CONSIDERATIONS

In preparing the *2007 Ozone Plan*, consistent with our guiding principle number 7, the control strategy in this plan is developed with utmost consideration to future needs for the upcoming PM2.5 attainment plan. The District elected not to prepare an integrated PM2.5/8-hr ozone plan for June 15, 2007 delivery to EPA for a variety of reasons. First, the standard is in flux. On October 17, 2006 EPA announced that it is lowering the 24-hr PM2.5 standard from 65 micrograms/cubic meter (this level is also referred to as the 1997 PM2.5 standard) to 35 micrograms per cubic meter, and that it would retain the annual PM2.5 standard of 15 micrograms/cubic meter (effective December 18, 2006). Second, although PM2.5 plans for the 1997 PM2.5 standards are due April 5, 2008, EPA still has not released the rule implementing these standards, and release of the rule may be further delayed by the December 22, 2006 U.S. Court of Appeals for the D.C. Circuit Court decision vacating the Phase I rule implementing the 8-hr ozone standard. Implementation rules for standards describe and finalize the planning requirements for the standards, so it is often prudent to develop the planning documents after the implementation rule is finalized. Third, the state of PM2.5 modeling for the San Joaquin Valley Air Basin is such that preliminary modeling results will not be available until the summer of 2007 at the earliest. This modeling is using state of the science tools developed with data gathered from the $30 million field programs studying air pollution in the San Joaquin Valley. The District plans to begin work in earnest on the PM2.5 Plan after the *2007 Ozone Plan* is adopted and transmitted to ARB.

Even though the District did not develop a combined PM2.5 and 8-hr ozone plan, the District wanted some indication (order of magnitude estimates) of the Valley's PM2.5 carrying capacity so that the District could gauge the effects of the Valley's 8-hr ozone emission control strategy on PM2.5 attainment. As a result, a simplified modeling exercise was conducted to help estimate the Valley's carrying capacity for PM2.5. The modeling exercise[5] indicated that the Valley's NOx carrying capacity for PM2.5 is between 370 and 420 tons per day.

Consequently, the San Joaquin Valley control strategy to attain the federal 8-hr ozone standard produces NOx emissions reductions that are close to what is needed for attainment of the 1997 PM2.5 standards by the maximum possible statutory attainment date of April 5, 2015. This suggests that the ozone control strategy will provide most – if not all - of the reductions needed to attain the PM2.5 annual standard, based on simple modeling exercises. There is a possibility that some additional NOx emissions reductions from incentive-based measures may be needed to demonstrate attainment of the 1997 annual PM2.5 standard. Results from more sophisticated modeling to be released later in 2007 may change these conclusions and findings.

References

California Air Resources Board (ARB) (April 2001), Ozone Transport, California Environmental Protection Agency, Sacramento, California.

[5] The modeling that ARB conducted was a simplified version of what was done for the District's *2006 PM10 Plan*. For more information on this technique, see Chapter 5 and Appendix C in the *2006 PM10 Plan*.