4. CALIFORNIA 2018 PROGRESS STRATEGY

4.1. Introduction

The Regional Haze Rule requires states to submit a long-term strategy that addresses regional haze visibility impairment for the Class 1 Areas impacted by the emissions from that state. This 2018 Progress Strategy reflects the measures which are included in setting California's reasonable progress goals for the first progress period. The Rule requires that a state's strategy consider emission reductions from on-going control programs as well as specifically consider construction activity mitigation, source retirement and replacement, and smoke management techniques. Due to the severity of our air quality problems, California has long-standing programs to reduce emissions that comprehensively address all of these aspects. While the driver for California's control efforts has been to meet national and State air quality standards and protect public health, the emission reductions achieved also provide significant benefits for visibility. It is within the context of these broader air quality efforts that California is setting our visibility Progress Strategy for the first progress period ending in 2018.

California's 2018 Progress Strategy includes ARB, local air district, and U.S. EPA adopted control measures. Based on a recently updated inventory, between 2002 and 2018, NOx emissions and mobile source PM2.5 go down over 40 percent and 37 percent, respectively, Statewide. These reductions come primarily from ARB's mobile source control program. ARB's aggressive and innovative control measures, which go far beyond federal requirements, define a comprehensive and long-term basis for setting the reasonable progress goals. These measures address the main constituents of California's visibility problem, NOx, SOx, and directly emitted particulate matter emissions, and will have a very significant impact on improving visibility between now and 2018 in all Class 1 Areas throughout the State, as well as areas outside the State that may be impacted by California emissions.

ARB is responsible for controlling emissions from mobile sources (except where federal law preempts ARB's authority) and consumer products, developing fuel specifications, establishing gasoline vapor recovery standards and certifying vapor recovery systems, providing technical support to the districts, and overseeing local district compliance with State and federal law. The Department of Pesticide Regulation is responsible for control of agricultural, commercial and structural pesticides, while the Bureau of Automotive Repair runs the State's Smog Check programs to identify and repair polluting cars on a regular basis.

Local air districts are primarily responsible for controlling emissions from stationary and areawide sources (with the exception of consumer products) through rules and permitting programs. Examples include industrial sources like factories, refineries, and power plants; commercial sources like gas stations, dry cleaners, and paint spray booth operations; residential sources like fireplaces,

water heaters, and house paints; and miscellaneous non-mobile sources like emergency generators. Districts also inspect and test fuel vapor recovery systems to check that such systems are operating as certified.

U.S. EPA has the authority to control emissions from mobile sources, including sources all or partly under exclusive federal jurisdiction (like interstate trucks, some farm and construction equipment, aircraft, marine vessels, and locomotives based in this country). U.S. EPA also has oversight authority for State air programs as they relate to the federal Clean Air Act. International organizations develop standards for aircraft and marine vessels that operate outside the U.S. Federal agencies have the lead role in representing the U.S. in the process of developing international standards. The following sections describe the comprehensive suite of measures that comprise the 2018 Progress Strategy for California.

4.2 ARB Control Programs in 2018 Progress Strategy

Statewide, motor vehicle emissions contribute significantly to visibility impairment. For over four decades, ARB has been regulating automotive emissions. Due the severity of the air quality problem in California, ARB has some of the strictest control strategies in the nation. Adopted SIP measures have been developed over the years through the combined efforts of air pollution regulators – with a foundation of ARB's mobile source and fuels programs. ARB has adopted 46 emission-reducing control measures since the approval of the 1994 1-hour ozone SIP. The key focus areas of ARB's control measures are described below.

4.2.1 Mobile Sources

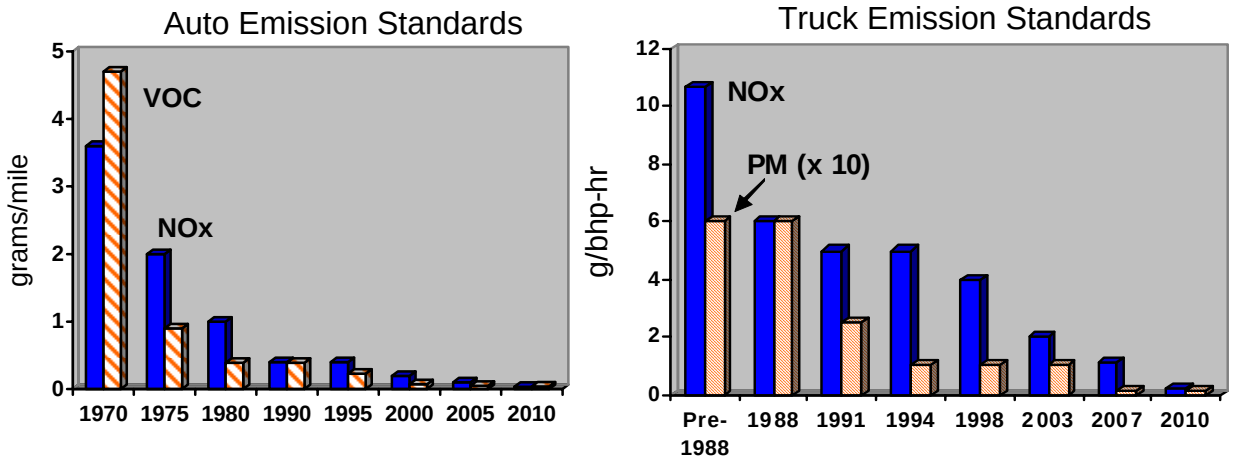
Cleaner Engines and Fuels

More than any other pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. California's ability to adopt vehicle emission standards that are more stringent than national standards has been fundamental to this success. The mobile sector continues to be the heart of the attainment effort with a new focus on vehicles and equipment already in use – the "legacy" or in-use fleet. California has dramatically tightened emission standards for on-road and off-road mobile sources and the fuels that power them. Figure 4-1 and Table 4-1, on the next page, show how dramatically the adopted measures have controlled emissions from new engines for the major categories of mobile sources.

California has led the way in adopting stringent regulations for passenger vehicles. Compared to uncontrolled vehicles, cars are now 99 percent cleaner. A new 1965 car produced about 2,000 pounds of ozone-forming VOC emissions during 100,000 miles of driving. In addition, to controlling vehicles, California has

also led the way in reducing smog forming emissions from gasoline. Reformulated gasoline has reduced smog-forming emissions by 15 percent and toxic air emissions by 40 percent. Overall, California's low-emission standards, coupled with reformulated gasoline, have cut that to less than 50 pounds for the average new car today. By 2010, California's standards will further reduce VOC emissions from the average new 2010 car to approximately 10 pounds.

Figure 4-1 California Emission Standards



ARB's first diesel engine regulations went into effect in 1988. Significant gains began with the introduction of California Clean Diesel fuel in 1993. Clean Diesel Fuel significantly reduced PM and SOx. U.S. EPA and ARB worked together to develop and adopt the next phases of on-road diesel engine control, with cleaner fuel in 2006 and even cleaner engines in 2007 that will reduce per-truck particulate matter emissions by another 90 percent. By 2010, new trucks will be 98 percent cleaner than new pre-1988 models, providing needed NOx reductions.

Table 4-1 Impact of Existing Standards and Emission Limits

Source	Controlled Since	Level of Control*
ON-ROAD		
Passenger Cars	1966	**99% in 2006 (VOC + NOx)**
Trucks and Buses	1988	**90% by 2007, 98% by 2010 (NOx)** **98% by 2007 (PM)**
Motorcycles	1975	**88% by 2008 (VOC + NOx)**
GOODS MOVEMENT		
Ship Auxiliary Engines (fuel)	2000	**96% (SOx), 83% (PM) by 2010**
Locomotives	1973	**60% in 2005 (VOC+NOx)**
Harbor Craft		**50% in 2004 (NOx)**
Cargo Handling Equipment		**95% by 2011-2012 (VOC+NOx, PM)**
OFF-ROAD SOURCES		
Large Off-Road Equipment	1996	**98% by 2015 (VOC + NOx)**
Personal Water Craft	1990	**88% by 2010 (VOC)**
Recreational Boats	1990	**89% by 2010 (VOC)**
Lawn & Garden Equipment	1990	**82-90% by 2010 (VOC)**
AREAWIDE SOURCES		
Consumer Products	1989	**50 categories controlled 50% (VOC)**

* Level of emissions control compared to uncontrolled source.

Working in concert with the U.S. EPA, standards for goods movement sources have also been cut dramatically. By requiring low-sulfur fuel, SOx emissions from ship auxiliary engines will be cut 96 percent by 2010. New locomotive engines are now 50-60 percent cleaner. Harbor craft emission standards were cut roughly in half. And new cargo handling equipment will be 95 percent cleaner by 2011.

California has also drastically lowered standards for off-road sources, from lawn and garden equipment, to recreational vehicles and boats, to construction equipment and other large off-road sources. From 2010 through 2014, these new off-road sources will be manufactured with 80-98 percent fewer emissions than their uncontrolled counterparts.

ARB has worked closely with U.S. EPA to regulate large diesel, gasoline and liquid petroleum gas equipment – where authority is split between California and the federal government – and by 2014, new large off-road equipment will be 98 percent cleaner. ARB has also made great strides in reducing emissions from the smaller engines under State control, from lawn and garden equipment, to recreational vehicles and boats. From 2010 to 2015, these new off-road sources will be manufactured with 82-90 percent fewer emissions than their uncontrolled counterparts.

Figure 4-2 Mobile Source Emissions in California

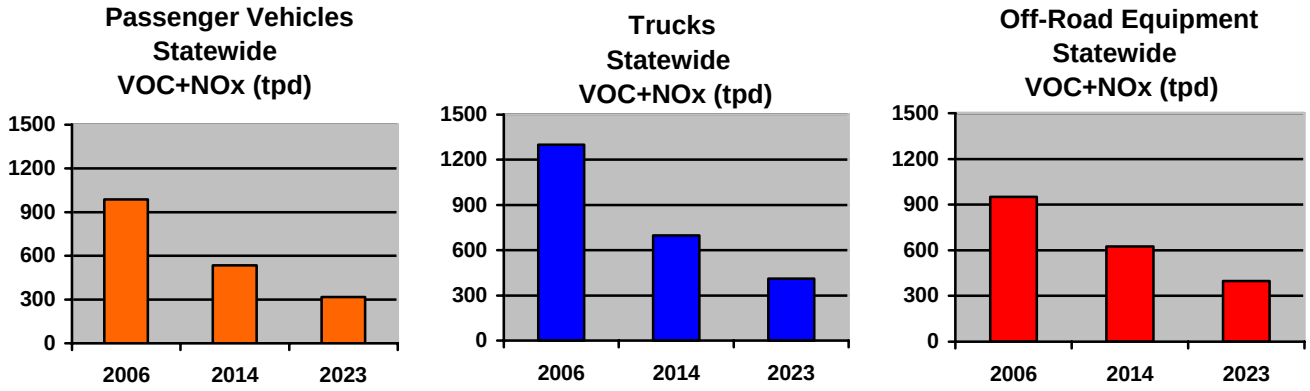
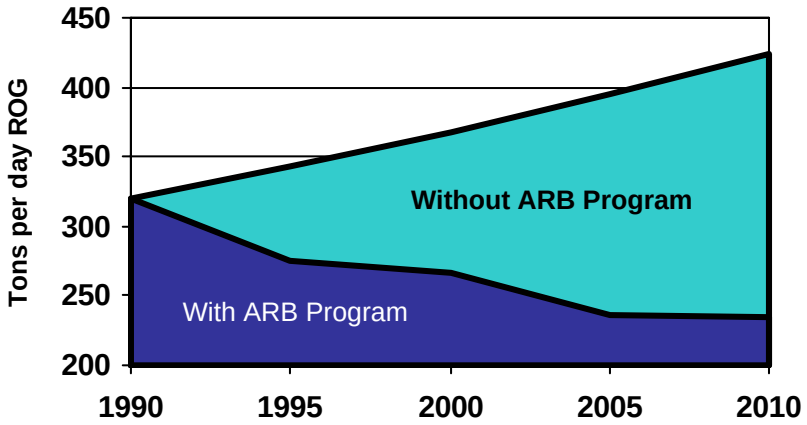


Figure 4-2 above clearly illustrates the benefits of adopted measures to reduce emissions from mobile sources despite significant population growth. The progress has been dramatic.

4.2.2 Consumer Products

ARB has adopted standards to limit emissions from nearly 50 consumer product categories (such as hair sprays, deodorants, and cleaning compounds), as well as over 35 architectural coatings and aerosol paints categories. The Board has adopted and implemented voluntary provisions to offer greater compliance flexibility to consumer product manufacturers while retaining the air quality benefits. Without these actions, VOC emissions from these products would be roughly 60 percent greater in 2010.

Figure 4-3 Consumer Product Emissions in California



4.2.3 ARB Diesel Risk Reduction Plan

An important source of directly emitted PM2.5 is diesel exhaust. The particulate matter from diesel-fueled engines (diesel PM) has been singled out as a particularly harmful pollutant and identified as a toxic air contaminant by ARB in 1998. Nearly 70 percent of the known cancer risk caused by air toxics is attributed to diesel PM. In 2000, ARB adopted a plan to reduce diesel PM emissions 85 percent by 2020, and has since adopted a number of regulatory measures to reduce diesel PM emissions Statewide. Additional measures are under development. Diesel PM control measures in the plan are reducing both direct diesel PM and NOx emissions through a combination of engine retrofits and replacements.

4.2.4 California Incentive Programs

In recent years, regulatory programs have been supplemented with financial incentives to accelerate voluntary emission reductions. Incentive programs like the Carl Moyer Program are both popular and effective. They also help to demonstrate emerging technologies that then can be used to set a tougher emissions benchmark for regulatory requirements. Most of the existing incentive programs are designed to pay for the incremental cost between what is required by regulation and advanced technology that exceeds that level. The incentive programs are publicly funded through fees paid by California vehicle owners as part of their annual registrations, smog inspections or new tire purchases. California is currently investing up to $170 million per year to clean up older, higher emission sources.

The support for clean air incentive funding from Governor Schwarzenegger, the Legislature, and California's voting public is reflected in the passage on November 7, 2006, of the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. The Bond Act includes $1 billion to accelerate the cleanup of air pollution caused by goods movement activities in California. Recently, ARB appropriated this money to fund emission reductions from activities related to the movement of freight along California's trade corridors. As with Carl Moyer, projects funded under this program must achieve emissions reductions not required by law or regulation.

4.3 Local Air District Control Programs in 2018 Progress Strategy

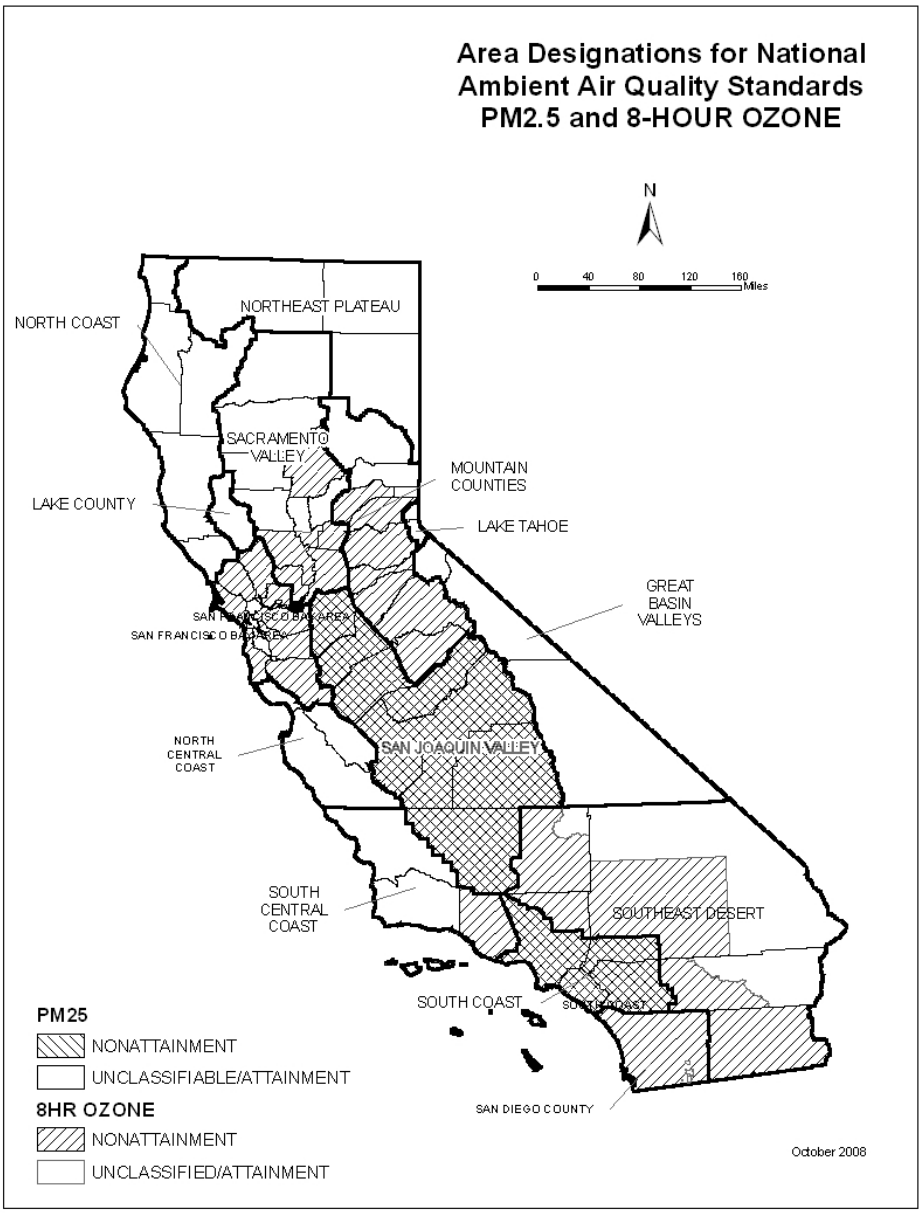
Businesses in California are subject to the most stringent air quality rules in the country. In California, local air districts are responsible for controlling stationary source emissions. Limits on emissions from new sources are addressed through the New Source Review (NSR) program. Our stationary sources are subject to stringent NSR requirements because of ongoing needs to meet federal air quality standards. Local air districts have also adopted a number of innovative rules and

programs over the years to help reduce emissions from existing stationary sources. Both the South Coast and the San Joaquin Valley set the benchmark for stationary source controls. For example, South Coast's innovative program, RECLAIM, provides market incentives for companies to use the cleanest possible technologies. In addition, the San Joaquin Valley has adopted a first-of-its-kind indirect source rule that ensures that new developments bear their fair share of the pollution burden. Finally, ARB has over 50 suggested control strategies for stationary sources that many local air districts have adopted.

The reason California has such stringent controls is due to the vast amount of the State that is currently nonattainment for national ambient air quality standards. As shown in Figure 4-4, existing nonattainment areas cover most of the large urban areas in the State. In addition, the State is currently in the process of designating nonattainment areas for the new 8-hour ozone and PM2.5 standards. These new areas potentially include portions of the South Central Coast, Sacramento Valley, and Great Basin Valleys for 8-hour ozone and the San Francisco Bay Area and portions of the Sacramento Valley for PM2.5. Taken together, California's federal nonattainment areas comprise a substantial portion of the State and corresponding Statewide emissions.

In context to the rest of the nation, California reviewed the top 10 facilities in the State for NOx and SOx emissions. For NOx, the facilities are located in the Mojave Desert, Kern County, and the San Francisco Bay Area. On a national level comparison, California's highest emitting NOx-emitting facilities are well controlled with our largest facility ranking 385 nationally. These facilities are all located in federal 8-hour ozone nonattainment areas which are required to have reasonably available control technologies (RACT) on all large facilities. For SOx, the facilities are located in the San Francisco Bay Area, South Coast region, Kern County, San Luis Obispo County, and Santa Barbara County. On a national level, California's largest SOx facility is ranked 469 and is located in the San Francisco Bay Area, a future PM2.5 nonattainment area which will be subject to RACT requirements. Thus, on a national basis, California facilities are lower emitting and are subject to multiple federal requirements ensuring their emissions are well controlled.

Figure 4-4 Ozone and PM2.5 Nonattainment Areas in California



Finally, in addition to federal requirements, California has State ozone and particulate matter standards that are more stringent than the federal standards. As shown in Figure 4-5, 27 local air districts are designated nonattainment for the State ozone standard. Triennially, local air districts that exceed the ozone standard must develop a plan demonstrating that they are making progress towards the standard. These plans are required to include an all feasible measure analysis if they do not show a 5 percent reduction in emissions per year. Each time the all feasible measure analysis is done, the air district must evaluate new rules that have been adopted. In addition, as shown in Figure 4-6, nearly the entire State is designated nonattainment for the State PM10 standards. In 2003, the Legislature passed Senate Bill 656 to initiate a planning

process for meeting the State PM10 and PM2.5 standards. This legislation required ARB, in consultation with local air districts, to adopt a list of the most readily available, feasible, and cost-effective control measures that could be implemented by air districts to reduce PM10 and PM2.5. In turn, local air districts were required to adopt implementation schedules of appropriate rules based upon the nature and severity of their PM problem. As a result of all of the ozone and PM requirements, stationary sources in California have some of the strictest controls in the nation.

Figure 4-5 2006 State Ozone Designations

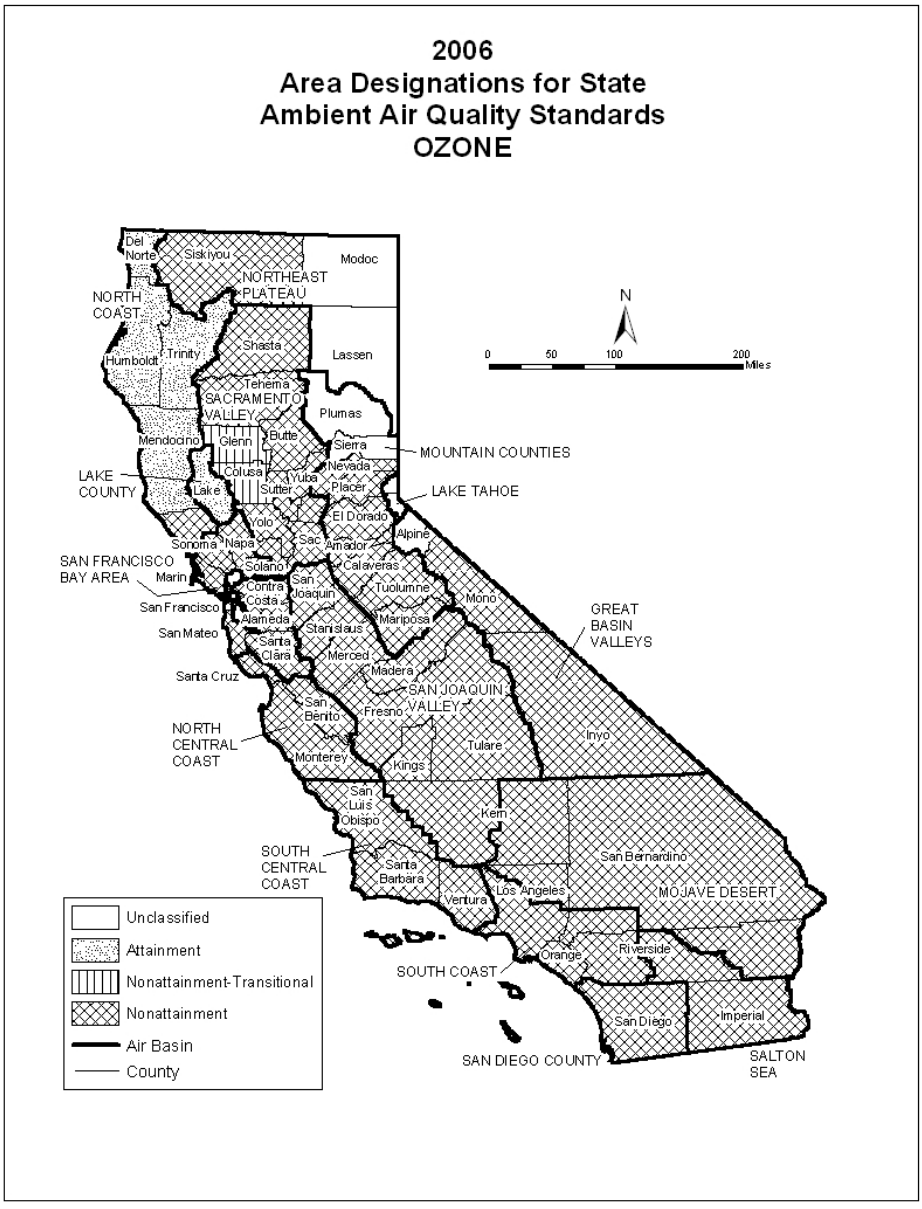
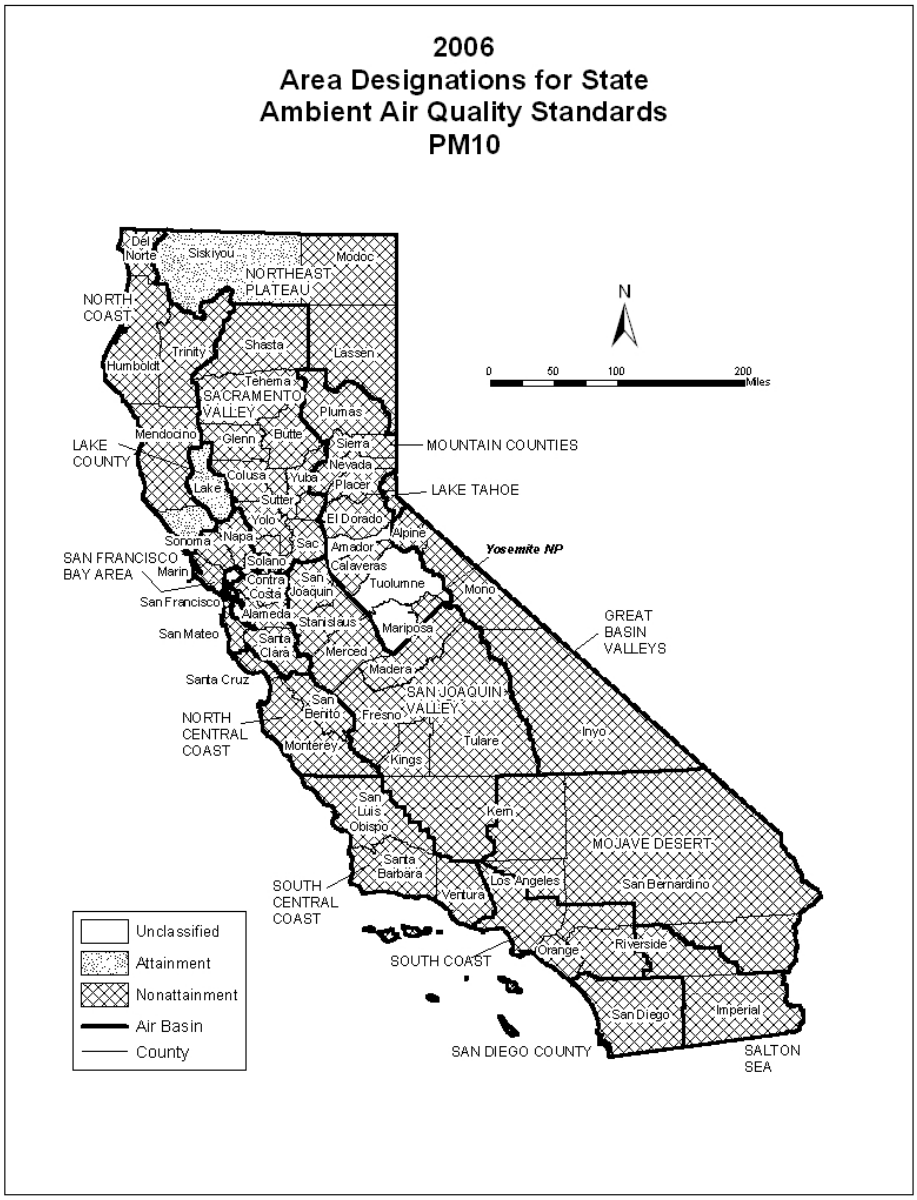


Figure 4-6 2006 State PM10 Designations



4.4 PSD/NSR Permit Programs

In California, new and modified major stationary sources are analyzed under the federal Prevention of Significant Deterioration (PSD) or NSR permitting programs. The PSD permit program applies to pollutants that do not exceed the NAAQS. Among other things, the PSD permit program is designed to protect air quality and visibility in Class 1 Areas by requiring best available control technology (BACT) and involving the public in permit decisions. In California, the responsibility to administer the federal PSD permit requirements is shared by U.S. EPA Region 9 and local air districts. However, U.S. EPA is in the process of re-delegating authority to air districts attaining the federal standards.

For areas with pollutants that do not meet the NAAQS, the NSR permit program administered by the local air districts is applicable. California's NSR program is designed to achieve no net increase in nonattainment pollutants or their precursor emissions for all new or modified major stationary sources. These same pollutants and precursor emissions impact visibility in California. Sources are required to install BACT. Dependent upon their air quality problem, sources are required to mitigate their emission increases after the installation of BACT. Finally, California law does not allow an air district to weaken their NSR program. As stated earlier, California has one of the most stringent NSR programs in the country.

Therefore, California's current PSD and NSR programs ensure that visibility at Class 1 Areas will not be impacted by growth in stationary sources. Figure 4.4 and 4.5 above show the areas of the State violating the federal PM2.5 and ozone standards and provide context for areas subject to NSR or PSD programs. The majority of California Class 1 Areas are located in current or future nonattainment areas.

4.5 Additional Regional Haze Rule Source Considerations

When developing the 2018 Progress Strategy, the Regional Haze Rule requires states to consider in addition to emission reductions from on-going programs, specific measures to mitigate construction activities, source retirement schedules, and smoke management techniques. The 2018 Progress Strategy described above considers all of these. Details regarding construction activity mitigation, source retirement, and smoke management techniques are discussed below.

4.5.1 Construction Activity Mitigation

Due to population growth, construction is an on-going activity throughout the State. In July 2007, ARB adopted a pioneering regulation aimed at reducing diesel and NOx emissions from the State's estimated 180,000 off-road vehicles used in construction, mining, airport ground support and other industries. By 2020, ARB estimates that particulate matter will be reduced by 74 percent and NOx will be reduced by 32 percent compared to current levels. In addition, many air districts have adopted stringent rules to control fugitive dust emissions from construction activities.

4.5.2 Source Retirement

New stationary sources and vehicles are very clean compared to older existing sources and vehicles. However, older sources make up the majority of mobile emissions. In California, mobile sources make up the majority of haze polluting emissions. Therefore, a key focus of California's source retirement strategy is on

mobile sources. Several programs are aimed at mobile source retirement. California's Smog Check Breathe Easier Campaign pays motorists $1,000 to permanently retire their high-polluting vehicles rather than repair the vehicle due to smog check inspection failure. These vehicles are taken to one of the State's authorized dismantlers where they are crushed. In addition, local air districts have vehicle retirement programs in which they pay motorists to retire an older vehicle that although it may pass the smog check inspection, may have higher emissions than a newer vehicle.

California has also pursued the retirement of engines used in a variety of activities through the use of incentive funding. These incentive programs have worked hand-in-hand with in-use regulations, providing added emissions benefits. California is currently investing up to $170 million per year to clean up older, higher-emitting sources through the Carl Moyer Program. The $170 million will clean up to 7500 engines with 24 tons per day of surplus NOx emissions achieved.

Finally, as stated previously, California air districts have some of the most stringent stationary source rules in the country. The stringency of these rules results in sources considering the costs of control in comparison to the useful life of the source in determining whether to retire a source.

4.5.3 ARB's Smoke Management Program

California's Smoke Management Program is an important element of the Regional Haze 2018 Progress Strategy. The Program is designed to provide for best management practices for agricultural and prescribed burning and thereby minimize the potential for harmful smoke impacts. The legal basis of the Program is found in ARB's Smoke Management Guidelines for Agricultural and Prescribed burning which was amended in 2000. In 2003, U.S. EPA accepted ARB's certification that the Guidelines met U.S. EPA's Enhanced Smoke Management requirements.

The ARB and the State's 35 local air pollution control districts are responsible for jointly administering the Guidelines. The ARB is responsible for general oversight of the program and also makes daily burn/no burn day decisions for each of the 15 air basins in the State. Air districts are required to adopt comprehensive smoke management programs and regulations to implement and enforce the Guidelines. These smoke management programs contain requirements for:

- Permits for all agricultural and prescribed burns
- Daily burn authorization systems
- Annual reporting of all agricultural and prescribed burning
- Annual or seasonal burn registration for prescribed burns
- Smoke management plans for prescribed burns

Basic information on burn location, types and amounts of material to be burned, and the location of smoke sensitive receptors are required for all burns greater than 10 acres in size. More comprehensive plans are required for the largest burns (greater than 100 acres) including projections of where smoke is expected to travel and contingency actions such as fire suppression or containment to be taken if weather changes or unexpected smoke impacts occur. Class 1 Areas are specifically considered as sensitive receptors in these smoke management plans.

4.6 Four-factor Analysis

The Regional Haze Rule requires the 2018 Progress Strategy to consider four factors in assessing the appropriateness of the strategy for setting reasonable progress goals: the cost of compliance; the time necessary for compliance; the energy and non-air quality environmental impacts of compliance; and the remaining useful life of potential sources. As described below, California's emission reduction program analysis considers the Regional Haze Rule's four-factor analysis. The 2018 Progress Strategy reflects benefits of these analyses for mobile, stationary, and area source reductions.

As shown earlier in Figure 4-4, California has two PM2.5 and fifteen 8-hour ozone nonattainment areas that cover a vast majority of the State. Due to these federal nonattainment areas plus the State ozone and PM planning requirements discussed earlier, the four-factor analysis process has been embodied in California emission reduction strategies for decades. Later on in this chapter, California will discuss the four-factor analysis on a sub-regional basis. Each of the sub-regions includes a combination of both State and federal nonattainment areas ensuring the four factors are considered and emissions will continue to decrease.

4.6.1 Cost of Compliance

Currently, the cost of compliance can be measured by the cost-effectiveness threshold per ton of pollutant reduced throughout the State, up to $24,500/ton and $20,200/ton for NOx and VOC, respectively, for stationary source rules adopted by local air districts. The local air districts calculate this based on local economies and all feasible control measures. Periodically, local air districts update these values based on their needs to meet air quality standards. For mobile source diesel PM, ARB has adopted regulations with cost-effectiveness up to $86,000/ton PM. In addition, ARB's Carl Moyer incentive program sets a maximum cost effectiveness of $16,000/ton for air quality improvement projects.

The magnitude of these cost-effectiveness thresholds reflects both the length of time that California has been pursuing emission reductions and the severity of California's air quality problems. This has led to the need to pursue ever more aggressive controls at greater costs in order to meet State and federal air quality

standards. These cost-effectiveness thresholds therefore set a very stringent bar for assessing reasonable controls and stationary sources in California are already required to reduce emissions at a higher cost than elsewhere in the United States.

4.6.2 Time Necessary for Compliance

During the rule development process, both ARB and local air districts consider the time needed to comply with the rule. In general, for new vehicle regulations, ARB considers the time it takes to develop the new technology, ensure the technology is durable, and implement the regulations within the time constraints of new vehicle certification to maximize the emission benefits. Local air districts also allow for time considerations in their rulemaking process to allow for the availability of new technology. Many ARB and air district rules are already considered technology forcing. ARB's 2018 Progress Strategy has taken these factors into consideration in specifying the suite of measures to be included in the Strategy.

4.6.3 Energy and Non-Air Quality Environmental Impacts

The California Environmental Quality Act requires a documented public review of all environmental and energy impacts for all rulemaking actions of State and local agencies in California. This ensures that all projects are assessed for their environmental impacts. These projects range from air quality plans to local construction projects. This review requires a determination of environmental factors that have a potentially significant impact and impacts that are potentially significant unless mitigated. The environmental factors that need to be reviewed are aesthetics, biological resources, hazards and hazardous materials, mineral resources, public services, utilities/service systems, agriculture resources, cultural resources, hydrology/water quality, noise, recreation, mandatory findings of significance, air quality, geology/soils, land use/planning, population/housing, and transportation/traffic.

4.6.4 Remaining Useful Life of any Potentially Affected Sources

When developing regulations, ARB and local air districts consider the useful life of potentially affected sources. The stringency of air district rules results in sources considering the costs of control in comparison to the useful life of the source in determining whether to retire a source or implement new control requirements.

ARB's long-term mobile source strategy has two distinct components – more stringent standards for new engines and clean-up of existing fleets. ARB's Low Emission Vehicle Program, which is a key element in the 2018 Progress Strategy, is ensuring that new vehicles entering the fleet are exceptionally clean. To address existing fleets, ARB has adopted 20 in-use regulations in the last five

years to provide for the clean-up of existing fleets. These include requiring use of cleaner fuels, limitations on truck idling, and diesel engine retrofit technologies. The California Legislature has also enabled funding programs to incentivize early retirement of equipment and replace them with lower emissions units. In aggregate, these measures provide a comprehensive basis for supporting California's reasonable progress goals for Regional Haze.

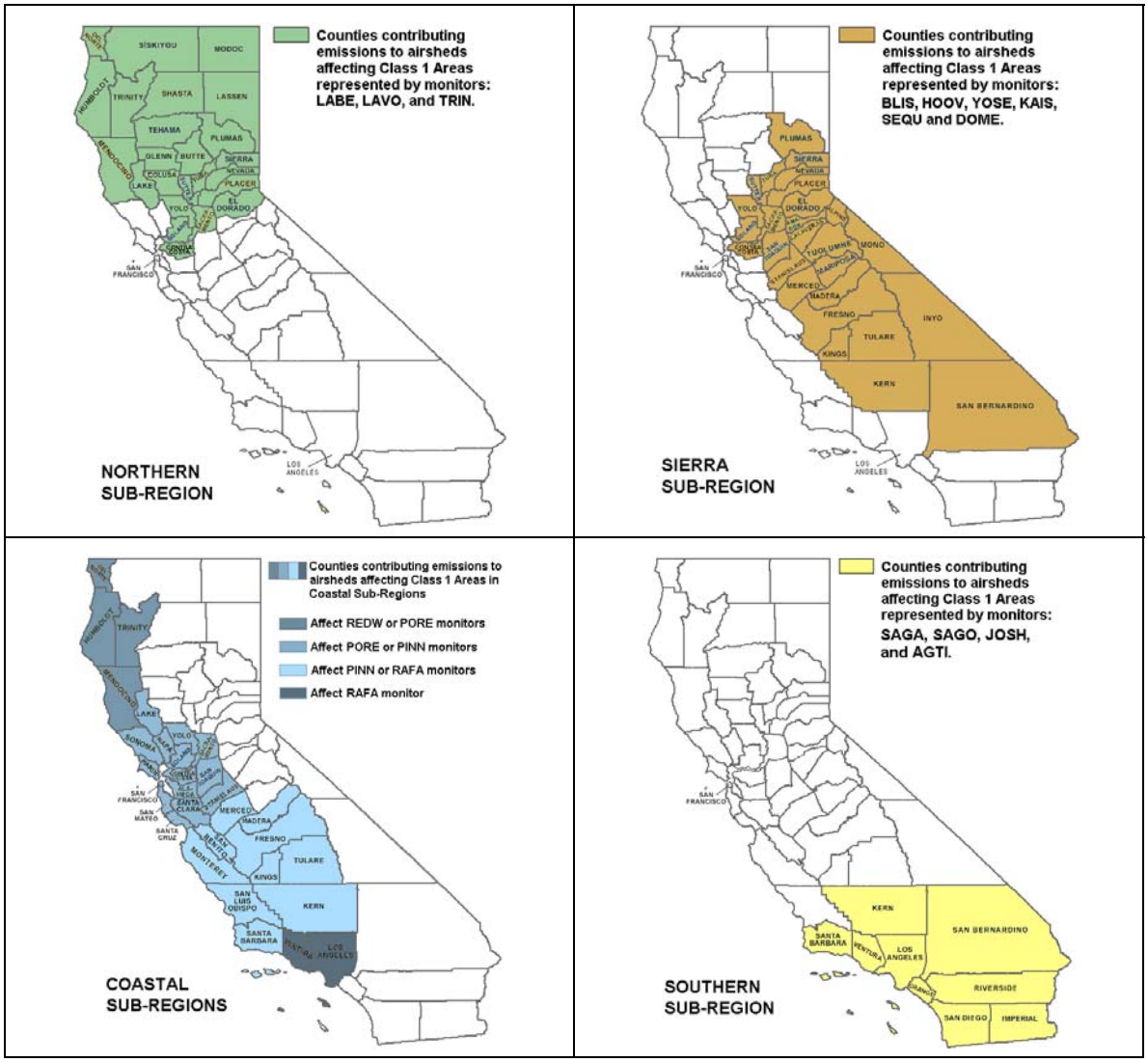
4.7 Regional Analysis of Source Categories

California has 15 air basins bounded by physical features, such as topography, that impact local weather patterns and affect inter-basin transport of air pollutants. The four sub-regions for analysis of haze in California reflect consideration of these intra-State air basins as well as the jurisdiction of the thirty-five air districts with regulatory control over stationary sources within them. The haze species that serve as the main drivers of haze on worst days are generally the same for each sub-region because the topography and natural resources of each sub-region affect the way the surrounding areas developed. Factors such as urbanization level and interstate transportation corridors also play into the types of sources within each sub-region. Finally climate, humidity, vegetative cover, and precipitation patterns also influence which haze species predominate during the year. Therefore, the groupings are based on factors beyond simple geographic proximity.

In developing the 2018 Progress Strategy, California analyzed each sub-region in the State to determine the types of sources affecting visibility in each sub-region and their current level of control, considering the four factors discussed above in section 4.6. The analysis focused on the significant pollutant species driving haze on worst days and source categories that California is able to control, specifically in-State and anthropogenic sources. The analysis reflects the results of existing controls to reduce emissions of ozone and particulate matter precursors that are necessary to meet federal and State health standards in the nonattainment areas of California since all of the State's Class 1 Areas are in one or more of these zones. These reductions demonstrate that the four-factor analysis embedded in California rulemaking is effective in improving visibility.

As discussed in Chapter 2, Class 1 Areas in California are clustered in four sub-regions. The counties whose sources are most likely to impact the Class 1 Areas in the sub-regions are shown in Figure 4-7.

Figure 4-7 Source Regions by Counties in California

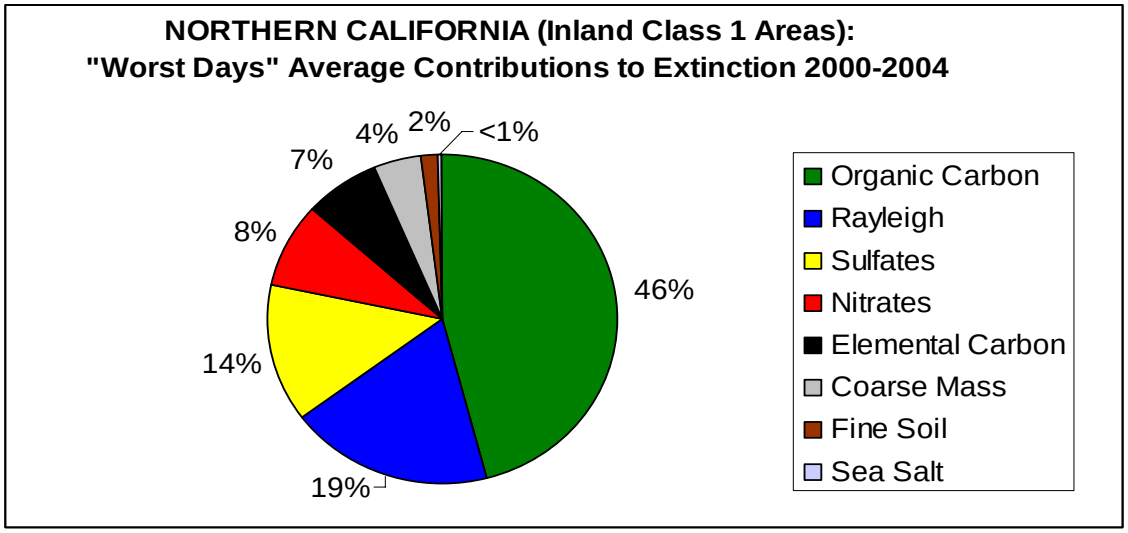


For each sub-region, at least part of each shaded county is in an airshed or air basin where topography and meteorological patterns indicate that the county's emissions influence visibility at the Class 1 Areas in the sub-region. The other counties are in air basins where separating mountain ranges and prevailing winds significantly reduce the influence of their emissions on Class 1 Areas in another sub-region. The emission inventories from the corresponding counties were reviewed, in conjunction with the results of the WRAP's NOx, SOx, and organic aerosol tracer tools, to identify the primary influences on worst day haze from California source categories in each sub-region of the State.

4.7.1 Northern California

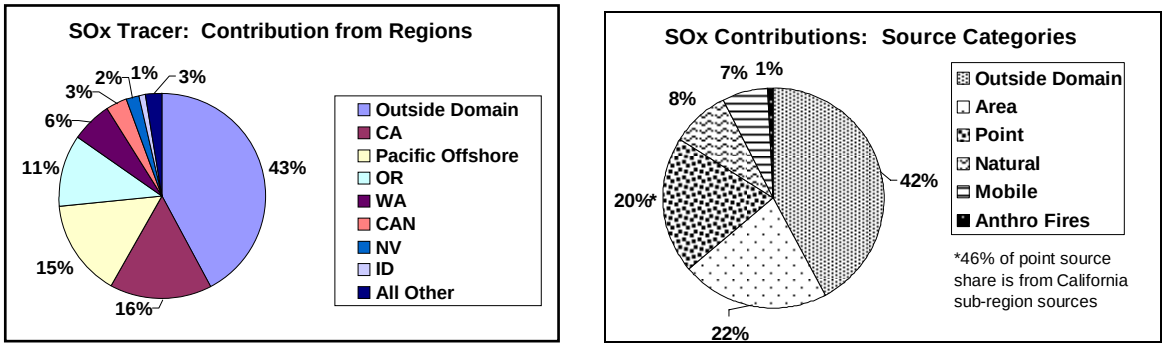
Northern California includes these inland Class 1 Areas: Lava Beds National Park, South Warner Wilderness Area, Lassen Volcanic National Park, Caribou Wilderness Area, Thousand Lakes Wilderness Area, Marble Mountain Wilderness Area, and Yolla Bolly-Middle Eel Wilderness Area. On worst days, organic aerosols drive haze in Northern California, dwarfing the contributions from sulfates and nitrates as shown in Figure 4-8. Rayleigh gas scattering is a natural phenomenon that contributes to haze and is considered "uncontrollable."

Figure 4-8 Species Contributions to Worst Days (Northern Class 1 Areas)



Source apportionment shows that natural wildfires and biogenic emissions contribute 70 to 80 percent of the organic aerosols on worst days. The balance is primarily from area sources and anthropogenic fires. Existing Statewide measures to reduce area source emissions of organic aerosols have already been discussed earlier. Area sources such as residential wood combustion are being controlled at various levels by air districts in Northern California. California has an EPA-certified enhanced Smoke Management Program, which is the best possible means of controlling anthropogenic smoke. In California, all open burning, including agricultural burning and other prescribed burning, is under shared State and air district jurisdiction. The Northern Region will also see a very slight reduction in anthropogenic emissions of precursor volatile organics from planned mobile source emissions reductions.

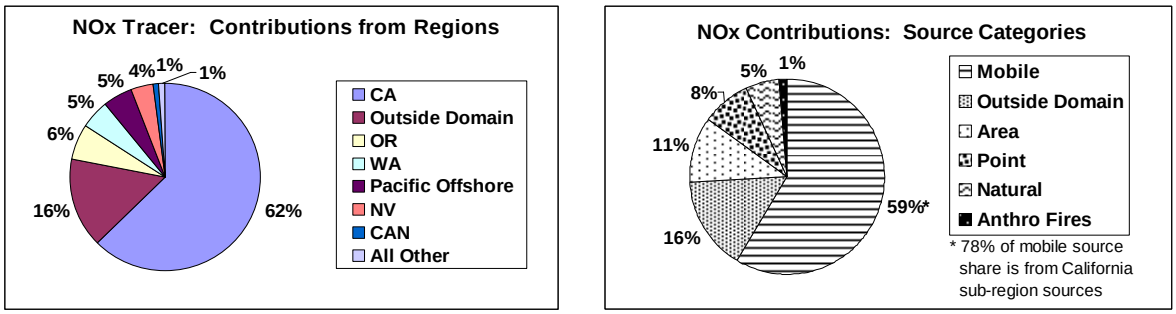
Figure 4-9 Worst Days SOx Source Attribution (Northern Class 1 Areas)



Sulfates are the third largest contributor to light extinction (haze) on worst days in Northern California. Sub-regional sources of SOx were analyzed with respect to their contribution to visibility impairment and existing level of control. The major contributors to sulfates impacting northern inland California Class 1 Areas are sources outside the modeling domain, California sources, and Pacific offshore sources, presumably marine commercial shipping and natural marine emissions. California has already reduced the sulfur content of fuels, which limits SOx emissions from all source categories. The SOx tracer analysis shows that only 16 percent of the sulfates causing worst days haze at Northern California Class 1 Areas come from California sources. Of that, California point sources lead with about 9 percent of the total contribution to light extinction by sulfates. When that amount is converted to visibility impact, the sub-regional California point sources contribute about 1.3 percent of total light extinction on worst days, on average, at Northern California IMPROVE monitors. By comparison, California mobile sources and area sources contribute about 0.4 percent each to total light extinction.

A review of the top 100 SOx-emitting stationary sources in the counties included in the sub-region shows that only eight facilities emitted more than 100 tons per year of SOx in 2006 due to existing controls. The closest source is a BART-eligible facility in Solano County, over 200 kilometers from the nearest Northern California Class 1 Area, Yolla Bolly - Middle Eel Wilderness Area. The facility will be implementing stringent controls to reduce its SOx emissions by more than 90 percent by 2013, which is equivalent to 24 percent of all current point source SOx emissions from the sub-region. The other seven large point sources are in Contra Costa County, even farther south. Existing State and air district rules controlling point sources were developed taking into consideration the cost of compliance, the time necessary for compliance, energy and non-air quality environmental impacts, and the remaining useful life of the source.

Figure 4-10 Worst Days NOx Source Attribution (Northern Class 1 Areas)

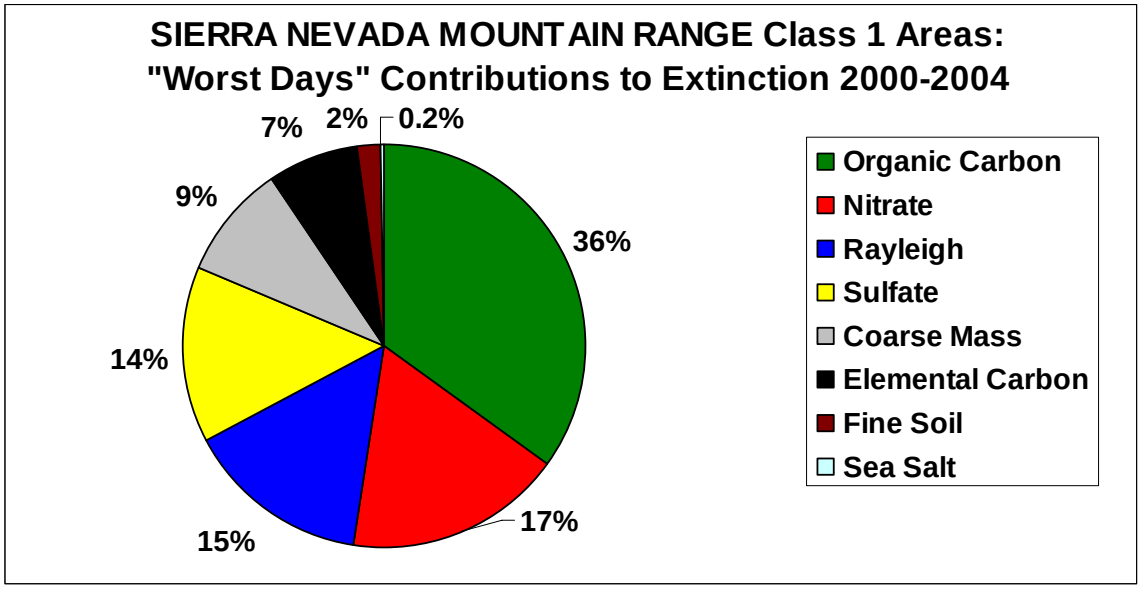


Nitrates are the fourth highest contributor to haze on worst days at Class 1 Areas in the Northern California sub-region. California sources are responsible for 62 percent of the nitrates with the bulk of these from in-State mobile sources. Mobile source NOx emissions from all regions contribute a 59 percent share of the nitrate light extinction in this sub-region. However, on average at all the Northern California monitors, only 3.6 percent of the total light extinction on worst days is due to NOx emissions from California's mobile sources. Moreover, only 0.6 percent and 0.4 percent of the total light extinction on worst days comes from California area and point sources, respectively, according to the WRAP's NOx tracer tool. California anticipates a 40 percent reduction in mobile source emissions by 2018. This reduction, along with those achieved by existing controls in other source categories, delivers more than a 20 percent reduction in nitrate extinction by 2018 at the Northern Class 1 Area monitors. Therefore, progress beyond a uniform 20 percent NOx reduction increment is achieved for the first of five planning periods before 2064.

4.7.2 Sierra California

There are eleven Class 1 Areas in the Sierra Nevada Mountain Range in California: Desolation Wilderness, Mokelumne Wilderness, Hoover Wilderness, Emigrant Wilderness, Yosemite National Park, Kaiser Wilderness, Ansel Adams Wilderness, John Muir Wilderness, Sequoia National Park, King's Canyon National Park and Domelands Wilderness. The air masses moving over the Sierra are similar in content and origin. The slight variations in light extinction at each IMPROVE monitor are influenced by elevation, latitude, vegetative cover, proximity to populated areas and transportation corridors, and position on the windward or leeward side of the crest line. Figure 4-11 shows the average contributions of haze species to light extinction in the baseline years at the six monitoring sites representing the Sierra Class 1 Areas.

Figure 4-11 Species Contributions to Worst Days (Sierra Class 1 Areas)

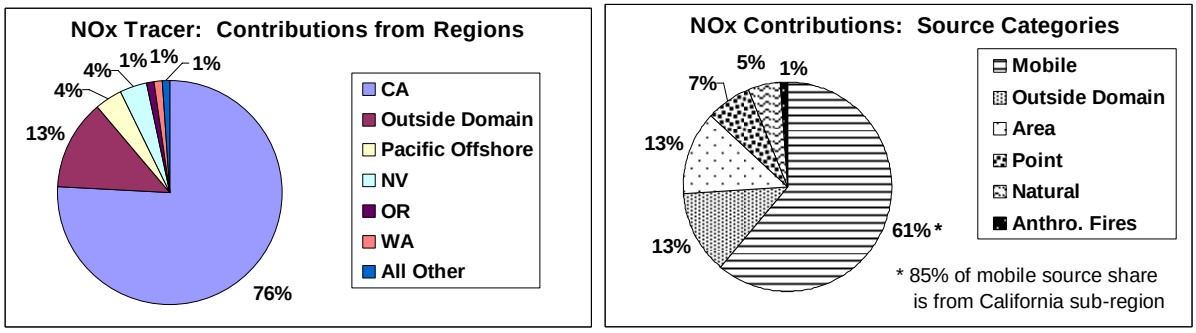


On average, organic aerosols are the predominant cause of haze on worst days, with slight variations in species strength at the representative monitoring sites. The contributions from sulfates and nitrates are stronger at Class 1 Areas closest to urbanized areas and transportation corridors. The influence of coarse mass increases on windy days in the drier, higher Class 1 Areas on the lee side of the Sierra crest. The contribution of elemental carbon increases on days when there are nearby wildfires in the heavily forested areas. Rayleigh scattering exerts more influence at higher elevations when the monitors are located above the mixing layers associated with adjacent populated valleys to the west and dry valleys and desert to the east. Fine soil and sea salt consistently have little impact on visibility throughout the Sierra.

Source apportionment shows that natural wildfires and biogenic emissions contribute more than half to 90 percent of the organic aerosols on worst days in the Sierra Class 1 Areas, with wildfire contributions also coming from out-of-State. The balance of the organic aerosols is from area sources, anthropogenic fire, mobile sources, and point sources. If only the California sources in the four "controllable" categories are considered, their combined share of organic aerosol extinction rarely exceeds 15 percent, primarily from area sources. As in the inland Northern California sub-region, area sources such as residential wood smoke and consumer products are controlled by existing State and local measures. Both local agricultural interests in the Central Valley, immediately west of the Sierra Nevada Range, and State and federal land management agencies, who oversee most of the land in the Sierra and east to the Nevada state line, actively practice smoke management. All open burning, whether by public or private entities, falls under coordinated State and local regulatory control of California's Smoke Management Program.

Currently, organic aerosols from mobile sources and point sources in California contribute about 1percent apiece to total light extinction in the Sierra Class 1 Areas. There will be reductions in mobile source organic aerosol emissions by 2018 under current controls. Although organic aerosols from point sources have marginal impact on visibility, the nonattainment status for both ozone and particulate matter in the Central Valley and the Mountain Counties means that existing controls are constantly evaluated and upgraded for stringency, taking into account the cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source. For example, the San Joaquin Valley Air Pollution Control District has been nonattainment for both Federal and State ozone and particulate matter health standards. The air district has already implemented control measures that reduce organic matter aerosol precursors from both area and point sources in the key upwind air basin for the Sierra Class 1 Areas.

Figure 4-12 Worst Days NOx Source Attribution (Sierra Class 1 Areas)

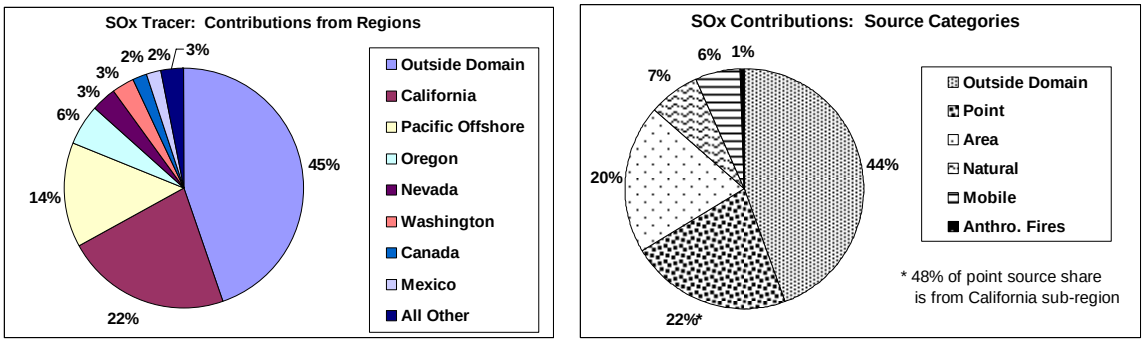


After organic aerosols, nitrates are the next highest driver of haze on worst days in the Sierra, closely followed by Rayleigh scattering and sulfates. Mobile source NOx emissions from all regions contribute an overwhelming 61 percent share of the nitrate light extinction on worst days in this sub-region. California mobile sources contribute 85 percent of the mobile source category, which equates to about 9 percent of the total extinction on worst days in the Sierra. California anticipates a 60 percent reduction in mobile source NOx emissions in the Sierra sub-region by 2018. Currently, California's area and point sources shares of total light extinction at Sierra Class 1 Areas are minor, about 2 percent and 1 percent, respectively.

Despite predicted population growth in the regional air basins in which the Sierra Class 1 Areas are located, the contribution to nitrates from all categories will decrease by 43 percent by 2018 with existing State and air district controls in place. As noted previously, all air quality rulemaking in California must consider the four factors; cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source, to assure that the most stringent and feasible controls are applied to new and

existing sources. Future controls, now in development to attain the new ozone and PM2.5 standards, will further reduce NOx emissions within the planning period. These controls and their potential benefits to visibility will be evaluated during the mid-course review.

Figure 4-13 Worst Days SOx Source Attribution (Sierra Class 1 Areas)



Sulfates are the fourth highest contributor to worst day haze, after natural Rayleigh gas scattering. Major contributors to sulfates impacting Sierra Class 1 Areas are sources outside the modeling domain, as well as from the Pacific Off-Shore region, with a combined contribution of 59 percent. California sources are responsible for about 22 percent of the sulfates reaching the Sierra Class 1 Areas from all regions. Of California's share of sulfates, 48 percent (about half of 22 percent) is from California point sources and about 20 percent (one fifth of 20 percent) from area sources. When converted to visibility impact, the sub-regional California point sources contribute, on average, about 1.5 percent to total light extinction on worst days in the Sierra. California area sources contribute only 0.6 percent to total light extinction on worst days.

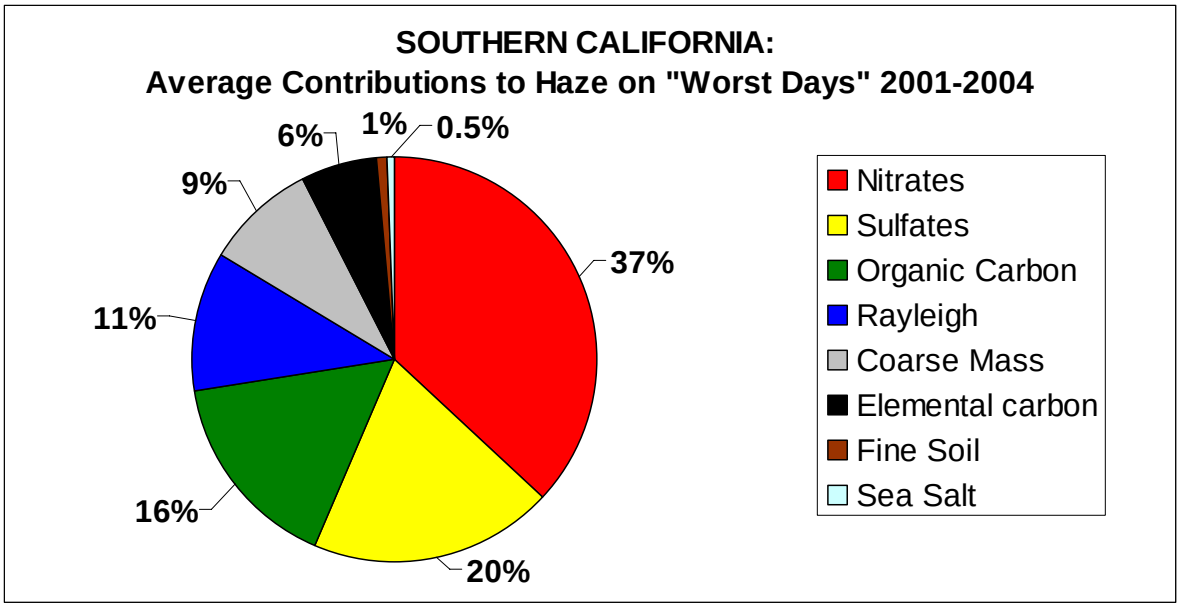
A review of the top 100 SOx-emitting stationary sources in the counties included in the Sierra sub-region shows that 21 facilities emitted more than 100 tons per year of SOx in 2006. All of the sources in the San Joaquin Valley were required to have BACT when they went through New Source Review, because the Valley was nonattainment for PM10. The other sources are in State nonattainment areas for PM and already have considered all feasible measures to improve air quality to benefit health taking into consideration cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source. The air districts also require that low-sulfur fuels be used for combustion in stationary sources. State mobile source measures will continue to reduce SOx emissions from traffic on interstate corridors running through and adjacent to the Sierra Class 1 Areas. All of these reductions also benefit visibility.

4.7.3 Southern California

There are six Class 1 Areas in Southern California: San Gabriel Wilderness, Cucamonga Wilderness, San Gorgonio Wilderness, San Jacinto Wilderness, Joshua Tree National Park, and Agua Tibia Wilderness. The Wilderness Areas are located in the mountains ringing the very densely populated Los Angeles Basin. The Route 10 corridor through the mountains funnels air from the Los Angeles Basin into the Coachella Valley and the sparsely populated Mojave Desert that surround Joshua Tree National Park. While airflows from the Basin distribute anthropogenic pollutants across all these Class 1 Areas, natural haze pollutants from geologic and biogenic sources are driven oceanward across the same Class 1 Areas during high velocity Santa Ana wind events. Unique to this part of the State, the hot, dry Santa Ana winds initiate seasonally in the desert every year. They can ignite and fan extensive wildfires throughout the Southern California sub-region spreading smoke throughout Class 1 Areas and nearby urban environments. All Southern Class 1 Areas are also located within 250 kilometers of the Pacific Ocean and Mexico, thereby exposed to transported offshore shipping emissions and international emissions.

Figure 4-14 shows the average contributions of haze species to light extinction in the baseline years at the four monitoring sites representing the Class 1 Areas in the Southern sub-region.

Figure 4-14 Species Contributions to Worst Days (Southern Class 1 Areas)

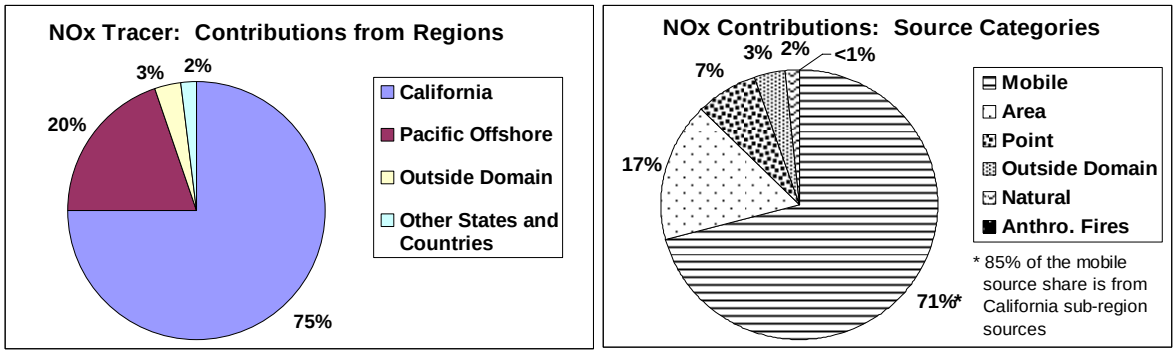


The four-factor analysis targets only the “controllable” sources in this complex mix of anthropogenic and natural emissions in the Southern sub-region. At least 17 million people live within a 50 kilometer radius of this cluster of six Class 1 Areas, with a 40 percent increase in population expected by 2018.

Nevertheless, considerable progress has been made in reducing haze pollutants because all six of the Class 1 Areas are wholly or partially within a federal nonattainment area for ozone or particulate matter, and have been for many years. This area is also nonattainment for the State standards and as such requirements for rulemaking to address these standards have considered on an ongoing basis the cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source. Therefore, visibility will continue to improve at the Southern Class 1 Areas, because existing stringent controls require offsets for growth from new sources and continual reductions from existing sources.

On average, nitrates are the predominant cause of haze on the worst days in this sub-region. As shown in Figure 4-15, a small portion of the NOx emissions leading to nitrate formation in the Southern sub-region come from natural sources and from anthropogenic sources not within California's jurisdiction.

Figure 4-15 Worst Days NOx Source Attribution (Southern Class 1 Areas)



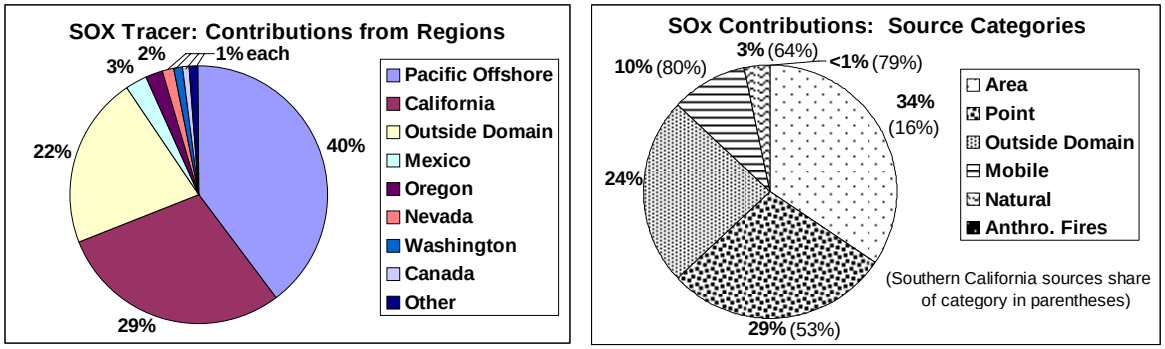
NOx emissions from all the California source categories, taken together, account for about 75 percent of the nitrates. This amounts to about 28 percent of the total light extinction in the Southern Class 1 Areas. Mobile sources, including emissions from commercial marine shipping offshore in the Pacific Ocean, account for the bulk of NOx emissions. NOx emissions from Southern California area and point sources have a lesser role in causing haze, about 3 percent and 2 percent of total light extinction, respectively.

All feasible measures to reduce NOx emissions from stationary sources are required by State law in Southern California. These existing controls which consider cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source in the rule development process include an aggressive local program for continuous, quantifiable reductions at facilities emitting more than four new tons of NOx or SOx per year. The same program requires an analysis of visibility impacts at the six Southern California Class 1 Areas. Area sources are also subject to rigorous prohibitory rules for industrial, commercial, institutional, and residential uses, to limit even minor emissions from each of the very large number of small units and

equipment in the densely populated area. While existing air district regulations keep new and existing stationary sources in check, State programs for reducing mobile source NOx emissions from all on-road and off-road mobile source categories, including portable equipment, provide the biggest benefit to visibility.

By 2018, California anticipates a 40 to 50 percent reduction in nitrate-caused light extinction using existing control measures. This calculation takes into account expected growth in area sources, vehicle miles traveled, and point source expansion, which must be offset. Future controls to attain new federal air quality standards to protect health, are anticipated. They will be addressed during the mid-course review.

Figure 4-16 Worst Days SOx Source Attribution (Southern Class 1 Areas)



Sulfates are the second highest cause of light extinction at the Southern California sub-region, when averaged. They are the primary influence at Agua Tibia, and are third highest in the forested mountains of the San Gabriel, Cucamonga, San Gorgonio, and San Jacinto Wilderness Areas where organic matter influence is slightly higher than sulfates on an annual basis. Sulfates increase slightly in hot, dry months at all the monitors, as do organic matter aerosols. The Agua Tibia IMPROVE monitor is at the lowest elevation, directly exposed to air masses containing the marine layer and urban pollution. The other IMPROVE monitors (SAGA, SAGO, and JOSH) are at elevations two to three times higher, above or outside the mixing zone of the urbanized Los Angeles Basin. Nevertheless, the six Class 1 Areas are close enough to be impacted by regional sulfate levels, no matter the location of the initial SOx emissions, because the sulfates subsequently-formed are persistent in the atmosphere.

The tracer analysis shows that SOx emissions come primarily from Pacific offshore sources, largely beyond State or local control. They also come from area, point, and mobile sources in California. These include port activities, interstate freight movements, military bases, and airports with shared federal, State, and local jurisdiction. A review of the top 100 SOx-emitting stationary sources in the Southern sub-region shows that only 19 facilities emitted more than 100 tons per year of SOx in 2006. All must operate at RACT or BACT level, in accordance with the respective air district federal nonattainment status or maintenance plan.

California has already implemented low sulfur fuel requirements for gasoline, diesel, natural gas, and coal used in combustion at stationary and mobile sources through existing State and air district programs. Fuel oil is restricted to emergency use and natural gas is required for routine use in many existing stationary source permits administered by Southern sub-region air districts. Fuel sulfur restrictions apply to area sources via existing prohibitory rules for residential heaters, small boilers, and internal combustion engines.

Anthropogenic SOx emissions originating in California contribute about 6 percent to regional worst day light extinction and are all subject to existing controls. That estimate does not count near-shore marine commercial emissions grouped with all Pacific Offshore sources in the SOx tracer analysis. Projections to 2018 for California mobile, point, and area sources show that sulfate concentrations will decrease from each source category. California will also continue existing efforts to work with Mexico in cooperative agreements to reduce the use of high-emitting vehicles entering the United States with commercial goods.

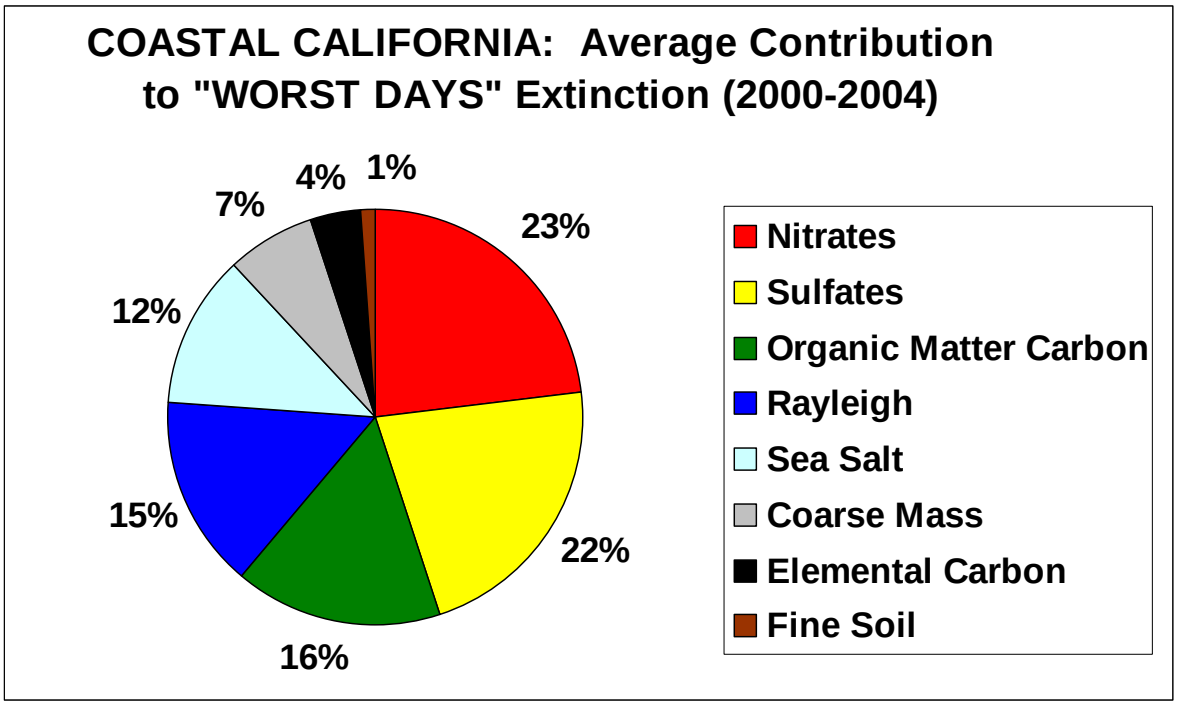
After sulfates, organic aerosols are the next highest driver of haze on worst days in Southern California, on average. In large part, these are due to sustained peaks of organic aerosol during large wildfires that ravaged forests weakened by drought and bark beetle infestations during the baseline years. The year-round growing season in Southern California also delivers plant-emitted carbon compounds that subsequently combine to form organic aerosols, especially in the forested Wilderness Areas. Neither wildfires nor biogenic emissions can be controlled. However, California's Smoke Management Program limits the impacts of anthropogenic fires, with controls and permits for prescribed burning by private and public land managers. Open burning for residential or commercial purposes is already banned in most of Southern California. Agricultural burning is diminishing, as farmlands and pasture are converted to non-agricultural uses.

Existing stringent State and air district controls of reactive organic gas emissions from consumer products and mobile, stationary, and area sources, to reduce ozone formation, have the benefit of also reducing organic aerosol formation. These controls are continuously updated, considering the cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source. As a result, anthropogenic emissions of organic aerosols will decrease at least 20 percent across the Southern sub-region by 2018. Despite the inability to control the predominately natural causes of organic aerosols, modeled projections indicate that organic aerosols from all sources will still decrease approximately 11 percent across the Southern sub-region by 2018.

4.7.4 Coastal California

There are five Class 1 Areas on or relatively close to the California coast of the Pacific Ocean: Redwoods National Park, Point Reyes National Park, Pinnacles National Monument, Ventana Wilderness, and the San Rafael Wilderness. These are grouped as the Coastal sub-region because prevailing winds from the ocean affect them directly. Four contiguous air basins comprise the sub-region: the North Coast, San Francisco Bay Area, North Central Coast, and South Central Coast Air Basins, encompassing the 900 kilometer distance from northernmost to southernmost Class 1 Areas. Three of the Class 1 Areas include Pacific shoreline as well as higher elevations in the mountain ranges along the California Coast Ranges. Pinnacles and San Rafael are farther inland along the crest line of the inner coastal mountain ranges, at 1,000 to 2,000 meters. These two Class 1 Areas are exposed more often to reverse flows of "inland" air masses that drain oceanward through passes and river valleys. Figure 4-17 shows the average contributions of haze species to worst day light extinction in the baseline years at the four IMPROVE monitors representing the Class 1 Areas of the Coastal sub-region.

Figure 4-17 Species Contributions to Worst Days (Southern Class 1 Areas)



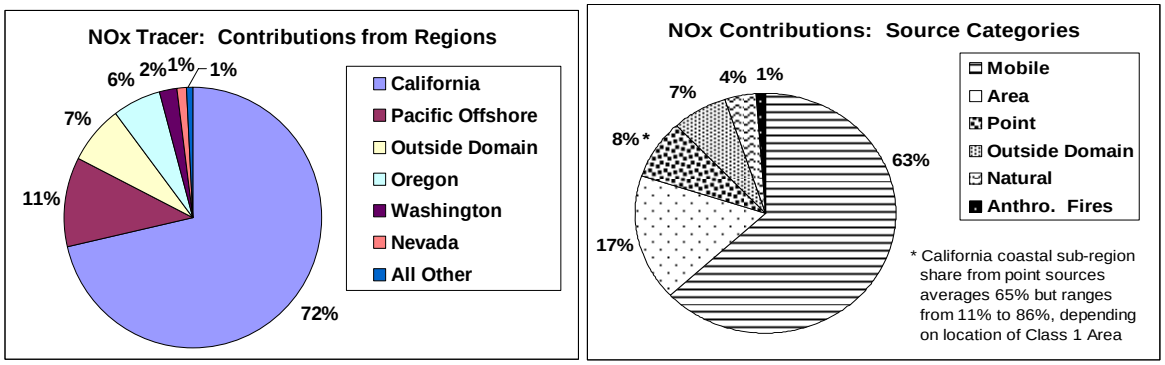
The causes of haze in each Class 1 Area of this sub-region do vary slightly from the averages depicted in Figure 4-17. The relative influence of nitrates, sulfates, organic matter, Rayleigh and sea salt vary in influence considerably more than coarse mass, elemental carbon, and fine soil due to factors such as latitude,

elevation, relative humidity, distance from the shoreline and prevailing offshore winds, and exposure to air masses flowing from inland valleys with different land uses.

Natural contributions from Rayleigh and sea salt show dramatic differences, depending on the elevation of the Class 1 Area and its distance inland from the coast, but these "causes" of haze are not "controllable." The contributions of fine soil, elemental carbon, and coarse mass to light extinction are at or below 15 percent at all of the Coastal Class 1 Areas. These pollutants are also largely the result of "uncontrollable" natural events, such as wildfires or local wind events in uninhabited forests and bare-soil areas. Therefore, the four-factor analysis again focuses on the anthropogenic source categories contributing nitrates, sulfates, and organic matter carbon. At each Class 1 Area, these three species are predominant haze drivers on worst days during the year.

The relative prevalence of on-shore and off-shore winds, and the variability of population density and land use near each Class 1 Area, affects the strength of each of the three major drivers of haze. Prevailing winds from off-shore bring in a mix of natural marine sulfates, anthropogenic marine commercial shipping emissions, out-of-State and international industrial pollutants, and transported wildfire smoke that can overwhelm emissions from "on-land" sources. California is addressing commercial marine shipping emissions, including in-port activities, through long-term programs. The results of these efforts will not be available until the mid-course review. Landside emissions have been addressed through existing programs to reduce ozone and particulate matter to attain State and federal health standards. The following analysis explains the significant existing controls of sources closest to the respective Class 1 Areas.

Figure 4-18 Worst Days NOx Source Attribution (Coastal Class 1 Areas)

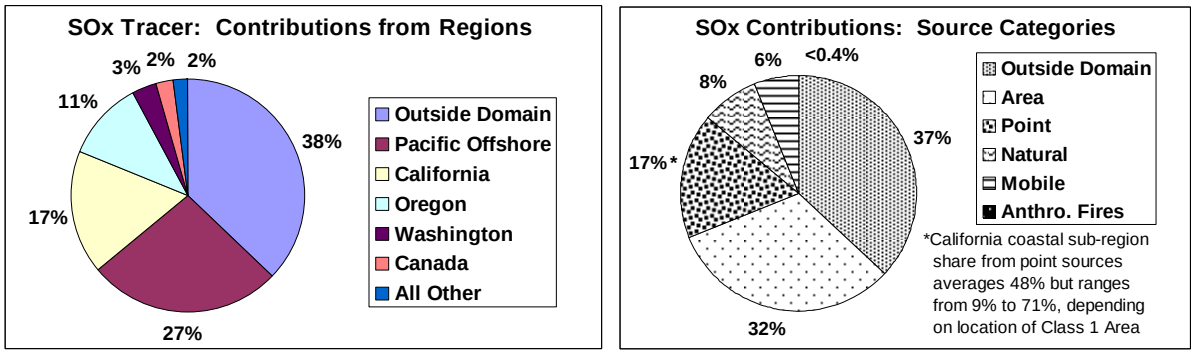


On average, nitrates causes the most light extinction on worst days in the Coastal sub-region, although sulfates exert more influence at Redwoods National Park and at the San Rafael Wilderness, as explained in the discussion of sulfates. Taken together, NOx emissions in California from all the source categories account for about 72 percent of the nitrates. This amounts to less than 20 percent of the total light extinction at every Coastal Class 1 Area. Mobile

sources, including emissions from commercial marine shipping offshore in the Pacific Ocean, account for the bulk of NOx emissions. Reductions in on-land mobile source NOx should decrease about 60 percent from 2002 to 2018.

The air districts in the three contributing air basins (San Francisco Bay Area, North Central Coast, and South Central Coast) have all enacted source controls considering the cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source beyond federal requirements because they are all nonattainment for stricter State health standards for ozone or particulate matter. They have also adopted all feasible measures to reduce NOx as required by State law to mitigate the impact of their emissions on the ozone attainment status of downwind air basins in the Central Valley. While there is a slight increase in stationary source NOx influence on the Coastal Class 1 Areas by 2018, it is more than offset by the overall mobile source reductions near every Coastal Class 1 Area. Overall, existing controls in the Coastal sub-region achieve a 40 to 55 percent reduction in nitrate extinction by 2018 at the Coastal Class 1 Area IMPROVE monitors. This will all occur while the population in the Coastal sub-region increases 16 percent (about 1.6 million more people) from 2002 to 2018.

Figure 4-19 Worst Days SOx Source Attribution (Coastal Class 1 Areas)



Overall, sulfates are the second highest cause of worst days haze in the California coastal sub-region. Sulfates in the Coastal sub-region originate largely from SOx emissions outside California. SOx contributions from the Pacific Offshore region alone exceed those from California. Marine commercial shipping emissions in shipping lanes along the entire coast account for a measurable share of the SOx inventory at Coastal Class 1 Areas because prevailing offshore winds blow these emissions inland. These sources, along with natural sources of sulfates are not fully "controllable". As discussed below, landside SOx sources in California's local air basins influence visibility largely when prevailing winds come from inland, or on stagnant days. The analysis below assesses the success of existing measures to reduce sulfate impacts from "controllable" sources.

In the North Coast Air Basin, the "controllable" (in-State, non-natural) sources have been held to 22 percent of the Basin's total emissions inventory for SOx,

using existing control measures to meet State health standards for ozone and particulate matter. Most of the anthropogenic sources are usually downwind of Redwoods. As a result, each of the local fire, mobile, area, and point sources categories contribute less than 10 percent of the sulfates contributed by all regions to Redwoods, according to the SOx tracer analysis. The sub-regional share of total extinction at Redwoods National Park is less than 0.5 percent from local SOx sources, considering the four factors, cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life.

The percentage of sulfates attributed to sources in the San Francisco Bay Area, North Central Coast, and South Central Coast Air Basins is higher than in the North Coast Air Basin because the population is much higher and the land uses more diverse. Area source contributions are higher, in part because the emissions inventory surrogates are linked to population and density. Nevertheless, combustion emissions of SOx from anthropogenic sources are already limited, since California already requires reduced sulfur in all commercially available fuels (coal, natural gas, gasoline and fuel oil.) Also, internal combustion engines used in portable construction equipment and stationary engines and pumps are already regulated, even in agricultural uses. By 2018, the SOx tracer tool shows that existing controls of Coastal sub-region area sources will reduce their contribution to the overall California share of sulfates by 14 percent. Likewise, existing mobile source controls can achieve an 11 percent reduction in that category's contribution to Coastal sub-region sulfates.

A review of the top 100 SOx-emitting stationary sources in the Coastal sub-region shows that 35 facilities emitted more than 100 tons per year of SOx in 2006. The facility with the highest SOx emissions Statewide, 6353 TPY of SOx in 2006, is a BART-eligible refinery in the San Francisco Bay Area Air Basin. The BART determination for this facility is discussed in Chapter 5; significant emissions reductions will be implemented by 2013. Only seven other facilities emit more than 1000 TPY of SOx in the counties whose emissions could affect the Coastal sub-region. Four are refineries in the San Francisco Bay Area Air Basin whose BART-eligible units went through subject-to-BART modeling and did not show an impact greater than 0.5 dv above the threshold. One facility in the South Central Coast Air Basin permanently shut down its high SOx-emitting kiln at the end of 2007 to reduce greenhouse gas emissions. One cement plant in the Mojave Desert Air Basin is usually downwind of the nearest Coastal Class 1 Area, 160 kilometers away, and went through New Source Review for a modern kiln design in 1982. Another refinery in the Los Angeles Air Basin is under the RECLAIM program for continuous reductions of emissions. No further changes were identified for these facilities, when considering the cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source.

In summary, the point source category shows a slight increase in the contribution to sulfates in the Coastal sub-region, but that growth is limited to 5 percent due to existing controls of particulate matter necessary to maintain the current attainment status for Federal particulate matter standards. As mentioned previously, the Coastal Class 1 Areas are all in nonattainment areas for State health standards for particulate matter. The affected air districts have adopted all feasible stationary source measures on a path to reduce emissions, as required by State law. California expects that additional measures will also be adopted and implemented in the future, to keep the Coastal sub-region in attainment of new federal particulate matter standards. These will be discussed in the mid-course review. Despite the anticipated 16 percent increase in population in the Coastal sub-region by 2018 from 2002 levels, the sub-region's share of sulfate extinction will decrease 3 percent on average on worst days, with existing controls in effect.

Along with sulfates, nitrates, sea salt and Rayleigh gas scattering, organic aerosols are significant drivers of worst days haze in Coastal California. In large part, these days are associated with sustained peaks of organic aerosol during large wildfires. The smoke containing the organic mater aerosols can be local or transported with minimal dispersion over long distances by ocean air masses. Biogenic emissions also contribute organic aerosols during the growing season, in direct relation to the types of vegetative covering at the respective Class 1 Areas. Neither wildfires nor biogenic emissions can be controlled. However, California's Smoke Management Program is used to limit the impacts of anthropogenic fires. Despite population growth, anthropogenic emissions of organic aerosols are decreasing. They will be lower than current levels by 2018 due to existing stringent State and air district controls of reactive organic gas emissions from consumer products and other source categories, to reduce ozone formation. These controls are continuously updated, considering the four factors, cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts, and remaining useful life of the source. Future refinements will be reported in the mid-course review.

4.8 Consultation

California consulted with nearby states regarding the 2018 Progress Strategy by actively participating in the WRAP regional planning organization. Via many WRAP meetings, California conveyed to the WRAP states California's 2018 Progress Strategy and the benefits it provides in improving visibility at all Class 1 Areas impacted by California emissions. In addition, California contacted neighboring states directly. Through this consultation process, the WRAP states concurred that California's 2018 Progress Strategy was appropriate for setting reasonable progress goals for both within State and out-of-State Class 1 Areas within the context of a western regional planning perspective.

4.9 Conclusion

In general, California has reduced emissions at a faster pace than anywhere in the world over the last forty years by introducing cleaner technologies. We evaluated our 2018 Progress Strategy from a western regional perspective in light of the four factors and have determined that the 2018 Progress Strategy provides a cost-effective, far-reaching, and comprehensive basis for setting our reasonable progress goals for the purpose of Regional Haze planning. However, due to the severity of California's air quality problems and the need to meet State and federal air quality standards, ARB will continue to develop additional strategies for years to come. Notably, in 2007 the Air Resources Board adopted a comprehensive Statewide strategy to provide for attainment of the federal 8-hour ozone and PM2.5 standards that outlines a plan for the development of a combination of far-reaching measures. ARB controls and benefits from future strategies will continue to reduce emissions through the 2018 time and improve visibility at all Class 1 Areas impacted by California emissions. California will evaluate the benefits of the 2018 Progress Strategy as well as new measures adopted in upcoming years during the mid-course review.