Chico, CA/Butte County $PM_{2.5}$ Nonattainment Area Redesignation Request and Maintenance Plan

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The Butte County Air Quality Management District appreciates the assistance and contributions from staff with the California Air Resources Board and the EPA Region 9 office.

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1. Executive Summary

In December 2009 most of Butte County was designated by the United States Environmental Protection Agency (EPA) as nonattainment for the 2006 24-hour Fine Particulate ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS). Under state and federal law, the Butte County Air Quality Management District (BCAQMD or District) is the local air quality agency responsible for meeting and maintaining compliance with federal air quality standards. The California Air Resources Board (CARB) is tasked with submitting State Implementation Plans (SIPs) to EPA that demonstrate how nonattainment areas will attain the NAAQS. EPA took final action effective October 2013 to determine that the Chico nonattainment area in Butte County, California had attained the 2006 24-hour $PM_{2.5}$ NAAQS.

The federal Clean Air Act (CAA) establishes the procedures to redesignate a nonattainment area as attainment. This document demonstrates that the Chico, CA/Butte County (partial) $PM_{2.5}$ Planning Area (Planning Area) has met the requirements established in the CAA to request redesignation to attainment for the 2006 24-hour $PM_{2.5}$ NAAQS. This document also demonstrates how the Planning Area will maintain the NAAQS through the next 10 years.

2. Introduction and Background

a. Area Setting

Butte County, California is located in the northeastern portion of the Sacramento Valley Air Basin (Figure 2-1). The EPA has designated a portion of Butte County as the Chico, CA/Butte County (partial) $PM_{2.5}$ Planning Area (Planning Area). The $PM_{2.5}$ monitoring site is located in the Planning Area at the eastern edge of the valley floor, on East Avenue in Chico, CA.

The EPA defines the Planning Area (Figure 2-2) as that portion of Butte County which lies west of the line described as follows: (Mount Diablo Base and Meridian) Beginning at the intersection of the Butte-Yuba county line and the township line common to T18N R6E and T19N R6E, west to the township line common to T18N R6E and T19N R6E, then north along the range line common to R5E and R6E, then west along the township line common to T21N and T20N, then north along the range line common to R4E and R5E, then west along the township line common to T24N and T23N to the Butte-Tehama County boundary.

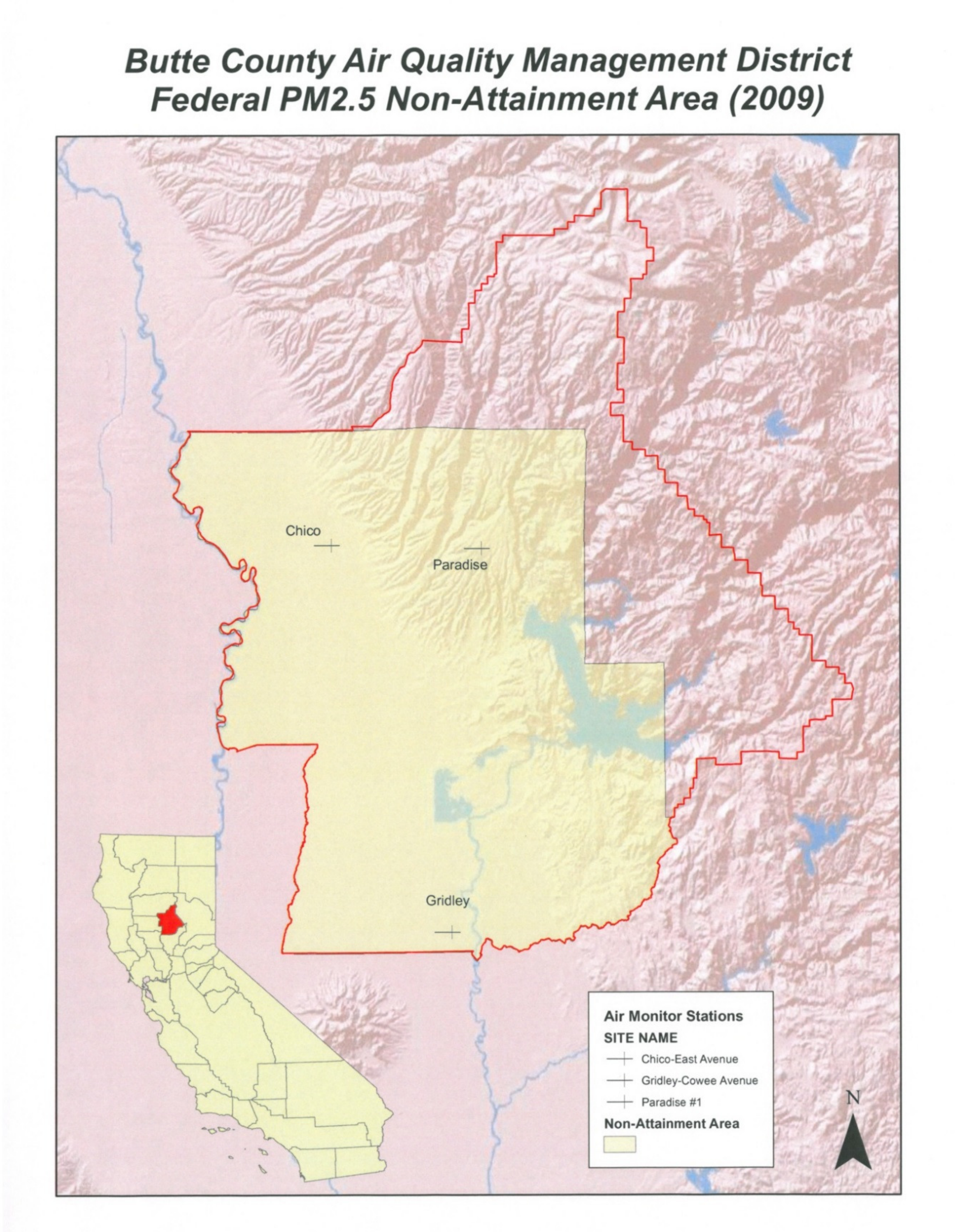
The Sacramento Valley is bound on the north and west by the Coastal Mountain Range and on the east by the southern portion of the Cascade Mountain Range and the northern portion of the Sierra Nevada Mountains. These mountain ranges reach heights in excess of 6000 feet above mean sea level (MSL), with individual peaks rising higher. This provides a substantial physical barrier to both locally created pollution and the pollution that has been transported northward on prevailing winds from the metropolitan areas to the south. Although a significant portion of the Planning Area is at elevations higher than 1,000 feet above MSL, the vast majority of its populace lives and works below that elevation. The valley is often subjected to inversion layers that, coupled with geographic barriers, create a high potential for poor air quality conditions.

Analysis by CARB indicates the key components of $PM_{2.5}$ in the Planning Area are carbonaceous aerosols, which include organic matter and elemental carbon, ammonium nitrate, and organic carbon. While the sources of ammonium nitrate are regional, sources of carbonaceous aerosols are more localized. Historically, $PM_{2.5}$ pollution is dominated during the winter months by smoke from wood burning stoves and fireplaces, and that is when the exceedances of the standard occur. Agricultural and residential open burning are also contributing factors. Due to meteorological conditions, smoke collects in localized, concentrated pockets. This means that the smoke from just one fireplace or wood-burning stove can cause a significant problem for an entire neighborhood. Because airborne particles take time to settle, the problem intensifies quickly. Additionally, smoke particles are so tiny that they may seep into homes despite closed doors and windows. Up to 70% of the outdoor wood smoke can re-enter the home (Reference 4). Neighbors of wood burners may be breathing unhealthy particles, even if they are not using their own wood-burning stoves or fireplaces.

Butte County currently has three (3) monitoring sites operated by the California Air Resources Board that measure $PM_{2.5}$, located in Chico, Gridley, and Paradise. However, only the Chico site has a federal reference monitor (FRM) that can be used for attainment demonstration purposes. $PM_{2.5}$ FRM data from Chico has been collected since 1998. The FRM sampling frequency was increased to daily in 2013. In order to collect diurnally resolved data, a non-FEM BAM operates in parallel with the FRM sampler. The Chico site also has a $PM_{2.5}$ speciation monitor that identifies the chemical composition of the $PM_{2.5}$. The monitoring site locations are indicated on Figures 2-1 and 2-2. The Chico monitoring location changed from Manzanita Avenue to East Avenue in 2012

Figure 2-1: Sacramento Valley Air Basin

Figure 2-2: Planning Area



b. Regulatory History

Pursuant to the CAA, the EPA sets primary air quality standards to protect public health, including protection of sensitive populations such as asthmatics, children, and the elderly, and secondary standards to protect public welfare, including the protection against decreased visibility and damage to crops, animals, vegetation, and buildings. Achieving the federal standards protects public health, reduces the region's health care costs, and improves the quality of life for residents. This chapter describes EPA's process for setting health-based standards and designating areas based on those standards, the history of the $PM_{2.5}$ standard and the area designations, and the CAA requirements for areas based on those designations.

c. National Ambient Air Quality Standards

The Clean Air Act was adopted in 1970. The legislation authorized the development of comprehensive federal and state regulations to limit emissions from stationary and mobile sources. The CAA was amended in 1977 and again in 1990. The CAA and amendments require the EPA adopt National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. EPA formally designates areas as "nonattainment" (not meeting the standard), "unclassifiable/attainment" (meeting the standard or expected to be meeting the standard despite a lack of monitoring data), or "unclassifiable" (insufficient data to classify).

Once nonattainment designations take effect, state and local governments develop implementation plans outlining how areas will attain and maintain the standards by reducing air pollutant emissions contributing to fine particle concentrations. The CAA requires EPA to conduct a periodic review of the standards and the science upon which the standards are based.

d. Overview of Particulate Matter NAAQS

Particulate matter is one of the six criteria pollutants. EPA first issued standards for particulate matter in 1971 and subsequently revised the standards in 1987, 1997, 2006, and 2012. The 2006 revision addressed two categories of particle pollution: *fine particles* ($PM_{2.5}$), which have an aerodynamic diameter of 2.5 micrometers or smaller, and *inhalable coarse particles* (PM_{10}) which have a nominal aerodynamic diameter of less than 10 micrometers.

The EPA established the separate annual and 24-hour standards for $PM_{2.5}$ in 1997 (62 *FR* 38652). The annual standard was set at 15.0 micrograms per cubic meter (μg/m^3). The 24-hour standard was set at 65 μg/m^3, based on a 3-year average of the 98^{th} percentile of 24-hour $PM_{2.5}$ concentrations.

In 2006, EPA lowered the 24-hour $PM_{2.5}$ standard from 65 μg/m^3 to 35 μg/m^3, and retained the annual $PM_{2.5}$ standard at 15.0 μg/m^3. The revised $PM_{2.5}$ standards were published on October 17, 2006 (71 FR 61144) and became effective on December 18, 2006.

In 2012, EPA lowered the annual $PM_{2.5}$ standard from 15.0 µg/m3 to 12.0 µg/m3, and retained the 24-hour $PM_{2.5}$ standard at 35 µg/m3. The revised $PM_{2.5}$ standards were published on January 15, 2013 (78 FR 3085) and became effective on March 18, 2013.

e. Designations

On November 13, 2009 (74 FR 58688), EPA promulgated air quality designations for all areas in the U.S. for the 2006 $PM_{2.5}$ NAAQS, effective on December 14, 2009. The Planning Area was designated nonattainment for the 24-hour $PM_{2.5}$ NAAQS based on 2005-2007 monitoring data.

3. Redesignation Request

The Butte County Air Quality Management District formally requests EPA to redesignate the Chico, CA / Butte County (partial) $PM_{2.5}$ Planning Area to attainment status with respect to the federal 2006 24-hour $PM_{2.5}$ standard. To grant this request, the EPA must first verify that the nonattainment area has met the five criteria contained in Section 107(d)(3)(E) of the federal CAA as described below:

a. EPA determines that the area has attained the NAAQS

On May 16, 2011, BCAQMD requested that CARB submit a request to the EPA to find the Butte County nonattainment area in attainment of the 2006 24-hour $PM_{2.5}$ NAAQS based on the 2008–2010 monitoring period (**Attachment A**). CARB submitted this request to the EPA on June 2, 2011 (**Attachment B**).

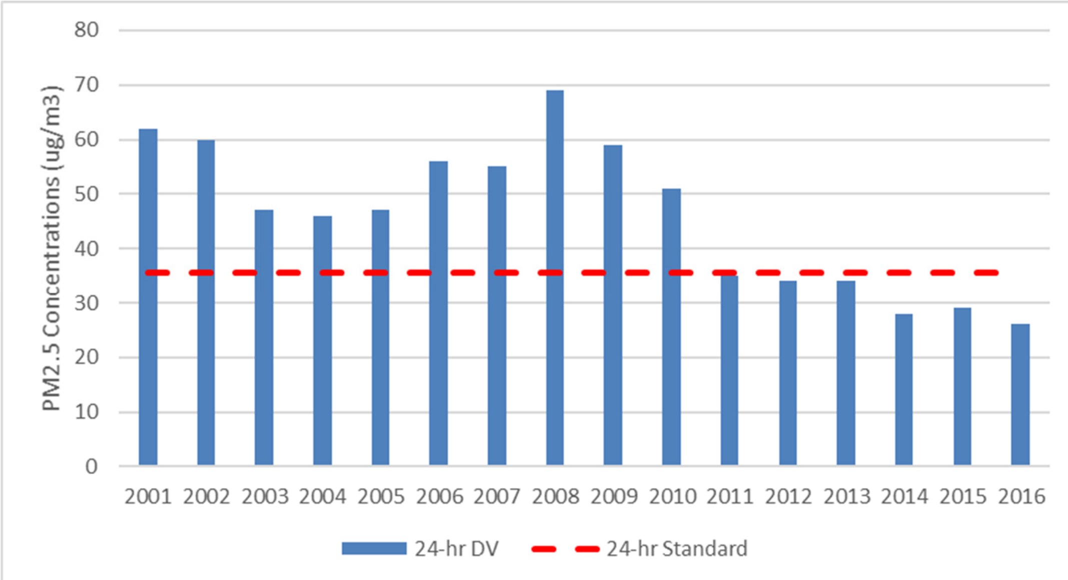
EPA took final action effective October 10, 2013 to determine that the Chico nonattainment area in Butte County, California had attained the 2006 24-hour $PM_{2.5}$ National Ambient Air Quality Standard (78 FR 55225). This determination was based upon complete, quality-assured, and certified ambient air monitoring data showing that this area has monitored attainment of the 2006 24-hour $PM_{2.5}$ NAAQS based on the 2010–2012 monitoring period. Further, on May 10, 2017 EPA determined that the Chico nonattainment area met the 2006 24-hour $PM_{2.5}$ standard as required by December 31, 2015 (82 FR 21711). This action was effective on June 9, 2017.

Table 3-1 and Figure 3-1 provides a summary of monitoring data for the Chico monitoring location demonstrating continued attainment of the 24-hour $PM_{2.5}$ NAAQS.

Table 3-1: Summary of 98th Percentiles of the 24-hour Concentrations (micrograms per cubic meter)

98th Percentile					24-hr Design Value		
2012	2013	2014	2015	2016	2014	2015	2016
26.3	30.2	26	29.5	21.2	28	29	26

Figure 3-1: 24-hour $PM_{2.5}$ Design Value Trend (micrograms per cubic meter)



b. EPA has fully approved the area's applicable implementation plan under section 110(k)

State Implementation Plans (SIPs) are comprehensive plans that describe how an area will attain the NAAQS. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts such as the BCAQMD prepare SIP elements and submit them to ARB for review and approval. After state review, CARB forwards SIP revisions to the EPA for approval. When a plan is submitted to the EPA for inclusion in the federally approved SIP, EPA evaluates it for consistency with the CAA and EPA policies, then publishes the proposed action in the Federal Register with a solicitation for public comment. After considering public comment, EPA makes a final determination of whether or not the submittal is approvable and will be included in the federally approved SIP.

On September 28, 2012, BCAQMD transmitted to CARB the 2012 $PM_{2.5}$ Emissions Inventory Submittal for inclusion into the SIP for the Planning Area. CARB approved the Emissions Inventory as a revision to the California SIP on October 18, 2012 and transmitted the SIP submittal to the EPA on November 15, 2012. EPA took direct final action on March 14, 2014 to approve revisions to the California SIP concerning $PM_{2.5}$ emission inventories for the Planning Area (79 FR 14404).

c. EPA determines improvement in air quality is due to enforceable emission reductions

BCAQMD used a combination of rule-making, air quality management programs, public outreach, and incentives to reduce ambient concentrations of $PM_{2.5}$ in the Planning Area. Several actions to reduce $PM_{2.5}$ concentrations in the Planning Area have resulted in permanent and enforceable emission reductions.

BCAQMD obtains its authority to adopt, amend, or repeal rules and regulations from California Health and Safety Code Sections 40000, 40001, and 40702. Table 3-2 shows BCAQMD rules adopted or amended since designation that control sources of $PM_{2.5}$. To prevent new facilities from causing $PM_{2.5}$ emissions impacts in the Planning Area, new facilities that may emit $PM_{2.5}$ are subject to permitting rules and New Source Review. New major sources of $PM_{2.5}$ are required to implement Best Available Control Technology. BCAQMD permitting rules 400 (81 FR 93820), 401 (81 FR 93820), 432 (81 FR 93820), 433 (82 FR 17380), and 1107 (80 FR 69880) have been incorporated into the SIP. Rule 432 was granted a limited approval/disapproval with a deficiency that ammonia was not included as a precursor to $PM_{2.5}$. This deficiency was corrected by the BCAQMD Board on March 23, 2017 and CARB re-submitted the amended rule to EPA on March 12, 2017.

Table 3-2: BCAQMD $PM_{2.5}$ Rules and Regulations Adopted/Amended Since Nonattainment Designation

Rule Number	Rule Name	Adoption or Amendment Date	Comments
207	Wood Burning Devices	Amended December 11, 2008	Establishes performance standards for wood burning devices installed in new and existing interior spaces.
300	Open Burning Requirements, Prohibitions, and Exemptions	Amended December 9, 2010, February 24, 2011, and August 27, 2015	Regulates agricultural, residential, and prescribed open burning. Establishes burn hours, performance standards, and cooperation with the Sacramento Valley Air Basin Smoke Management Program.
400	Permit Requirements	Amended May 26, 2011 and April 24, 2014	Provides a permitting process for new and modified stationary sources of air pollution.
401	Permit Exemptions	Amended May 26, 2011 and April 24, 2014	Specifies emissions units that are categorially or conditionally exempt from permit requirements.
430	State New Source Review (SNSR)	Amended May 26, 2011 and December 8, 2011	Regulates all non-attainment pollutants for major and minor sources for state purposes. BACT Thresholds added for $PM_{2.5}$.
432	Federal New Source Review (FNSR)	Adopted May 26, 2011. Amended April 24, 2014 and March 23, 2017	Regulates all non-attainment pollutants for major sources for federal purposes.
433	Rice Straw Emission Reduction Credits	Amended April 24, 2014	Federally recognized procedure for quantifying and certifying rice straw burning emission reductions.
1107	Prevention of Significant	Adopted June 28, 2012	Permitting program for new major facilities and major modifications to existing major facilities and

	Deterioration (PSD) Permits		areas designated as attainment or unclassifiable for any criteria pollutant.

Amendments to BCAQMD Rule 300 in 2010 and 2011 further regulated open residential burning in the Planning Area with the inclusion of burn hours and performance standards. The establishment of burn hours restricts open burning at night when inversions can trap pollutants close to ground level. BCAQMD also participates in the Sacramento Valley Air Basin Smoke Management Program to manage agricultural and prescribed burning in the air basin. BCAQMD Rule 300 has been incorporated into the SIP (81 FR 70018).

BCAQMD managed a woodstove replacement program between 2005 and 2007 replacing older non-certified wood-burning devices with EPA-certified woodstoves, pellet stoves, or gas stoves. 52 devices were changed out in 2005, 71 devices were changed out in 2006, and 120 devices were changed out in 2007. An additional 27 non-certified wood-burning devices were changed out in 2010 using civil penalty funds. The 270 woodstove replacements between 2005 and 2010 contributed positively towards the Planning Area reaching 24-hour $PM_{2.5}$ standard with the 2011 design value. BCAQMD agreed in 2013 to participate in a wood burning device change out program as part of a consent decree between the EPA and Powertrain, et al. A total of 480 non-EPA certified wood burning devices in Butte County (469 in the Planning Area) were replaced with either an EPA certified wood burning device, a pellet stove, or a natural gas burning device. The cumulative benefit of 739 woodstove replacements during the 2005 – 2015 replacement programs as calculated using CARB methodology (**Attachment C**) is estimated to be an emissions reduction of 40.508 tons per year of $PM_{2.5}$.

Because BCAQMD Rule 207 prohibits the installation of non-certified wood-burning devices in new and existing dwellings, the wood-burning device replacements that have occurred through the various programs brought permanent and enforceable emission reductions. BCAQMD Rule 207 has also been incorporated into the SIP (78 FR 21540).

Worth noting is BCAQMD's voluntary residential wood burning curtailment program, *Check Before You Light,* which has been active each winter since 2008. *Check Before You Light* Advisories are issued for days with forecasted exceptionally poor dispersion periods. Alerts are published in the daily newspaper, distributed to the media, and are available to the public via the district website, a dedicated phone hotline, and social media. The frequency of alerts has decreased substantially since 2012 which BCAQMD attributes to awareness and education that accompanies the program. As a voluntary public outreach program, emission reductions from this program are not categorized as permanent and enforceable. In conjunction, effective 2011, the City of Chico adopted Municipal Code 8.23 *Wood Burning Regulations* which prohibits the use of wood burning devices within the city limits of Chico when a *Check Before You Light* advisory is issued by BCAQMD, with limited exemptions. Since this code is implemented by another jurisdiction and could be subject to change, it is also not categorized as permanent and enforceable from BCAQMD's standpoint.

The collective success of these programs are shown in Figures 3-2 and 3-3. There has been a 36% reduction in the three year average mass of carbonaceous aerosols measured between 2008 and 2016, on the average winter day. When considering the top 10% of $PM_{2.5}$ speciation monitoring days, the reduction in the three year average mass of carbonaceous aerosols increases to 58%.

Figure 3-2: Trends in Three Year Average Winter Composition – Chico, CA

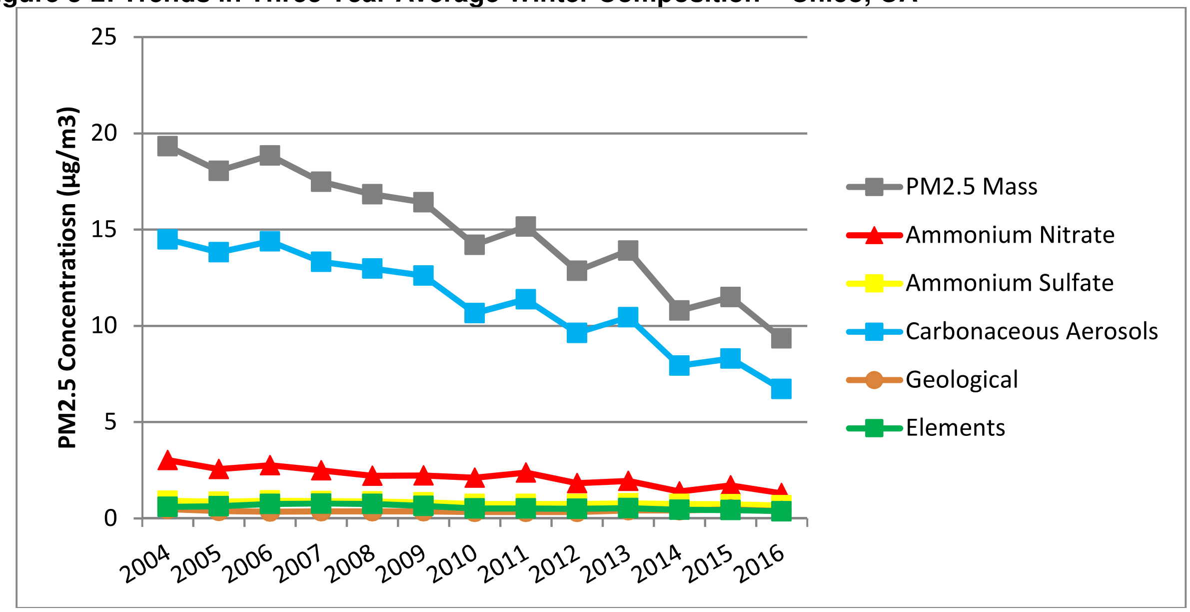
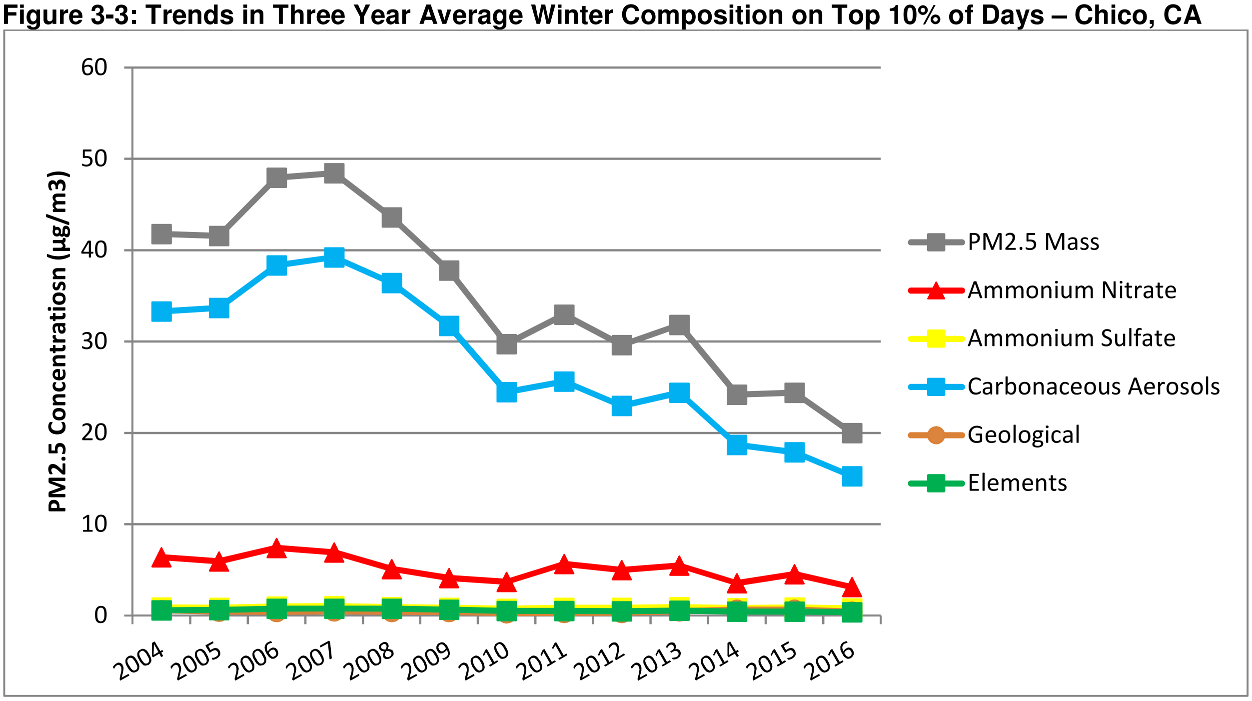


Figure 3-3: Trends in Three Year Average Winter Composition on Top 10% of Days – Chico, CA



During the peak hours associated with wood burning for home heating (6 p.m. to 10 p.m.) hourly concentrations on the top 10% of days declined on average 63% since 2008 (Figure 3-4). Since the highest concentrations are observed during stagnant conditions which typically occur in the evening and early morning hours, the reductions in hourly concentrations were particularly evident during those times. Improvements also continues through the nighttime.

Figure 3-4: Change in Diurnal Patterns on Top 10% of Days – Chico, CA

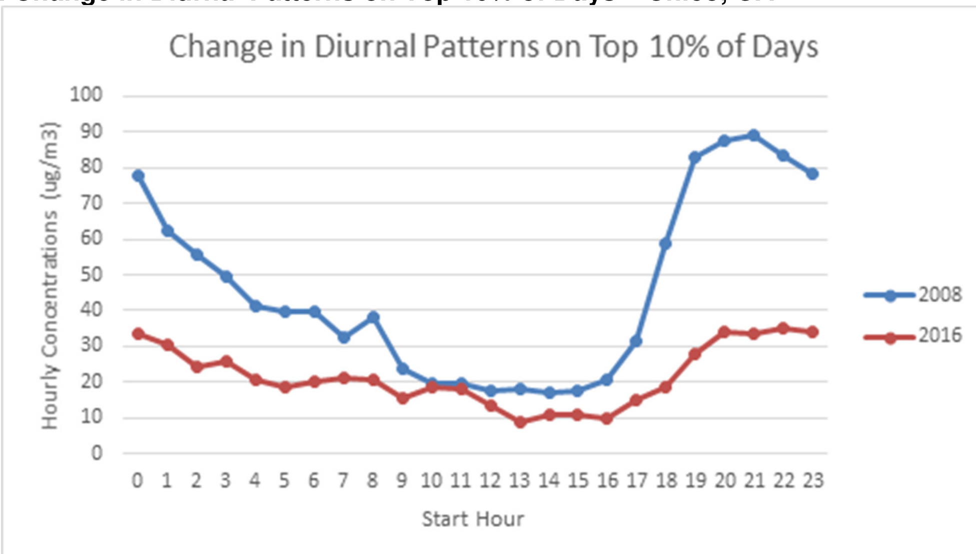
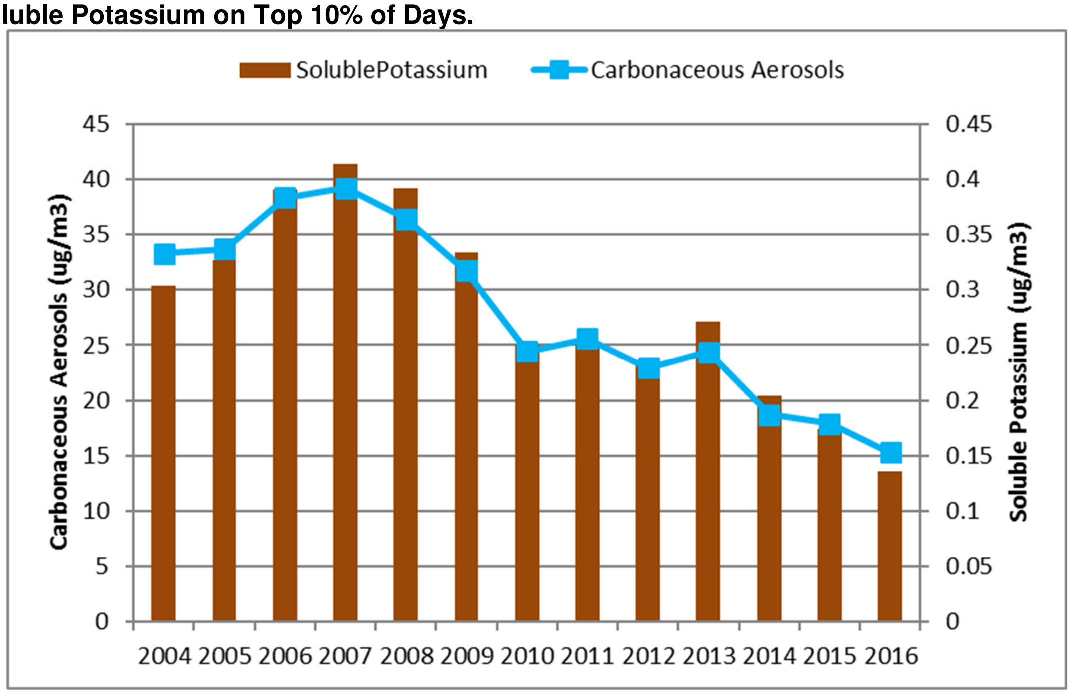


Figure 3.5 further illustrates that the trend in carbonaceous aerosol concentrations closely matches the trend in concentrations of soluble potassium, a wood burning marker. The consistency between the two demonstrates that the reductions in carbonaceous aerosol concentrations are due to reductions in wood burning emissions.

Figure 3.5: Comparison of Three-Year Average Trends in Concentrations of Carbonaceous Aerosols and Soluble Potassium on Top 10% of Days.



Between 2005 and 2015, 729 old wood burning devices in the nonattainment area were replaced with cleaner burning home heating devices. The reductions associated with these change-outs are estimated at 0.238 tons per day of $PM_{2.5}$ emissions on an average winter day. For the top 10% of days, these reductions should be even more significant due to both increased burning activity and low atmospheric dispersion. The concentration of carbonaceous aerosols during the top 10% of days was 2.3 times higher compared to an average winter day.

The calculated wintertime emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors have also decreased within the Planning Area since the 2006 24-hour $PM_{2.5}$ NAAQS were established. Between 2006 and 2015, total wintertime emissions of $PM_{2.5}$ in the Planning Area decreased by 11.8% while oxides of nitrogen (NOx) decreased by 41.3% and oxides of sulfur (SOx) decreased by 45.3%. These modeled reductions include a 12.1% reduction in $PM_{2.5}$ from the residential fuel combustion areawide source subcategory. The greatest reductions for $PM_{2.5}$, NOx, and SOx were in the mobile source category (Table 3-3). These reductions in the mobile source category can be attributed to permanent and enforceable vehicle emission standards established by the EPA and CARB.

Figure 3-6: Comparing Wintertime Emissions in the Planning Area Between 2006 and 2015

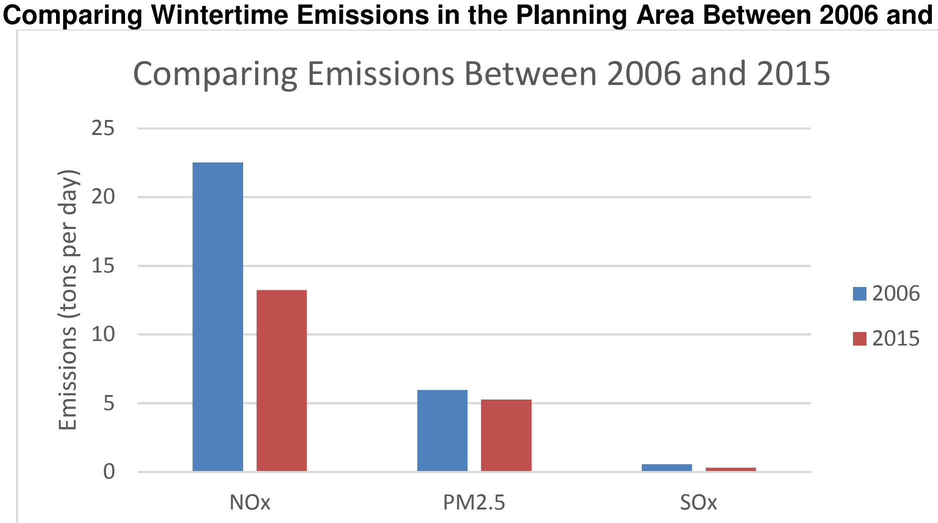


Table 3-3: Planning Area Wintertime Emission Changes Between 2006 and 2015

$PM_{2.5}$ (tons per day)				
	2006	**2015**	**Emissions Change**	**Emissions Change (%)**
Stationary Sources	0.683	0.560	-0.123	-18.0%
Areawide Sources*	4.568	4.322	-0.246	-5.4%
*Residential Fuel Combustion**	*2.451*	*2.155*	-0.296	-12.1%
Mobile Sources	0.710	0.375	-0.335	-47.2%
Total*	5.961	5.257	-0.704	-11.8%

NOx (tons per day)				
	2006	**2015**	**Emissions Change**	**Emissions Change (%)**
Stationary Sources	2.101	1.653	-0.448	-21.3%
Areawide Sources	1.432	1.449	+0.017	+1.2%
Mobile Sources	18.98	10.121	-8.859	-46.7%
Total	22.513	13.223	-9.290	-41.3%

SOx (tons per day)				
	2006	**2015**	**Emissions Change**	**Emissions Change (%)**
Stationary Sources	0.115	0.096	-0.019	-16.5%
Areawide Sources	0.089	0.145	+0.056	+62.9%
Mobile Sources	0.333	0.053	-0.280	-84.1%
Total	0.537	0.294	-0.243	-45.3%

Source: California Emissions Projection Analysis Model (CEPAM) 2016 SIP Baseline Emission Projects and *CARB analysis of Planning Area woodstove replacement programs

The Planning Area has continued to attain the 2006 $PM_{2.5}$ NAAQS through a variety of meteorological conditions, showing that favorable weather is not solely responsible for the improved air quality conditions. The Planning Area normally experiences a Mediterranean climate with hot, dry summers and cool, wet winters. There are occasional episodes where high pressure systems can become established over the Planning Area during the winter months. These high pressure systems encourage radiative cooling in the Sacramento Valley which can bring overnight temperatures below freezing with stagnant winds. Wintertime high pressure systems also encourage pollutant-trapping inversions to form aloft which further limits dispersion. The Upper Sacramento Hydrological Unit, which includes the Planning Area, experienced a historic drought between 2013 and 2015 (Figure 3-7). The Planning Area continued to attain the 2006 $PM_{2.5}$ NAAQS while experiencing a historically wet year in 2016. The Planning Area has also continued to attain the 2006 $PM_{2.5}$ NAAQS while the region experienced both cooler and warmer than normal years (Figure 3-8). The Planning Area first met the 24-hour standard in 2011 based on 2009-2011 conditions which were, on average, cooler than the 1981-2000 normal.

The Chico Metropolitan Statistical Area, which includes the Planning Area, has experienced a continuous increase in Gross Domestic Product (GDP) since the economic downturn in 2008 (Figure 3-9). Because ambient $PM_{2.5}$ concentrations continue to improve as GDP increases, economic conditions are not responsible for improved air quality conditions.

Figure 3-7: Annual Precipitation in the Upper Sacramento Hydrological Unit

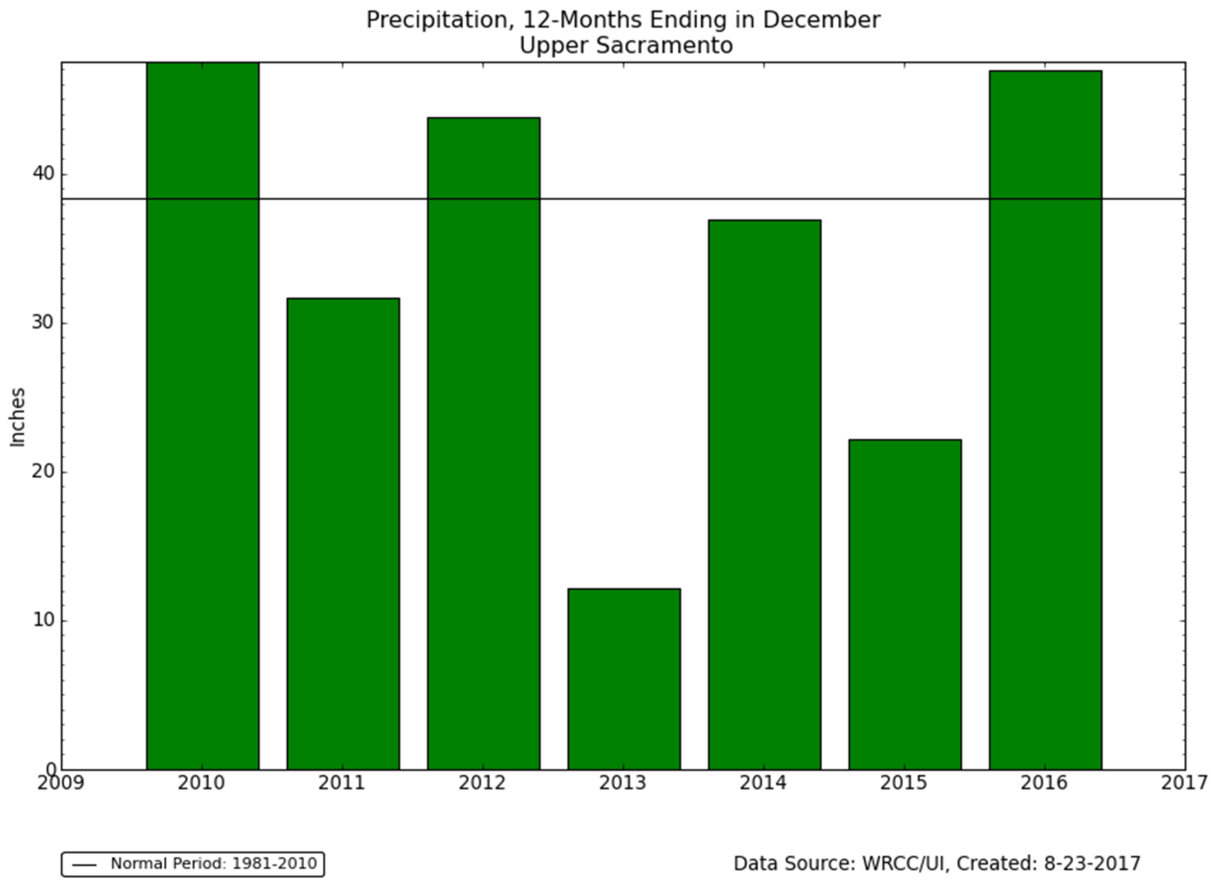


Figure 3-8: Annual Mean Temperature in the Upper Sacramento Hydrological Unit

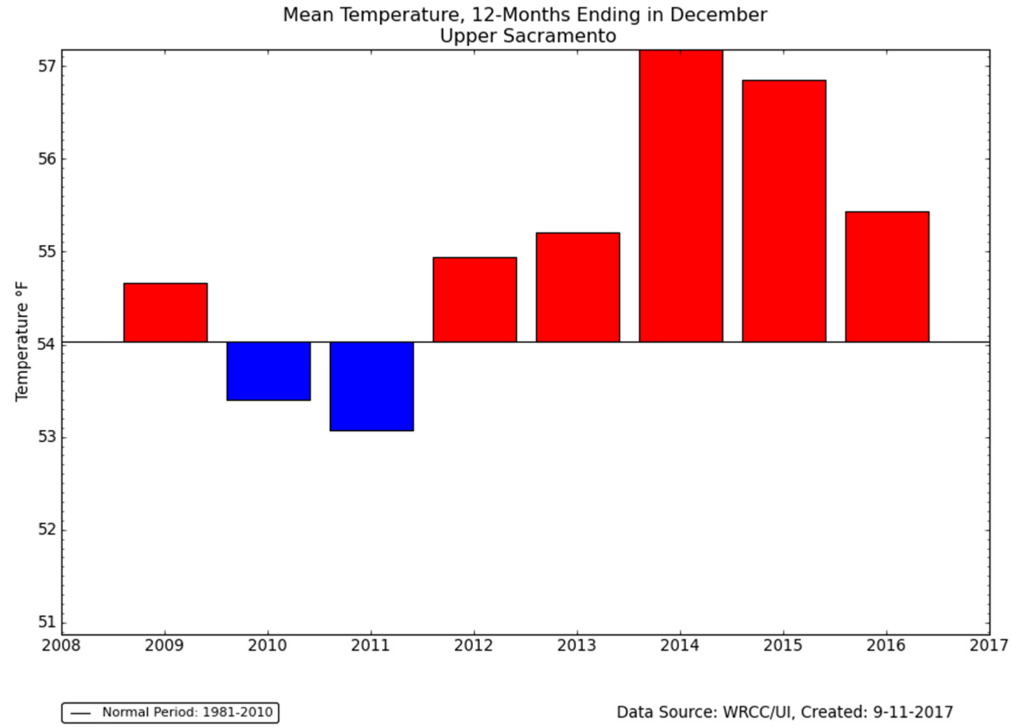
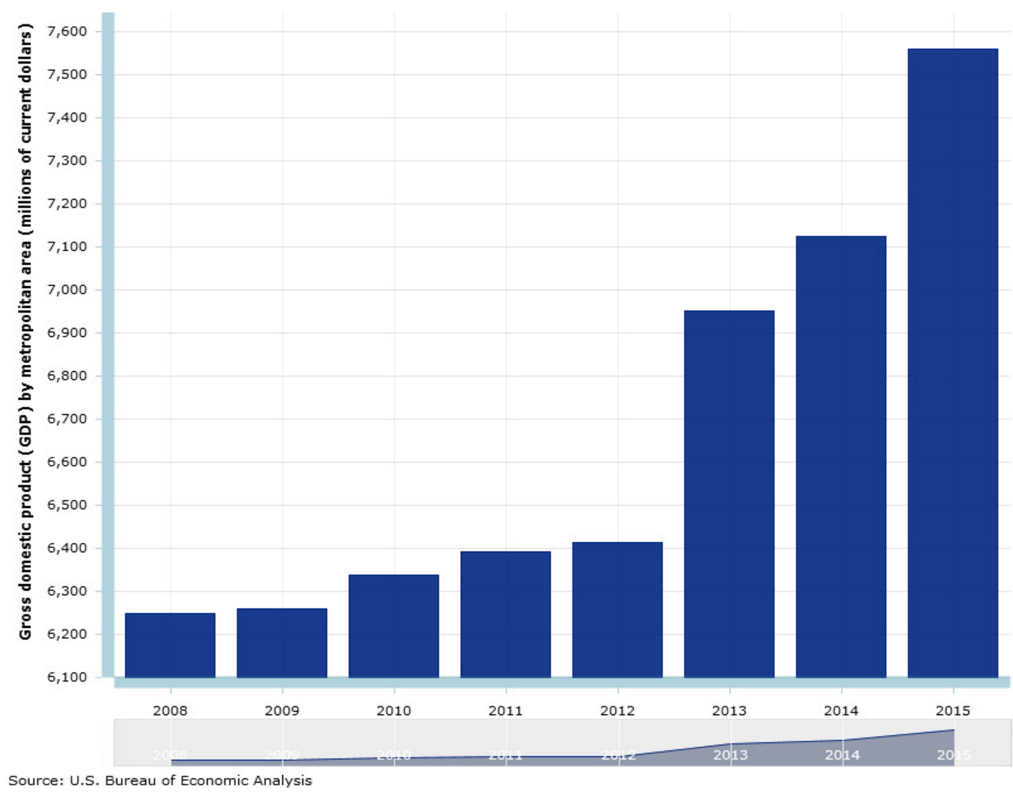


Figure 3-9: GDP, All Industries – Chico Metropolitan Statistical Area



d. The area has a fully approved maintenance plan meeting section 175A.

EPA's 1992 Calcagni Memo clarifies that the redesignation request and maintenance plan may be submitted at the same time. See Section 4, Maintenance Plan.

e. The area has met all of the requirements applicable to the area under section 110 and Part D prior to the approval of the redesignation.

EPA took final action on October 10, 2013, based on the determination of attainment, to suspend the requirements for the Chico nonattainment area to submit an attainment demonstration and associated Reasonably Available Control Measures (RACM), a RFP plan, contingency measures, and any other planning SIPs related to attainment of the 2006 24-hour $PM_{2.5}$ NAAQS for so long as the area continues to attain the 2006 24-hour $PM_{2.5}$ NAAQS (78 FR 55225).

EPA took direct final action on March 14, 2014 to approve the $PM_{2.5}$ emissions inventory for the Planning Area (79 FR 14404). EPA generally approved the California's infrastructure SIP for CAA section 110(a) on April 1, 2016, including, among other things, requirements pertaining to the State and local air districts' legal authority, regulatory structure, resources, permit programs, and monitoring necessary to assure attainment and maintenance of the various NAAQS (81 FR 18766).

4. Maintenance Plan

a. Maintenance Demonstration

The purpose of the maintenance demonstration is to demonstrate that the Planning Area is projected to remain in attainment with the NAAQS throughout the entire 10 year maintenance period. CARB, with emissions inventory information provided by BCAQMD, developed an inventory for the base year of 2015 and forecast emissions through the horizon year of 2030 (**Attachment D**). Because the finding was made that $PM_{2.5}$ exceedances in the Planning Area primarily occurred during the winter months, wintertime emissions were considered in the emission forecasts. The maintenance demonstration includes emissions of direct $PM_{2.5}$ and the precursors SOx, NOx, Ammonia (NH_3), and Volatile Organic Compounds (VOC).

BCAQMD issues Emission Reduction Credits (ERCs) for emission reductions due to equipment shutdown or voluntary control. These ERCs may then be used as offsets to compensate for an increase in emissions from a new or modified major source regulated by BCAQMD. To conservatively account for the potential that banked ERCs may be used during the maintenance period, the balance of the ERC bank was added to the horizon year emission forecasts. Additionally, the current BCAQMD ERC bank contains credits for PM_{10} but not for $PM_{2.5}$. As a conservative approach, the bank of PM_{10} credits was added to the $PM_{2.5}$ emissions forecast even though $PM_{2.5}$ is a fraction of PM_{10}.

The method chosen to demonstrate maintenance of the $PM_{2.5}$ 24-hr NAAQS is a rollback proportional model. The rollback model is based on the assumption that there is a direct correlation between emissions of a pollutant and measured concentrations of that pollutant in the same air shed, and that changes in emissions will result in corresponding changes in concentrations. This correlation is then used to predict future concentrations based on future emissions.

The rollback model has two main parts: concentrations and emissions. Ambient monitoring data from speciation samplers located at the Chico monitoring site were used to assess the chemical composition of $PM_{2.5}$. Two samplers and multiple filter media are used to determine chemical speciation profiles. A Speciation Air Sampling System (SASS) sampler is used to collect $PM_{2.5}$ constituents including ions (sulfate, nitrate, sodium, potassium, and ammonium) and numerous trace elements while a University Research Glassware 3000N (URG) sampler is used for collecting elemental and organic carbon data. Both speciation samplers (SASS and URG) operate on a 1-in-6 day sampling schedule. $PM_{2.5}$ gravimetric mass and elements are measured by X-ray fluorescence (XRF) on Teflon-membrane filters. Ions are measured by ion chromatography on nylon-membrane filters. Organic and Elemental Carbon (OC and EC respectively) are measured by Total Optical Reflectance (TOR) method on quartz-fiber filters. The data are analyzed by CARB's Monitoring and Laboratory Division and reported to U.S. EPA's Air Quality Systems (AQS) database. Currently applied measurement technology does not quantify all measured components, so the sum of the measured species is always less than the full measured mass. PM mass reconstruction applies multipliers to measured species to estimate unmeasured components. In order to reconstruct $PM_{2.5}$ mass concentrations using chemical composition data, assumptions about the molecular form of the species must be made.

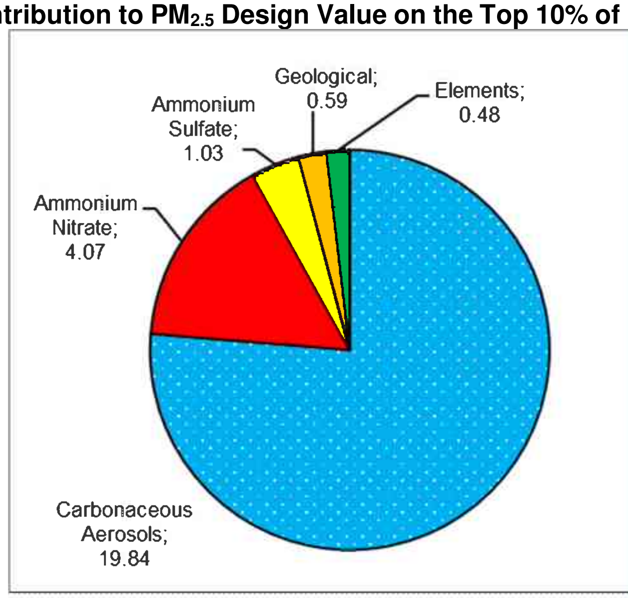
Table 4.1 presents assumptions used in this report. Sulfate and nitrate are assumed to be neutralized to ammonium sulfate [$(NH_4)_2SO_4$] and ammonium nitrate (NH_4NO_3) with the NH_4^+ fraction accounted for by applying stoichiometric multipliers as specified in Table 4.1. Geological material is estimated following the formula utilized by the IMPROVE Program. Elements are estimated by summing the remaining elements by XRF, excluding sulfur and geological elements. Carbonaceous aerosols are back-calculated from mass as the concentration that would result in reconstructed mass being exactly equal to gravimetric mass. Estimates of carbonaceous aerosols are validated by comparing to the sum of the measured elemental carbon (EC) and organic matter, which was estimated as organic carbon times 1.4. Reconstructed mass is then expressed as the sum of its representative chemical components, including ammonium nitrate, ammonium sulfate, carbonaceous aerosols, geological material, and trace elements.

Table 4.1: Form of Molecular Species Assumed in this Report

Component	Formula
Ammonium Nitrate	1.29 x Nitrate
Ammonium Sulfate	1.38 x Sulfate
Geological	2.2 x Aluminum + 2.49 x Silicon + 1.63 x Calcium + 2.42 x Iron + 1.94 x Titanium
Elements	Sum of remaining species (excluding S, Al, Si, Ca, Fe, and Ti)
Carbonaceous Aerosols	Measured $PM_{2.5}$ Mass - (Ammonium Nitrate + Ammonium Sulfate + Geological + Elements)

$PM_{2.5}$ concentrations used in the rollback model represent average concentrations on the top 10% of days between 2014 and 2016 (Figure 4.1). Typically, about 60 daily speciation samples are collected each year at the Chico monitoring station, so for each of the three years (2014-2016), six samples with the highest $PM_{2.5}$ mass were selected and the data were averaged to represent a typical annual high-day composition for each year. These annual averages for 2014 through 2016 were then averaged together to correspond to the three-year design value period. Since the resulting average $PM_{2.5}$ concentration for 2014-2016 was 20 µg/m^3, each component was then scaled to the 2016 design value of 26 µg/m^3 while preserving the relative proportions of the measured chemical components.

Figure 4.1: Average Contribution to $PM_{2.5}$ Design Value on the Top 10% of Days (2014-2016) (µg/m^3).



The rollback model assumes that atmospheric pollutant concentrations in excess of background represent $PM_{2.5}$ mass subject to controls (mass available for rolling) and are proportional to emissions. The mass available for rolling is estimated by subtracting background concentration from the mass assigned to each source. For example, the mass of ammonium nitrate available for rolling is calculated by subtracting the background concentrations of ammonium nitrate. Background concentrations are concentrations that would occur in the airshed in the absence of local anthropogenic emissions and represent local natural emissions and transported pollutants.

Background $PM_{2.5}$ concentrations were determined using IMPROVE data collected at the Bliss State Park monitoring site (AQS ID: 060179000), located on the western side of Lake Tahoe. The 24-hr background concentrations were calculated by averaging $PM_{2.5}$ data collected at the Bliss site on days when high $PM_{2.5}$ concentrations were measured at Chico ($PM_{2.5}$ concentrations exceeding 20 µg/m^3). Between 2011 and 2014 there were 34 high days at Chico with coinciding chemical composition data for the Bliss site. Table 4.2 shows the average 24-hr background concentrations for Chico.

Table 4.2. Background $PM_{2.5}$ Concentrations for Chico

$PM_{2.5}$ Component	**24-hr (µg/m^3)**
Ammonium Nitrate	0.13
Ammonium Sulfate	0.20
Geological	0.15
Carbonaceous Aerosols and Elements	0.89
Sum of Species	1.38

On the emission side, directly emitted $PM_{2.5}$ dust ($PM_{2.5}$ Dust) was separated from all other sources of directly emitted $PM_{2.5}$ ($PM_{2.5}$ Non-Dust), so that changes in dust emissions could be projected on concentrations of fugitive dust and changes in emissions from all other sources of directly emitted $PM_{2.5}$ could be projected on concentrations of carbonaceous aerosols and elements.

The first step in calculating the maintenance year $PM_{2.5}$ design values is to estimate the anticipated increase or decrease in emissions from each source between 2015 (the base year) and 2030 (the maintenance year). The same percentage of increase or decrease in emissions from each source is then applied to the $PM_{2.5}$ mass available for rolling. The future year contributions of each component were calculated by applying the percent change to the mass available for rolling and then adding background concentrations back, as shown in the equation below:

$$Future\ Year\ Contribution = Mass\ Available\ for\ Rolling \times (1 + Percent\ Change\ from\ Base\ Year) + Background\ Concentrations$$

The maintenance year design value is determined by summing maintenance year contributions for all of the components, as illustrated in Table 4.3.

Table 4.3: 2030 maintenance demonstration using proportional rollback model

Emissions	PM2.5 Component	2016 DV (ug/m3)	Background (ug/m3)	Available for Rolling (ug/m3)	Emissions 2015 (tpd)	2030 (tpd)	% Change	2030 DV (ug/m3)
Secondary PM2.5								
NOx	Ammonium Nitrate	4.07	0.13	3.94	13.223	7.086	-46%	2.24
SOx	Ammonium Sulfate	1.03	0.20	0.83	0.293	0.337	15%	1.15
Primary PM2.5								
Dust	Fugitive Dust	0.59	0.15	0.43	0.794	0.906	14%	0.65
Non-Dust PM2.5	Carbonaceous Aerosols+Elements	20.32	0.89	19.43	4.463	4.427	-1%	20.16
Final DV		**26.00**	1.38	24.62				**24.20**
Decrease in DV								**1.80**

The rollback model demonstrates that changes in emissions between 2015 (the base year) and 2030 (the maintenance year) will lead to a further reduction in 24-hr design value of 1.8 µg/m^3 which will result in a 2030 projected design value of 24 µg/m^3.

b. Monitoring Network

CARB maintains the monitoring network in the Planning Area. The monitoring network includes a $PM_{2.5}$ FRM SLAMS sampler operating on a daily schedule, a continuous $PM_{2.5}$ non-FEM BAM monitor, and a speciation sampler operating on a 1-in-6 day schedule sited at 984 East Avenue in Chico, CA. Together, these monitors provide the necessary data to demonstrate continuous compliance with the standard as well as support Air Quality Index reporting, declaring *Check Before You Light* advisories, and making burn decisions in the agricultural burning program. BCAQMD supports the continued operation of the monitoring network in the Planning Area to meet the air quality monitoring requirements in 40 CFR Part 58.

c. Verification of Continued Attainment

CARB is responsible for monitoring $PM_{2.5}$ in the Planning Area. CARB also oversees the quality assurance of $PM_{2.5}$ data and submits annual monitoring network plans to the EPA. CARB will maintain an appropriate $PM_{2.5}$ monitoring network through the maintenance period, with any potential changes to be developed in collaboration with the EPA and subject to stakeholder review. To verify continued attainment of the $PM_{2.5}$ standard, CARB will continue to conduct $PM_{2.5}$ monitoring and review data as it becomes available. BCAQMD will track the progress of the maintenance plan through the acquisition of ambient and source emission data. All permitted stationary sources within the District are required to submit annual throughput data that the District uses to compile the emission inventory. BCAQMD develops a comprehensive stationary source emission inventory every three years for submittal to CARB. BCAQMD will commit to reviewing the emission inventory for unexpected growth in directly emitted $PM_{2.5}$, NOx, SOx, NH3, or VOC that may jeopardize the maintenance of the 2006 $PM_{2.5}$ NAAQS.

d. Transportation Conformity

Section 176(c) of the Federal Clean Air Act (CAA) establishes transportation conformity requirements that are intended to ensure that transportation activities do not interfere with air quality progress. The CAA requires that transportation plans, programs, and projects that obtain federal funds or approvals *conform to* applicable state implementation plans (SIP) before being approved by a Metropolitan Planning Organization (MPO). Conformity to a SIP means that proposed activities must not:

(1) Cause or contribute to any new violation of any standard,
(2) Increase the frequency or severity of any existing violation of any standard in any area, or
(3) Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

A SIP analyzes the region's total emissions inventory from all sources for purposes of demonstrating Reasonable Further Progress (RFP), attainment, or maintenance. The portion of the total emissions inventory from on-road highway and transit vehicles in these analyses becomes the "motor vehicle emissions budget." [1] Motor vehicle emissions budgets are the mechanism for ensuring that transportation planning activities conform to the SIP. Budgets are set for each criteria pollutant or its precursors, and it is set for each RFP milestone year and the attainment year. Subsequent transportation plans and programs produced by transportation planning agencies are required to conform to the SIP by demonstrating that the emissions from the proposed plan, program, or project do not exceed the budget levels established in the applicable SIP.

Significance of $PM_{2.5}$ Precursors for Transportation Conformity

U.S. EPA has promulgated rules in Title 40, Part 93 of the federal Code of Regulations (CFR) that implement the conformity section of the Act. Section 93.102(b) of the conformity rule identifies the precursor/pollutants that, in the budget setting process, are presumed to be significant for a particular NAAQS and must be addressed. Pollutants and/or precursors presumed insignificant only need to be addressed when the SIP finds them significant. For $PM_{2.5}$, the only pollutants/precursors presumed significant are directly emitted $PM_{2.5}$ (exhaust, tire and brake wear), and NOx from on road motor vehicles.

Section 93.102(b)(2)(iv and v) of the conformity rule identifies volatile organic compounds (VOC), sulphur oxides (SOx), and ammonia as $PM_{2.5}$ precursor pollutants that that are presumed insignificant unless the SIP makes a finding that the precursor is significant. In addition, section 93.102(b)(3) identifies re-entrained road dust from paved and unpaved roads as $PM_{2.5}$ emissions that are presumed insignificant unless the SIP makes a finding of significance. While the applicability section of the rule does not address fugitive dust

[1] Federal transportation conformity regulations are found in 40 CFR Part 51, subpart T – Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved under Title 23 U.S.C. of the Federal Transit Laws. Part 93, subpart A of this chapter was revised by the EPA in the August 15, 1997 Federal Register.

from road construction specifically, the rule does indicate that the interagency consultation process should be used during the development of $PM_{2.5}$ SIPs to determine when construction emissions are a significant contributor. This plan makes no findings of significance for VOC, SOx, ammonia, re-entrained dust or fugitive road construction dust as $PM_{2.5}$ precursor pollutants.

Determining Insignificance for of NOx and Direct $PM_{2.5}$ for Transportation Conformity

Section 93.109(f) of the conformity rule provides that an area need not satisfy the regional emissions analysis requirement in sections 93.118 or 93.119 of the transportation conformity rule if the SIP finds that the regional motor vehicle emissions of a pollutant/precursor to be an insignificant contributor to the air quality problem for that pollutant/precursor and NAAQS. To make an insignificance finding, the SIP has to make a finding that it would be unreasonable to expect that the area would experience enough growth in motor vehicle emissions to cause violations of the NAAQS. The rule section states that the following criteria be used to evaluate the insignificance of pollutant/precursor emissions for a particular NAAQS:

- The contribution of on road emissions to the total SIP inventory
- The current state of air quality in the region
- The absence of any on road control measures in the plan that are required to attain or maintain the NAAQS and,
- Historical and future projections of on road emissions of that pollutant/precursor

Note that a finding of insignificance for a given pollutant/precursor and NAAQS only applies to the regional emissions analysis required by sections 93.118 and 93.119 of the rule. Other provisions of the transportation conformity rule such as consultation, hot spot analysis, fiscal constraint of plans and programs, etc. still apply. Transportation conformity will also continue to apply in the region for any other NAAQS for which the area is classified as either nonattainment or maintenance.

This maintenance plan finds that regional emissions of NOx and direct $PM_{2.5}$ are insignificant contributors to $PM_{2.5}$ air quality in Butte County. Below is a summary of air quality in the region, followed by a discussion of the application of the insignificance criteria above to NOx and direct $PM_{2.5}$ emissions in Butte County.

Summary of Air Quality in the Region

U.S. EPA established the separate annual and 24-hour NAAQS for $PM_{2.5}$ in 1997 (62 FR 38652). The annual standard was set at 15.0 micrograms per cubic meter (µg/m3). The 24-hour standard was set at 65 µg/m3. The 24-hour standard is based on a 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations. In 2006, U.S. EPA lowered the 24-hour $PM_{2.5}$ standard from 65 µg/m3 to 35 µg/m3, and retained the annual $PM_{2.5}$ standard at 15.0 µg/m3. The revised $PM_{2.5}$ standards were published on October 17, 2006 (71 FR 61144) and became effective on December 18, 2006.

On November 13, 2009 (74 FR 58688), U.S. EPA promulgated air quality designations nationwide for the 2006 $PM_{2.5}$ NAAQS, effective on December 14, 2009. The Butte County PM2.5 Nonattainment Area was designated nonattainment for the 24-hour $PM_{2.5}$ NAAQS based on 2005-2007 monitoring data. Emissions from the combustion of wood for space heating were identified as the primary cause of exceedances of the 24hour $PM_{2.5}$ NAAQS.

On October 10, 2013, U.S. EPA took final action to determine that the Butte County $PM_{2.5}$ Nonattainment Area had attained the 2006 24-hour $PM_{2.5}$ NAAQS. This finding was based on ambient air monitoring data from 2010-2012 showing that the area has attained the 2006 24-hour $PM_{2.5}$ NAAQS. On April 28, 2017, U.S. EPA determined that the Butte County $PM_{2.5}$ Nonattainment Area met the 2006 24-hour $PM_{2.5}$ standard, as required, by December 31, 2015.

Table 4.4 below summarizes the current air quality in the region. The data show that the region's design value (DV) for 2016 is well below the standard of 35 µg/m3, based on monitored ambient concentrations over the most recent 3 years. The table also shows that the DV has been below the standard for the previous 2 years.

Table 4.4: Summary of Design Values for the 24-hour PM2.5 NAAQS in Butte County

24-hr $PM_{2.5}$ Design Value (µg/m3)		
2014	2015	2016
28	29	26

More information on the region's past and current air quality may be found in Section 3.a elsewhere in this plan.

<u>Insignificance of NOx and Direct PM2.5 Emissions for Transportation Conformity</u>

NOx

In the attainment year of 2015, emissions of NOx from on road motor vehicles contribute 6.3 tons per day (tpd) or about 48 percent of the region's NOx inventory. In the maintenance year of 2030, the contribution of on road NOx is reduced to 1.95 tpd or about 28 percent. Table 4.5 below summarizes the projected trends in NOx emissions and the projected contribution of on road motor vehicles to the nonattainment area's emissions inventory. A modified roll-back analysis was conducted to determine how much on road NOx would have to increase before there would be violations of the NAAQS. This analysis shows that emissions from on road NOx would have to increase approximately 600% in 2030 from 2015 NOx emissions before violations of the $PM_{2.5}$ NAAQS would occur.

Table 4.5: NOx Emissions (tons/winter day)

	2015	2025	2030
Total NOx	13.2	7.9	6.9
On Road NOx	6.3	2.4	1.9
Percent contribution of On Road	47.7	30.4	27.5

Source: CPAM 1.05

The analysis in **Attachment F** demonstrates that NOx emissions from on road motor vehicles contribute 1.9 µg/m3 in the form of nitrate or about 7.8 percent to the region's $PM_{2.5}$ design value. Maintenance of the NAAQS is not dependent on any controls in this plan of NOx.

Direct $PM_{2.5}$

Emissions of direct $PM_{2.5}$ from on road motor vehicles results from the combustion of fuel, and tire and brake wear. In the attainment year of 2015, these $PM_{2.5}$ emissions represent 3.9 percent of the $PM_{2.5}$ emissions in the region, or 0.17 tpd. By 2030, direct $PM_{2.5}$emissions from on road vehicles reduce to 3.0 percent or 0.13 tpd. Table 4.6 below details the projected emissions trend and contributions of direct $PM_{2.5}$ in the nonattainment emissions inventory.

Table 4.6: Non-dust $PM_{2.5}$ emissions (tons/winter day)

Pollutant	2015	2025	2030
Total Non-Dust $PM_{2.5}$	4.47	4.50	4.43
Direct PM from On-Road Motor Vehicles (exhaust, tire wear, and brake wear)	0.17	0.13	0.13
Percent Non-Dust from On-Road	3.9	2.8	3.0

Source: CPAMv1.05

Attachment F demonstrates that direct $PM_{2.5}$ contributes 0.8 µg/m3 or approximately 3 percent to the region's 24-hour NAAQS design value. Maintenance of the NAAQS is not dependent on any controls in this plan of direct $PM_{2.5}$ from on road motor vehicles. Therefore, for the purposes of transportation conformity, direct PM2.5 from on road motor vehicles is not a significant precursor for the 24-hour $PM_{2.5}$ NAAQS and this plan does not set emissions budgets for transportation conformity for direct $PM_{2.5}$.

Findings of Insignificance for NOx and Direct $PM_{2.5}$

This plan and the analysis in Attachment F show, consistent with the transportation conformity rule at 93.109(f), that:

- It would be unreasonable to expect enough growth in NOx or Direct $PM_{2.5}$ emissions to cause a violation of the NAAQS,
- This plan does not contain controls of on road NOx or direct $PM_{2.5}$ emissions,

- Emissions of NOx and direct $PM_{2.5}$ contribute less than eight and three percent, respectively, to the design value in the region, and
- Historical and future projections of on road NOx and direct $PM_{2.5}$ emissions are both declining in their contribution to the overall NOx and $PM_{2.5}$ inventories as well as declining in mass emissions of NOx and $PM_{2.5}$ from on road vehicles,

For the purposes of transportation conformity, NOx and direct $PM_{2.5}$ from on road motor vehicles are insignificant precursors in the Butte nonattainment area for the 24-hour $PM_{2.5}$ NAAQS and this plan does not set NOx or $PM_{2.5}$ emissions budgets for transportation conformity.

More detail regarding the insignificance of NOx and $PM_{2.5}$ from on road motor vehicles can be found in Attachment F.

e. Contingency Plan

BCAQMD will use the 24-hour $PM_{2.5}$ design value (the 3-year average of the 98th percentile) as the contingency plan trigger. The contingency plan trigger will be prompted when certified data collected at the Chico-East Avenue monitoring station shows an exceedance of the 2006 $PM_{2.5}$ NAAQS (data for the previous calendar year is certified no later than May 1). If the 24-hour $PM_{2.5}$ design value at this site exceeds the 2006 $PM_{2.5}$ NAAQS, BCAQMD shall commence analyses within 60 days including meteorological evaluation of high $PM_{2.5}$ days and emissions inventory assessment. The analyses will also include whether the exceedance was caused by an exceptional event or an instrument malfunction.

Once the analyses are complete, BCAMQD will consult with interested parties, community organizations, and industry to identify voluntary and incentive based measures to reduce directly emitted $PM_{2.5}$ or precursors that can be implemented within nine months of the contingency plan being triggered. BCAQMD will make its analyses and summary of voluntary measures available to the public at a Governing Board meeting.

If voluntary and incentive based measures fail to result in attainment with the 24-hour $PM_{2.5}$ NAAQS 12 months after the contingency plan is triggered, BCAQMD will complete sufficient analyses to begin consideration of necessary rules for ensuring attainment and maintenance of the 24-hour $PM_{2.5}$ NAAQS within 18 months of trigger date. If new rules are necessary, then they would be proposed for adoption and implementation to the BCAQMD Governing Board within 24 months of the trigger date.

Actions that BCAQMD may consider include, but are not limited to, the measures found in Table 4-6. The measures chosen for consideration would depend on BCAQMD analysis as to the source of the exceedance.

Table 4-6: Potential Measures to be Considered if Contingency Plan is Triggered

Potential Voluntary and Incentive Measures
Consider issuing additional Check Before You Light advisories.
Expand outreach regarding burning in a fireplace or woodstove.
Provide additional incentives to change out older wood-burning devices.
Potential Rule Adoption Measures
Reasonable Available Control Technology (RACT) for existing stationary sources emitting $PM_{2.5}$ or $PM_{2.5}$ precursors.
Additional fugitive dust measures for construction activities and stationary sources.
Additional opacity restrictions.
Additional open burning restrictions for residential, agricultural, and prescribed burning.
Additional curtailment measures for residential wood-burning devices.

5. Environmental Impact

The District determined that pursuant to California Environmental Quality Act (CEQA) Guidelines § 15061(b)(2) and 15308, this Redesignation Request and Maintenance Plan is categorically exempt from CEQA as a Class 8 action taken by a regulatory agency to assure the maintenance, restoration, enhancement, and protection of the environment and application of the exemption is not barred by one of the exceptions set forth in CEQA Guidelines § 15300.2.

6. Conclusion

The Chico, CA/Butte County (partial) $PM_{2.5}$ Planning Area was determined by the EPA in October 2013 to be in attainment with the 2006 24-hour $PM_{2.5}$ National Ambient Air Quality Standard. On May 10, 2017 EPA determined that the Chico, CA/Butte County (partial) $PM_{2.5}$ Planning Area attained the standard by December 31, 2015, as required. The Planning Area has continued to attain the 2006 24-hour $PM_{2.5}$ NAAQS.

BCAQMD used a combination of enforceable rule-making, air quality management programs, public outreach, and incentives to provide a permanent reduction in ambient $PM_{2.5}$ concentrations which led to attainment with the NAAQS.

The Planning Area demonstrates maintenance of the standard for ten years through the development of future year inventories and projecting the resultant pollutant contributions to future $PM_{2.5}$ concentrations.

The Maintenance Plan has been prepared to incorporate all of the requirements in Section 175A of the CAA. BCAQMD requests that EPA find all of the requirements applicable under Section 110 and Part D are met and redesignate the Chico, CA/Butte County (partial) $PM_{2.5}$ Planning Area to attainment for the 2006 24-hour $PM_{2.5}$ NAAQS.

Attachment A

BCAQMD Letter to CARB Requesting Attainment Finding

629 Entler Avenue, Suite 15
Chico, CA 95928

(530) 332-9400
(530) 332-9417 Fax

Butte County Air Quality Management District

W. James Wagoner
Air Pollution Control Officer

Robert McLaughlin
Asst. Air Pollution Control Officer

May 16, 2011

James N. Goldstene, Executive Officer
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812-2815

Re: Request for Finding of Attainment

Dear Mr. ~~Goldstene~~: James,

The Butte County Air Quality Management District (District) is requesting that ARB submit a request to the United States Environmental Protection Agency (U.S. EPA) to find the Butte County nonattainment area in attainment of the 2006 24-hour fine particulate National Ambient Air Quality Standard (PM2.5). This request is based on a review of the quality assured and certified PM2.5 data for the 2008-2010 period.

We understand that ARB previously requested that the U.S. EPA exclude from the record the PM2.5 wildfire exceedances Butte County experienced during the summer of 2008.

We appreciate the assistance of your staff in processing this request. If you have any questions, please do not hesitate to contact me.

Sincerely,

W. James Wagoner
Air Pollution Control Officer

cc: Karen Magliano, Chief, Air Quality Data Branch
Sylvia Zulawnick, Manager, Particulate Matter Analysis Section
Theresa Najita, Staff, Particulate Matter Analysis Section

Attachment B

CARB Letter to EPA Supporting Attainment Finding

Air Resources Board

Mary D. Nichols, Chairman
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Linda S. Adams
Acting Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

June 2, 2011

Mr. Jared Blumenfeld
Regional Administrator
United States Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Blumenfeld:

The Air Resources Board (ARB) requests that the United States Environmental Protection Agency (U.S. EPA) find the Chico PM2.5 nonattainment area in attainment for the 2006 24-hour fine particulate PM2.5 National Ambient Air Quality Standard (NAAQS). This request is based upon review of quality assured and certified PM2.5 data that show attainment of the NAAQS during the 2008-2010 period. In addition to making a finding of attainment, we also request that the U.S. EPA suspend the attainment plan and progress plan requirements. ARB recognizes that a finding of attainment under the Clean Air Act does not constitute a redesignation to attainment.

On October 8, 2009, the Chico area was designated nonattainment for the 2006 24-hour PM2.5 NAAQS. An area is considered to be in attainment of the 24-hour PM2.5 standard when the design value is less than or equal to 35 $\mu g/m^3$. The 24-hour design value for the Chico area is 32 $\mu g/m^3$ for 2008-2010, as illustrated in Table 1 in the enclosure. This design value is valid for a comparison to the NAAQS because it meets completeness criteria for each quarter within the designated three-year period. However, the 2008 design value excludes data affected by exceptional events, as shown in Table 2 in the enclosure. These data have been flagged in U.S. EPA's Air Quality System database and the documentation was submitted to U.S. EPA on August 28, 2009.

Under U.S. EPA's Clean Data Policy, a finding of attainment supports suspension of certain State Implementation Plan requirements, such as attainment and progress plans so long as the area remains in attainment or until the area completes the requirements to be redesignated to attainment. Since the Chico area now meets the standard, ARB requests a finding of attainment from U.S. EPA for the Chico PM2.5 nonattainment area.

If you have any questions, please contact Lynn Terry, Deputy Executive Officer, at (916) 322-2739, or have your staff contact Karen Magliano, Chief, Air Quality Data Branch, at (916) 322-7137.

Sincerely,

James N. Goldstene
Executive Officer

Enclosure

cc: Deborah Jordan, Director
United States Environmental Protection Agency
Air Division, Region 9
75 Hawthorne Street
San Francisco, California 94105

W. James Wagoner
Air Pollution Control Officer
Butte County Air Quality Management District
629 Entler Avenue, Suite 15
Chico, California 95928

Lynn Terry
Deputy Executive Officer

Karen Magliano, Chief
Air Quality Data Branch
Planning and Technical Support Division

Attachment C

Emissions Reductions Achieved From Wood Stove Change-out Programs

Emissions Reductions Achieved from 2005-2015 Wood Stove Change-out Programs

The methodology presented below was used to account for PM2.5 emissions avoided by replacing uncertified wood stoves with cleaner burning and more efficient home heating devices. Table 1 summarizes the replacement devices by year and device type.

Table 1. Wood stove change-out replacement devices by type and year

Replacement Device Type	Year					
	2005	2006	2007	2010	2013-2015*	Total
Wood Stove	16	33	63	21	244	377
Pellet Stove	7	7	10		76	100
Natural Gas	29	31	47	6	149	262

* Funded by Powertrain

Table 2 summarized emission factors as well as constants and conversions used in calculating emission reductions.

Table 2. Emission factors, constants, and conversions

Constants & Conversions	Value	Unit	Source
PM2.5 Emission Factors*			
Woodstove: Conventional	29.50	lb/ton	AP-42, Table 1.10.-1
Woodstove: Phase II Certified	14.10	lb/ton	AP-42, Table 1.10.-1
Pellet Stove	2.90	lb/ton	AP-42, Table 1.10.-1
Natural Gas	0.00		
Old Device Efficiency	54	%	AP-42, Table 1.10-5
New Device Efficiency	68	%	AP-42, Table 1.10-5
Wood Use	3	cord/year	District Survey
Wood Density	1.54	ton/cord	CARB Emission Methodology
Pellet Use	2	tons/year	CARB Emission Methodology
Conversion from ton to lb	2000		

* PM2.5 Emissions adjusted based on CARB methodology

The following formulas were used to calculate PM2.5 emissions of the old devices, the new devices, and the difference between them.

$$Equation\ 1: E_{old} = ND_{old}(EF_{old} \times WU \times WD)/2000$$

$$Equation\ 2: E_{new} = ND_{CWS}(EF_{CWS} \times WU \times WD \times (EFC_{old}/EFC_{new}))/2000 + \\ + ND_{PS}(EF_{PS} \times PU)/2000 + ND_{GS} \times 0$$

$$Equation\ 3: E_{benefit} = E_{old} - E_{new}$$

Where:

ND	Number of devices where: ND_{old} - number of old devices, ND_{CWS} - number of certified wood stoves, ND_{PS}-number of pellet stoves, and ND_{GS}-number of gas stoves
E_{old}	Emissions of old device (ton/year)
E_{new}	Emissions of new device (ton/year)
EF_{old}	Emission factor for the old device (lb/ton)
EF_{CWS}	Emission factor for the certified wood stove (lb/ton)
EF_{PS}	Emission factor for the pellet stove (lb/ton)
WU	Wood use (cords)
WD	Wood density (ton/cord)
PU	Pellet use (tons)
EFC_{old}	Device efficiency for the old device (%)
EFC_{new}	Device efficiency for the new device (%)
$E_{benefit}$	Emission reductions from change-out (ton/year)

The calculations were performed on a per year basis. Estimated emission benefit in tons per year was converted to tons per month using CARB's monthly woodburning profile (Table 3) to be consistent with CARB's emission inventories and further converted to tons per day by dividing the monthly emission savings by the number of days in a month.

Table 3. Percent of annual burning assigned to each month

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
18.2	18.2	12.7	9.1	0	0	0	0	0	9.1	14.5	18.2

Table 4 summarizes emission reductions per year.

Table 4. Emission reductions achieved from a wood stove change-out program

Device Type	2005	2006	2007	2010	2013-2015*	Total
Wood Stove	16	33	63	21	244	377
Pellet Stove	7	7	10		76	100
Natural Gas	29	31	47	6	149	262
Emissions Before (t/y)	3.544	4.838	8.177	1.840	31.960	50.359
Emissions After (t/y)	0.421	0.861	1.640	0.543	6.387	9.851
Savings (t/y)	3.123	3.978	6.538	1.297	25.573	40.508
Savings (t/d)	0.018	0.023	0.038	0.008	0.150	0.238

* Powertrain Change-out

Since the emission reductions achieved from the wood stove change-out were not accounted for in the emission inventory, they were subtracted in the maintenance plan from the total emissions.

Attachment D

Emissions Inventory Data

Winter Season Emission Projects for Butte County, California (Tons per Day)

Source: California Emissions Projection Analysis Model (CEPAM) 2016 SIP Baseline Emission Projects. Emissions grown and controlled.

Stationary Sources

Category Name	PM2.5				NOx				SOx				ROG			Ammonia		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
FUEL COMBUSTION	0.168	0.095	0.099	0.104	2.049	1.578	1.534	1.570	0.095	0.080	0.095	0.101	0.239	0.259	0.275	0.000	0.000	0.000
WASTE DISPOSAL	0.005	0.010	0.012	0.012	0.014	0.018	0.019	0.020	0.002	0.002	0.002	0.002	0.232	0.265	0.282	0.121	0.135	0.142
CLEANING AND SURFACE COATINGS	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.002	0.000	0.000	0.000	0.000	0.941	1.077	1.207	0.000	0.000	0.000
PETROLEUM PRODUCTION & MARKETING	0.004	0.001	0.001	0.001	0.018	0.011	0.010	0.010	0.000	0.000	0.000	0.000	0.498	0.404	0.384	0.001	0.001	0.001
INDUSTRIAL PROCESSES	0.506	0.454	0.540	0.583	0.017	0.046	0.056	0.061	0.018	0.013	0.016	0.018	0.064	0.081	0.090	0.003	0.004	0.005
SUBTOTAL	0.683	0.560	0.652	0.699	2.101	1.653	1.621	1.662	0.115	0.096	0.113	0.122	1.973	2.086	2.238	0.126	0.141	0.147

Areawide Sources

Category Name	PM2.5				NOx				SOx				ROG			Ammonia		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
SOLVENT EVAPORATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.081	2.287	2.356	2.781	2.865	2.895
RESIDENTIAL FUEL COMBUSTION	2.493	2.393	2.325	2.219	0.828	0.862	0.848	0.849	0.066	0.058	0.062	0.064	3.432	3.741	3.851	0.155	0.169	0.174
FARMING OPERATIONS	0.327	0.339	0.349	0.352	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.299	0.299	0.299	0.545	0.545	0.545
MANAGED BURNING AND DISPOSAL	1.187	1.252	1.263	1.268	0.602	0.585	0.595	0.598	0.023	0.087	0.088	0.089	1.009	1.019	1.022	0.133	0.135	0.135
OTHER MISC. PROCESSES	0.602	0.576	0.660	0.690	0.002	0.002	0.003	0.003	0.000	0.000	0.000	0.000	0.027	0.028	0.029	0.324	0.353	0.364
SUBTOTAL	4.609	4.560	4.597	4.529	1.432	1.449	1.446	1.450	0.089	0.145	0.151	0.153	6.848	7.374	7.557	3.937	4.067	4.113

Mobile Sources

Category Name	PM2.5				NOx				SOx				ROG			Ammonia		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
ON-ROAD MOTOR VEHICLES	0.384	0.172	0.128	0.133	13.057	6.278	2.440	1.952	0.092	0.024	0.021	0.021	2.260	0.968	0.774	0.164	0.129	0.129
OTHER MOBILE SOURCES	0.326	0.203	0.127	0.103	5.923	3.843	2.390	1.858	0.241	0.029	0.032	0.033	1.843	1.412	1.315	0.001	0.001	0.001
SUBTOTAL	0.710	0.375	0.255	0.236	18.980	10.121	4.829	3.809	0.333	0.053	0.053	0.055	4.103	2.379	2.090	0.165	0.131	0.130

Total for All Categories	PM2.5				NOx				SOx				ROG			Ammonia		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
	6.002	5.495	5.504	5.464	22.513	13.223	7.896	6.922	0.537	0.293	0.317	0.329	12.924	11.839	11.885	4.228	4.338	4.390

ERC BANK	PM2.5*				NOx				SOx				ROG		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
			0.107	0.107			0.164	0.164			0.008	0.008		0.164	0.164

*BCAQMD currently has an ERC bank for PM10 but not for PM2.5. As PM2.5 is a fraction of PM10, this is a conservative projection.

BENEFIT OF WOODSTOVE CHANGEOUT*	PM2.5			
*see Attachment E	**2006**	**2015**	**2025**	**2030**
	-0.042	-0.238	-0.238	-0.238

GRAND TOTAL INCLUDING ERC BANK AND WOODSTOVE CHANGEOUT	PM2.5				NOx				SOx				ROG			Ammonia		
	2006	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2006**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**	**2015**	**2025**	**2030**
	5.960	5.257	5.373	5.333	22.513	13.223	8.060	7.085	0.537	0.294	0.325	0.338	12.924	12.003	12.049	4.228	4.339	4.390

Attachment E

Supporting Air Quality Data

Figure 3-1: PM2.5 98th Percentiles and 24-hr Design Values (ug/m3)

Year	98th Percentile	24-hr Design Value
1999	60	
2000	70	
2001	56	62
2002	53	60
2003	32	47
2004	54	46
2005	54	47
2006	59	56
2007	53	55
2008	93.8	69
2009	30	59
2010	29	51
2011	46.2	35
2012	26.3	34
2013	30.2	34
2014	26	28
2015	29.5	29
2016	21.2	26

(Highlighted) Based on data combined from two sites

Figure 4.1: 2014-2016 Average Composition on a Typical Winter Day and Top 10% of Days Scaled to 2016 DV (ug/m3)

Component	Winter Average		Top 10% of Days	
	ug/m3	%	ug/m3	%
Carbonaceous Aerosols	18.69	72	19.84	76
Ammonium Nitrate	3.63	14	4.07	16
Ammonium Sulfate	1.88	7	1.03	4
Geological	1.08	4	0.59	2
Elements	0.73	3	0.48	2
Total	26.00	100	26.00	100

Figure 3-2: Three-Year Average PM2.5 Composition During Winter (ug/m3)

Year	Obs Count	PM25Mass	Carbonaceous Aerosols	Ammonium Nitrate	Ammonium Sulfate	Geological	Elements	SolublePotassium	Levoglucosan
2004	87	19.33	14.49	3.03	0.91	0.48	0.42	0.15	
2005	89	18.05	13.83	2.57	0.86	0.38	0.42	0.15	
2006	91	18.85	14.39	2.76	0.92	0.35	0.43	0.16	
2007	91	17.48	13.32	2.50	0.90	0.36	0.40	0.16	
2008	92	16.83	12.98	2.21	0.88	0.36	0.40	0.15	
2009	89	16.42	12.61	2.23	0.83	0.37	0.37	0.15	0.76
2010	88	14.20	10.67	2.11	0.74	0.34	0.34	0.13	0.75
2011	88	15.15	11.37	2.38	0.75	0.33	0.32	0.13	0.93
2012	91	12.85	9.63	1.83	0.74	0.34	0.31	0.11	0.79
2013	92	13.91	10.44	1.95	0.78	0.42	0.33	0.13	0.82
2014	93	10.80	7.93	1.40	0.75	0.42	0.30	0.11	0.52
2015	93	11.50	8.30	1.71	0.73	0.46	0.29	0.10	0.52
2016	96	9.34	6.71	1.31	0.67	0.39	0.26	0.08	0.31

Figure 3-3: Three-Year Average PM2.5 Composition on the Top 10% of Days (ug/m3)

Year	Mass	Mass	Ammonium Nitrate	Ammonium SulfateOld	Geological	Elements	Carbonaceous Aerosols	SolublePotassium	Levoglucosan
2004	18	41.78	6.39	0.89	0.60	0.60	33.30	0.30	
2005	18	41.56	5.94	0.86	0.44	0.63	33.69	0.33	
2006	18	47.94	7.42	1.01	0.42	0.75	38.35	0.39	
2007	18	48.44	6.92	1.03	0.49	0.77	39.24	0.41	
2008	18	43.61	5.11	0.93	0.41	0.74	36.41	0.39	
2009	18	37.78	4.14	0.87	0.39	0.64	31.74	0.33	2.41
2010	18	29.72	3.72	0.76	0.28	0.51	24.46	0.25	2.08
2011	18	32.94	5.65	0.86	0.31	0.51	25.62	0.25	2.34
2012	18	29.62	5.00	0.87	0.30	0.49	22.95	0.23	2.17
2013	18	31.83	5.48	0.93	0.49	0.54	24.39	0.27	2.13
2014	18	24.21	3.57	0.81	0.66	0.46	18.71	0.20	1.39
2015	18	24.40	4.54	0.88	0.64	0.43	17.90	0.17	1.24
2016	18	19.99	3.13	0.79	0.45	0.37	15.25	0.14	0.97

Figure 3-4. Three-Year Average Diurnal Concentrations (ug/m3)

Year	Start Hour																						
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2004	62.6	52.1	45.5	39.8	35.6	33.8	31.8	34.9	36.6	28.9	27.2	22.0	21.6	23.9	22.5	20.8	26.1	56.5	72.1	84.8	83.6	78.8	91.6	74.2
2005	69.3	57.1	45.8	41.3	35.1	33.3	32.1	44.5	32.8	28.6	26.2	20.0	18.4	22.0	18.3	18.5	22.1	40.1	64.2	82.0	88.6	84.2	97.8	93.1
2006	89.3	69.6	62.1	52.0	41.5	39.6	38.7	46.9	38.9	32.6	29.6	24.2	21.7	24.2	22.0	21.4	24.0	42.6	72.0	91.1	101.5	91.9	101.1	96.2
2007	95.6	73.3	62.1	55.1	45.5	41.1	41.8	46.8	39.5	28.2	24.5	23.9	20.2	22.6	21.0	20.0	23.0	36.2	63.2	92.2	98.5	96.3	92.2	93.8
2008	78.0	62.4	55.9	49.6	41.3	39.5	39.9	32.4	38.3	23.9	19.8	19.4	17.7	18.2	17.3	17.4	20.8	31.4	59.0	83.1	87.4	89.1	83.4	78.5
2009	54.1	49.7	41.1	37.4	34.6	32.9	36.9	35.3	34.6	21.7	16.5	15.7	14.5	14.8	12.5	14.3	18.1	28.7	46.4	63.6	68.9	80.9	73.4	78.5
2010	34.4	34.7	29.3	25.8	25.3	25.3	29.6	29.8	26.9	19.0	14.7	13.1	13.7	13.9	12.3	13.6	16.0	28.6	43.2	50.7	56.0	64.4	59.1	62.5
2011	48.5	47.4	41.1	32.9	29.9	28.6	33.0	37.6	32.7	21.9	18.7	16.9	17.3	17.2	16.1	17.0	19.4	31.0	44.2	48.6	53.0	61.7	61.8	65.4
2012	47.2	46.6	40.2	30.8	27.8	26.3	27.5	33.0	29.7	19.4	18.2	15.8	16.6	15.8	15.8	16.0	16.8	25.6	42.1	44.8	51.0	52.9	56.9	54.3
2013	53.6	52.3	44.9	35.4	30.1	28.3	28.0	32.4	35.5	24.4	22.8	19.1	17.3	16.8	16.6	16.9	17.6	24.7	41.8	41.2	49.3	47.9	55.1	54.4
2014	38.7	36.4	31.1	28.6	23.7	20.9	21.7	24.5	26.2	19.9	23.3	20.7	14.7	11.4	12.0	11.9	12.4	20.2	30.2	29.9	35.2	32.3	34.3	33.9
2015	38.1	35.3	31.2	31.4	24.1	21.8	23.0	24.7	26.0	19.9	23.3	21.5	15.7	10.8	12.8	13.6	13.0	19.6	25.6	26.2	32.8	32.6	32.5	31.4
2016	33.6	30.2	24.3	25.7	20.6	18.4	20.1	21.4	20.8	15.3	18.7	18.3	13.3	8.8	10.7	10.7	10.0	15.2	18.6	27.7	33.8	33.7	35.1	34.3

Figure 3-5. Three-Year Average Trends in Concentrations of Carbonaceous Aerosols and Soluble Potassium on Top 10% of Days (ug/m3)

Year	Carbonaceous Aerosols	Soluble Potassium
2004	33.30	0.30
2005	33.69	0.33
2006	38.35	0.39
2007	39.24	0.41
2008	36.41	0.39
2009	31.74	0.33
2010	24.46	0.25
2011	25.62	0.25
2012	22.95	0.23
2013	24.39	0.27
2014	18.71	0.20
2015	17.90	0.17
2016	15.25	0.14

Attachment F

Assessment of Significance for Transportation Conformity

Assessment of Significance for Transportation Conformity

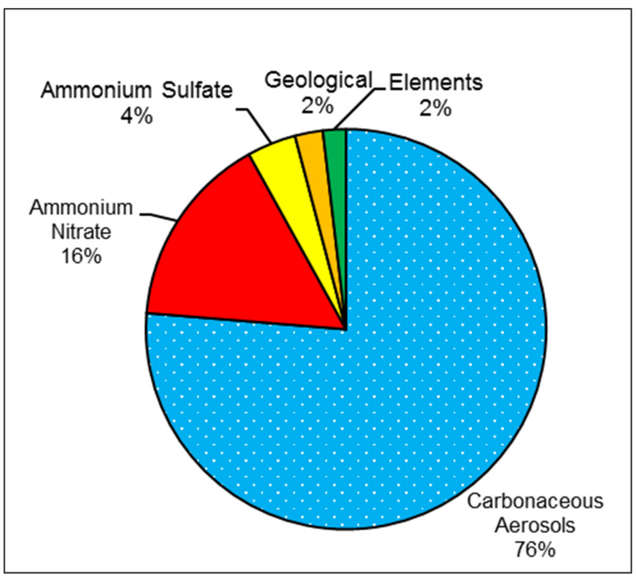
Developing a $PM_{2.5}$ maintenance plan involves examining the impact of on-road emissions of NOx and directly emitted $PM_{2.5}$ from vehicle exhaust, tire wear, and brake wear on the current design value and evaluating the area's ability to maintain attainment of the standard through the maintenance year.

On-road sources contribute to $PM_{2.5}$ by emitting both a precursor to ammonium nitrate formation, NOx, as well as directly emitted $PM_{2.5}$ from vehicle exhaust, tire wear, and brake wear.

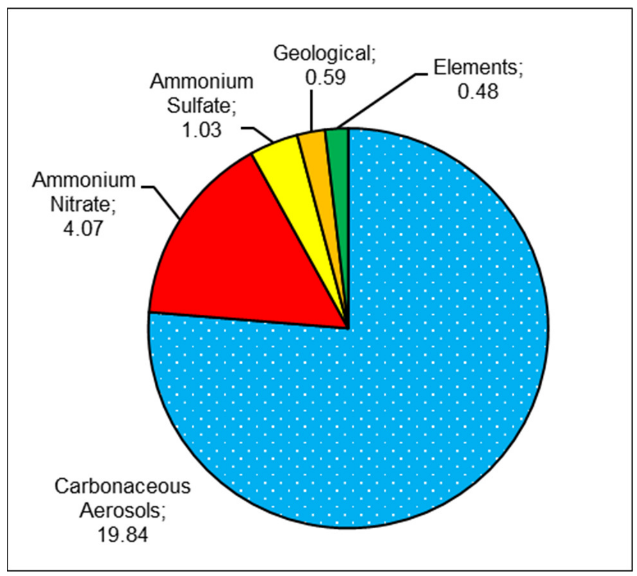
As illustrated in Figure 1, ammonium nitrate contributes 4.07 µg/m^3 or 16 percent of the 2016 design value. Since the on-road NOx emissions are responsible for 47.5 percent of the total NOx inventory, on-road sources contribute 1.93 µg/m^3 or 7.43 percent to the design value in form of ammonium nitrate.

Figure 1: $PM_{2.5}$ Composition on Top 10 Percent of Days (2014-2016)

a) Percent Contribution



b) µg/m^3 Contribution



To further evaluate the significance of on-road NOx emissions on the 24-hr value, we evaluated how much on-road NOx emissions would have to increase between 2015 and 2030 to result in a violation of the 24-hr standard by running two rollback tests. In the first test, illustrated in Table 1, on-road NOx emissions were increased 500 percent (a six-fold increase from 6.278 tpd to 37.668 tpd). All other NOx sources were kept consistent with the 2015 and 2030 inventories. As illustrated in Table 1, even if on-road NOx would increase 500 percent, the area would still attain the 24-hr standard with a design value of 35 µg/m^3. In Table 2, 2030 on-road NOx emissions were increased even further, 600 percent from the 2015 level (a seven-fold increase from 6.278 tpd to 43.946 tpd). At this point, the area would violate the 24-hr standard with the design value of 37 µg/m^3. To help put this into perspective, in 2015 the entire Sacramento Valley on-road NOx emissions were about 44 tpd, which is similar to the level that would be needed before Butte County would violate the 24-hr design value.

Table 1: Rollback Scenario with 500 Percent Increase in On-road NOx Emissions

PM2.5 Component	2016 DV (ug/m3)	Background (ug/m3)	Available for Rolling (ug/m3)	Emission Category	Emissions 2015 (tpd)	2030 (tpd)	% Change	2030 DV (ug/m3)
Secondary PM2.5								
Ammonium Nitrate	4.07	0.13	3.94	NOx On-Road	6.278	37.668	500%	12.87
				NOx Other	6.945	5.134	-26%	
Ammonium Sulfate	1.03	0.20	0.83	SOx	0.293	0.337	15%	1.15
Primary PM2.5								
Fugitive Dust	0.59	0.15	0.43	Dust	0.794	0.906	14%	0.65
Carbonaceous Aerosols+Elements	20.32	0.89	19.43	Non-Dust PM2.5	4.463	4.427	-1%	20.16
Final DV	**26.00**	1.38	24.62					**34.84**
Final DV Rounded								**35 (Attainment)**

Table 2: Rollback Scenario with 600 Percent Increase in On-road NOx Emissions

PM2.5 Component	2016 DV (ug/m3)	Background (ug/m3)	Available for Rolling (ug/m3)	Emission Category	Emissions 2015 (tpd)	2030 (tpd)	% Change	2030 DV (ug/m3)
Secondary PM2.5								
Ammonium Nitrate	4.07	0.13	3.94	NOx On-Road	6.278	43.946	600%	14.74
				NOx Other	6.945	5.134	-26%	
Ammonium Sulfate	1.03	0.20	0.83	SOx	0.293	0.337	15%	1.15
Primary PM2.5								
Fugitive Dust	0.59	0.15	0.43	Dust	0.794	0.906	14%	0.65
Carbonaceous Aerosols+Elements	20.32	0.89	19.43	Non-Dust PM2.5	4.463	4.427	-1%	20.16
Final DV	**26.00**	1.38	24.62					**36.71**
Final DV Rounded								**37 (Nonattainment)**

Table 3 illustrates the rollback using 2015 and 2030 emissions. Unlike the rollback scenarios in Tables 1 and 2, the CARB projected inventory shows 69 percent decrease in on-road NOx emissions and 26 percent decrease in all other categories between 2015 and 2030 (Table 3). Assuming a 1-to-1 relationship between NOx emissions and ammonium nitrate concentrations, ammonium nitrate is projected to decrease to 2.24 µg/m^3 by 2030 and the subsequent contribution from on-road sources is projected to decrease to 0.62 µg/m^3.

Table 3: Rollback using 2015 and 2030 emissions.

PM2.5 Component	2016 DV (ug/m3)	Background (ug/m3)	Available for Rolling (ug/m3)	Emission Category	Emissions 2015 (tpd)	Emissions 2030 (tpd)	Emissions % Change	2030 DV (ug/m3)
Secondary PM2.5								
Ammonium Nitrate	4.07	0.13	3.94	NOx On-Road	6.278	1.952	-69%	2.24
				NOx Other	6.945	5.134	-26%	
Ammonium Sulfate	1.03	0.20	0.83	SOx	0.293	0.337	15%	1.15
Primary PM2.5								
Fugitive Dust	0.59	0.15	0.43	Dust	0.794	0.906	14%	0.65
Carbonaceous Aerosols+Elements	20.32	0.89	19.43	Non-Dust PM2.5	4.463	4.427	-1%	20.16
Final DV	**26.00**	1.38	24.62					**24.20**
Final DV Rounded				**24 (Attainment with 11 ug/m3 safety margin)**				

To summarize the potential impact of on-road NOx on the 24-hr design value, we conclude that it is not possible for an area like Butte County to experience an increase in on-road NOx emissions significant enough to lead to a violation of the 24-hr standard. On the contrary, the area is expected to experience a significant decrease in NOx emissions between 2015 and 2030. Therefore, NOx does not need to be considered for transportation conformity.

On-road sources of directly emitted $PM_{2.5}$ also contribute to carbonaceous aerosols and elemental species. Emissions of carbonaceous aerosols and elemental species could be estimated by subtracting dust emissions from the total directly emitted $PM_{2.5}$, with the result being referred to as 'Non-Dust' $PM_{2.5}$. These include on-road emissions (motor vehicle exhaust and tire and brake wear) in addition to all other sources of carbonaceous aerosols. Since there is no way to separate the emissions of elemental species from other 'Non-Dust' categories, they were included in the analysis along with carbonaceous aerosols. Table 4 lists emission categories contributing to carbonaceous aerosol and elemental species concentrations.

Table 4: Contribution from On-road Sources to Non-Dust $PM_{2.5}$ Emissions (tons per day)

Pollutant	2015	2025	2030
Non-Dust $PM_{2.5}$	4.466	4.500	4.430
On-Road Motor Vehicles (including exhaust, tire wear, and brake wear)	0.172	0.128	0.133
% of Non-Dust from On-Road	3.9	2.8	3.0

Figure 1b, above, shows that carbonaceous aerosols and elemental species contribute 20.32 $\mu g/m^3$ to the design value. Since on-road sources are responsible for 3.9 percent of 'Non-Dust PM2.5' emissions, they contribute 0.78 $\mu g/m^3$ or 3 percent of the design value. Therefore, directly emitted $PM_{2.5}$ from vehicle exhaust, tire wear, and brake wear are considered insignificant and do not need to be considered for transportation conformity.