



CALIFORNIA
AIR RESOURCES BOARD

Staff Report

**Chico, CA/Butte County
PM_{2.5} Redesignation Request and
Maintenance Plan**

Release Date: October 13, 2017

Scheduled for Consideration: November 16, 2017

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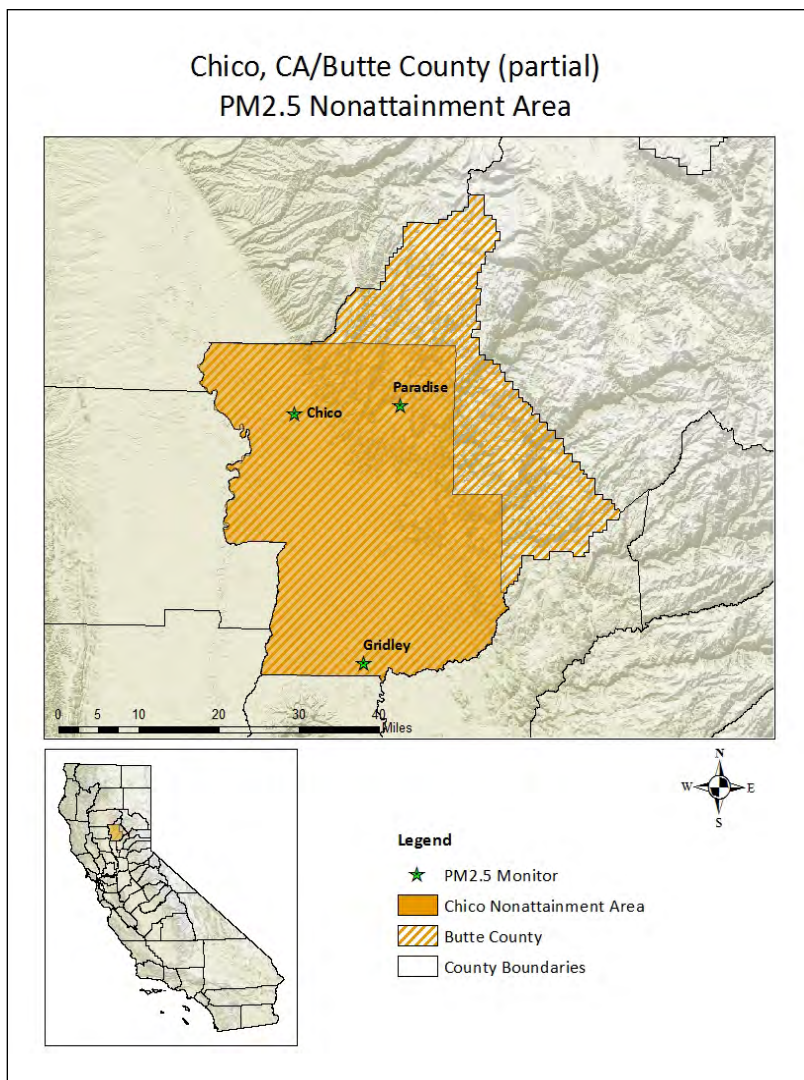
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I. BACKGROUND

The Chico area in the Butte County Air Quality Management District (District) was designated as nonattainment for the $35 \mu\text{g}/\text{m}^3$ 24-hour fine particulate ($\text{PM}_{2.5}$) National Ambient Air Quality Standard (standard or NAAQS) effective December 14, 2009. The nonattainment area encompasses the western portion of Butte County, including the cities of Chico, Gridley, Oroville, and Paradise. This area was designated nonattainment based on certified 2005-2007 monitoring data collected using a Federal Reference Method (FRM) monitor. Figure 1 outlines the Chico Nonattainment Area and shows the location of the monitoring sites. The Chico Nonattainment Area has a single $\text{PM}_{2.5}$ FRM monitor located in Chico, and three $\text{PM}_{2.5}$ non-Federal Equivalent Method (FEM) continuous monitors located in Chico, Gridley, and Paradise.

Figure 1. Map of the Chico $\text{PM}_{2.5}$ Nonattainment Area



On June 2, 2011, the California Air Resources Board (CARB) submitted a request to the U.S. Environmental Protection Agency (U.S. EPA) to find the Chico/Butte County Nonattainment Area (Chico Nonattainment Area) in attainment of the 35 µg/m³ 24-hour PM_{2.5} standard. An emission inventory was subsequently submitted to U.S. EPA on November 15, 2012 as a revision to the California State Implementation Plan (SIP). The U.S. EPA took final action on September 10, 2013 (effective October 10, 2013) determining that the area met the standard. This Determination of Attainment, also known as a Clean Data Finding under the U.S. EPA *Clean Data Policy for the Fine Particulate National Ambient Air Quality Standards* (Clean Data Policy), suspends the majority of the planning elements required under the Clean Air Act (Act). The base year emission inventory was the only planning element that was required to be submitted into the SIP. CARB submitted the inventory to U.S. EPA on November 15, 2012 and it was approved on March 14, 2014.

On May 10, 2017, U.S. EPA published a Determination of Attainment by Attainment Date for the Chico Nonattainment Area based on 2013-2015 data. This action was effective on June 9, 2017. The District is submitting the *Chico, CA/Butte County PM_{2.5} Nonattainment Area Redesignation Request and Maintenance Plan* (Maintenance Plan), requesting redesignation of the Chico Nonattainment Area from nonattainment to attainment and demonstrating how the Chico Nonattainment Area will maintain the 24-hour PM_{2.5} standard for the next ten years.

II. REDESIGNATION REQUIREMENTS

CARB staff reviewed the Maintenance Plan within the context of the Act, which identifies the following requirements an area must meet to be redesignated to attainment: the area has attained the standard; the applicable implementation plan is fully approved under Act section 110 (k), and the area has met all applicable requirements of Act section 110 and part D; the PM_{2.5} air quality improvements are due to permanent and enforceable emission reductions; and the area has a fully approved maintenance plan satisfying section 175A of the Act.

The Act also sets the general framework for maintenance plans.¹ Each PM_{2.5} maintenance plan must provide for continued maintenance of the PM_{2.5} standard for ten years after redesignation and must include the following components:

¹ Calcagni, John, Memorandum, *Procedures for Processing Requests to Redesignate Areas to Attainment*, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, September 4, 1992.
<https://www.epa.gov/ozone-pollution/procedures-processing-requests-redesignate-areas-attainment>

1. Attainment emission inventory;
2. Maintenance demonstration;
3. Commitment to continue the monitoring network operation;
4. Commitment for verification of continued attainment; and
5. Contingency plan to promptly correct any violation of the PM_{2.5} standard that occurs after the area has been redesignated.

III. EVALUATION OF THE REDESIGNATION REQUIREMENT

Based on review of the District's Maintenance Plan and supporting technical analysis, CARB staff concurs that the Maintenance Plan meets the Act's requirements. The following sections describe the major elements of the Maintenance Plan.

A. Monitoring Shows Compliance with PM_{2.5} Standard

PM_{2.5} air quality (Figure 2) has improved significantly over the last few years in the Chico Nonattainment Area. PM_{2.5} is measured at a single FRM monitoring station in the City of Chico (see previous Figure 1). This monitoring site has changed locations in recent years, moving from Manzanita Avenue to East Avenue in 2012, resulting in a combined data record from 2012 to 2014. The area first reached compliance with the 35 µg/m³ 24-hour standard in 2011, with a design value of 35 µg/m³. The design value represents the 3-year average of the 98th percentile of 24-hour PM_{2.5} concentrations.

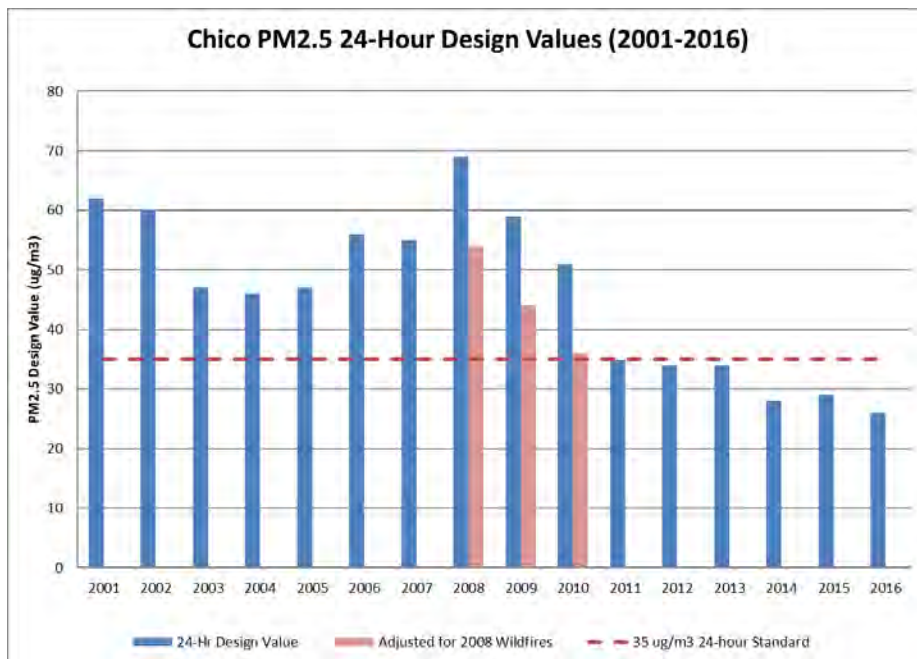
Wildfires that occurred in the summer of 2008 resulted in a number of exceedances of the 24-hour standard. U.S. EPA's exceptional events rule² allows for exclusion of exceedances due to natural events. As shown in the figure below, although exclusion of these 2008 wildfire events would have lowered the Chico Nonattainment Area's design value, it would not have resulted in attainment of the standard.

Between 2001 and 2016, 24-hour PM_{2.5} design values in the Chico Nonattainment Area decreased by 58 percent due to ongoing emission reductions. As detailed in the Maintenance Plan, this downward design value trend was not the result of either unusually favorable meteorology or reduced economic conditions. The area experienced a variety of meteorological conditions, including a severe drought from 2013 to 2015 and an abnormally wet winter in 2016. Average annual temperatures were below normal in 2010 and 2011, two years which contributed to the 2011 design value, when the Chico Nonattainment Area first attained the standard. Butte County has also experienced an almost 10 percent increase in

² *Treatment of Data Influenced by Exceptional Events*, 81 FR 68216, October 3, 2016.

population since the 2000 Census and a steady increase in Gross Domestic Product (GDP) since the economic downturn in 2008.

Figure 2. PM_{2.5} 24-hour Design Values at Chico



B. Approved SIP Requirement is Satisfied

CARB and the District have met all of the Act requirements applicable for a PM_{2.5} nonattainment area to be considered for redesignation.

On June 2, 2011, CARB requested a finding of attainment, also known as a clean data finding, for the 35 µg/m³ 24-hour PM_{2.5} standard for the Chico Nonattainment Area, which was approved by U.S. EPA on September 10, 2013 (78 FR 55225), effective October 10, 2013. This determination was based on 2010-2012 data and suspended the obligation to submit SIP elements that provide for attainment of the standard, implementation of all reasonably available control measures (RACM), reasonable further progress (RFP), and implementation of contingency measures for failure to meet deadlines for RFP and attainment. On November 15, 2012, CARB submitted the remaining required SIP element, an emission inventory, to U.S. EPA for inclusion in the California SIP. The emission inventory was approved by U.S. EPA on March 14, 2014 (79 FR 14404).

C. Attainment Results from Permanent and Enforceable Emission Reductions

Numerous District and State emission control programs have been adopted and implemented over the last several years, providing permanent and enforceable reductions in direct PM_{2.5} and PM_{2.5} precursor emissions. At the State level, these programs are part of a comprehensive

strategy to reduce emissions from mobile sources including stringent emissions standards for new vehicles, in-use programs to reduce emissions from existing vehicle and equipment fleets, cleaner fuels that minimize emissions, and incentive programs to accelerate the penetration of the cleanest vehicles beyond that achieved by regulations alone. At the local level, the District has adopted or strengthened rules regarding performance standards for wood burning devices, open burning regulations, and emissions from stationary sources. These programs will continue to provide emission reductions during the maintenance period, ensuring continued compliance with the standard. The Maintenance Plan includes an accounting of post-2006 control measures responsible for significant improvements in PM_{2.5} air quality, including the above-mentioned restrictions on open burning and residential fuel combustion.

D. Maintenance Plan Provides for Continuing Attainment

Section 175A of the Act establishes the required elements of a maintenance plan for areas seeking redesignation from nonattainment to attainment. Using an attainment year inventory and future inventory projections, plans must demonstrate continued attainment through the first 10-year maintenance period. Comprehensive inventories were developed for the representative attainment year (2015), an interim year (2025), and the end of the maintenance period (2030) for directly emitted PM_{2.5} and PM_{2.5} precursors.

1. Attainment Year Emission Inventory

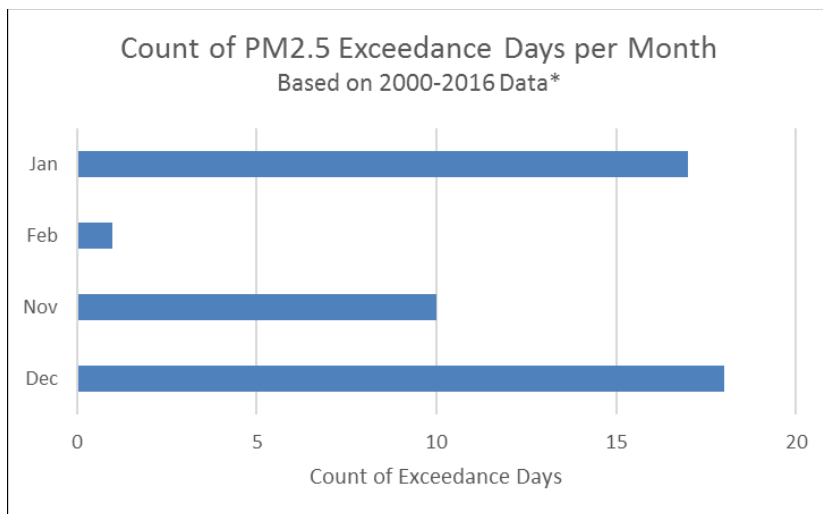
An emission inventory is a critical tool used to support evaluation, control, and mitigation of air pollution and is comprised of a systematic listing of the sources of air pollutants along with the amount of these pollutants emitted from each source or category over a given period of time. Emission inventories are estimates of the air pollutant emissions released into the environment and are not direct ambient concentration measurements. As part of the Maintenance Plan, the District included an attainment year inventory characterizing emissions in the Chico Nonattainment Area.

U.S. EPA recommends that the attainment year inventory be from one of the three years used to demonstrate attainment. Since the U.S. EPA finalized the Determination of Attainment by Attainment Date (82 FR 21711) for the Chico Nonattainment Area was based on 2013-2015 data, 2015 was selected as the attainment year. The attainment year inventory includes emissions of directly-emitted PM_{2.5}, volatile organic compounds (VOCs), oxides of nitrogen (NO_x), oxides of sulfur (SO_x), and ammonia (NH₃).

An emission inventory should be consistent with the nature of the air quality problem. Since the 2006 24-hour PM_{2.5} standard was designated to protect against peak exposures, the inventory should reflect the season when most of these exceedances occur. As demonstrated in the Maintenance Plan and shown in Figure 3, all of the highest PM_{2.5} concentrations in the Chico Nonattainment Area occur during the winter months, with the exception of a few

summer wildfire events. The winter inventory was therefore developed for the attainment year and future years as the most appropriate for SIP planning purposes. Table 1 lists 2015 winter emission inventories split by source category.

Figure 3. Total Count of Exceedance Days per Month Based on 17 Years of Data



* Excluding data affected by exceptional events.

Table 1. Attainment Year (2015) Winter Emission Inventory (tons/day)

Category	VOC	NOX	SOX	PM _{2.5}	NH ₃
STATIONARY	1.97	1.65	0.10	0.56	0.13
AREAWIDE	6.85	1.45	0.15	4.56	3.94
ON-ROAD MOTOR VEHICLES	2.26	6.28	0.02	0.17	0.16
OTHER MOBILE SOURCES	1.84	3.84	0.03	0.20	0.00
TOTAL	12.92	13.22	0.30	5.49	4.23

2. Maintenance Demonstration

In order to demonstrate maintenance of the PM_{2.5} 24-hour standard through the year 2030, the District compiled a winter emission inventory for the attainment year (2015) and the final year of the maintenance period (2030). The attainment year and projected inventories represent winter emissions which reflect the nature of the PM_{2.5} problem in the area. If each of the projected emission levels is less than the emissions for the attainment year, maintenance of the standard is demonstrated. This approach assumes that ambient concentrations will remain below the standard as long as future emissions are kept below the attainment year total emissions. The future year inventories include banked Emission Reduction Credits (ERCs) to demonstrate that the ERC's will not compromise attainment.

The 2007 PM_{2.5} implementation rule (72 FR 20586) specifies that a precursor is considered significant for control strategy development purposes when a significant reduction in the emission of that precursor pollutant leads to a significant decrease in PM_{2.5} concentration. Such pollutants are known as PM_{2.5} attainment plan precursors. The 2016 PM_{2.5} implementation rule (81 FR 58010) established the presumption that PM_{2.5}, NO_x, SO_x, VOCs, and ammonia are attainment plan precursors unless it is demonstrated that they are not needed for the attainment demonstration. Although this is a maintenance plan, not an attainment plan, and as previously noted is not subject to the majority of the attainment plan requirements, information regarding these precursors is included to aid in fully understanding the nature of the air quality issues in the Chico Nonattainment Area.

Speciation data is routinely collected at the Chico monitoring site. Carbonaceous aerosols make up the largest component to PM_{2.5} in the winter months, contributing about 72 percent of the total mass, followed by ammonium nitrate, which is responsible for about 14 percent. Data from the highest 10 percent of winter days, those most likely to contribute to an exceedance of the standard, shows a similar pattern, with carbonaceous aerosols contributing 76 percent to PM_{2.5} mass and ammonium nitrate contributing 16 percent. Although these data are based on a three-year average of 2014-2016 samples, the data collected in previous years indicate that while the number of high days has decreased, the high day composition remains similar from year to year due to the nature of the PM_{2.5} problem.

In the Chico Nonattainment Area, high PM_{2.5} values occur exclusively under stagnant winter conditions leading to the accumulation of primary pollutants and the formation of secondary components. While carbonaceous aerosols are primarily emitted directly into the air, ammonium nitrates are secondary pollutants that are formed in the atmosphere from gaseous NO_x emissions and ammonia. CARB's mobile source control programs aimed at reducing NO_x emissions have played an important role in reducing the ammonium nitrate fraction of PM_{2.5}. Long-term ammonium nitrate and NO_x data collected throughout the State demonstrate that reductions in ambient NO_x concentrations have resulted in commensurate reductions in PM_{2.5} ammonium nitrate concentrations. Past modeling and monitoring studies in northern and central California highlight that reductions in VOCs are insignificant for reducing either carbonaceous aerosols or nitrate; therefore, they would not provide any benefit in reducing PM_{2.5} concentrations. Based on the nature of the PM_{2.5} problem in the Chico Nonattainment Area and an understanding of precursor effectiveness, as well as the fact that the area has already attained the standard, VOCs and ammonia are not considered significant PM_{2.5} precursors.

The attainment and future emission projections for the Chico Nonattainment Area are presented in Table 2. Between 2015 and 2030, emissions of NO_x are projected to decline 46 percent while emissions of SO_x and direct PM_{2.5} are projected to increase by small amounts. These changes are accounted for in the rollback proportional model demonstration in the

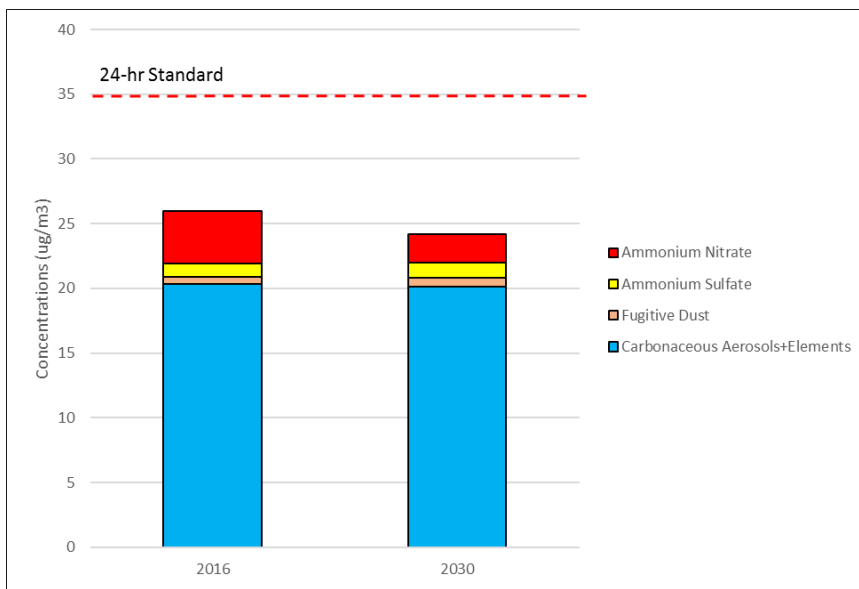
Maintenance Plan, which assumes a direct correlation between emissions and measured concentrations, and result in a 2030 design value of 24.2 $\mu\text{g}/\text{m}^3$ (Figure 4). Thus, the small potential increase in SOx emissions will be fully offset by a greater decrease in nitrate concentrations, as illustrated in Figure 4. Additionally, the current 2016 design value of 26 $\mu\text{g}/\text{m}^3$ is 26 percent below the standard, providing further assurance that the 2030 design values will also remain below the standard.

Table 2. Projected Changes in Emissions between 2015 and 2030 (tons/day)*

Year	2015	2030	2015-2030	Percent Change (2015-2030)
PM _{2.5}	5.26	5.33	0.07	1.3%
NOx	13.22	7.09	-6.13	-46.4%
SOx	0.29	0.34	0.05	17.2%

* Includes Emission Reduction Credits and the benefits of woodstove changeouts in the future year inventories.

Figure 4. Comparison of Measured 2016 and Projected 2030 Design Value



3. PM_{2.5} Monitoring Network

The existing PM_{2.5} monitoring network in the Chico Nonattainment Area includes a PM_{2.5} FRM monitor located at 984 East Avenue in Chico operating on a daily schedule, as well as a non-FEM Beta Attenuation Monitor (BAM) running in parallel to the FRM, and a PM_{2.5} speciation monitor that operates on a 1-in-6 day schedule. In addition, two PM_{2.5} non-FEM BAM monitors are operated in the communities of Gridley, to the south, and Paradise, to the east. Altogether, these monitors provide the necessary data to demonstrate continuous compliance with the

standard as well as support Air Quality Index reporting, forecast air quality episodes, and support burn decisions in the agricultural burning program.

4. Verification of Continued Attainment

CARB is responsible for monitoring PM_{2.5} air quality within the Chico Nonattainment Area. CARB oversees the quality assurance of PM_{2.5} data and submits annual monitoring network plans to U.S. EPA on behalf of the District. CARB commits to maintaining an appropriate PM_{2.5} monitoring network through the maintenance period, with any potential changes to be developed in collaboration with U.S. 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 expeditiously review data as it becomes available to evaluate any risk of impending violations.

5. Contingency Plan

The Act requires a maintenance plan to include contingency provisions for prompt correction of any PM_{2.5} standard violation that might occur after the area has been redesignated to attainment. Unlike in an attainment SIP, a maintenance plan is not required to contain fully adopted contingency measures that will go into effect without further action. Instead, the area must have a plan to ensure that contingency measures are adopted once they are triggered.

The District will use the 35 µg/m³ 24-hour design value as the trigger in the contingency plan. In the event that the 24-hour design value exceeds the 35 µg/m³ 24-hour standard, the District will:

- Commence analyses within 60 days, including a meteorological evaluation and an emission inventory assessment;
- Use the results of the analyses to rule out potential exceptional events or instrument malfunction;
- 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 trigger;
- Complete additional sufficient analyses within 12 months to consider necessary rules for ensuring attainment and maintenance of the 24-hour standard; and, if necessary,
- Propose new or strengthened rules for adoption and implementation by the District Board within 24 months of the original trigger date.

Examples of potential voluntary and incentive measures include:

- Additional Check Before You Light advisories;
- Expanded outreach programs for residential wood burning; and
- Additional incentives to change-out older wood burning devices.

Examples of potential rule adoption measures include:

- RACT for existing stationary sources emitting PM_{2.5} or precursors;
- Additional fugitive dust measures for construction activities and stationary sources;
- Additional opacity restrictions;
- Additional open burning restrictions for residential, agricultural, and prescribed burning; and
- Additional curtailment measures for residential wood burning devices.

CARB staff believes the contingency requirements in the Maintenance Plan are adequate to protect air quality in the area.

6. Transportation Conformity Budgets

The Maintenance Plan shows, consistent with the transportation conformity rule found at Title 40 Part 93.109(f) of the federal Code of Regulations, that NO_x and direct PM_{2.5} from on-road motor vehicles are insignificant precursors in the Chico Nonattainment Area for the 24-hour PM_{2.5} NAAQS. The Maintenance Plan, therefore, does not set any PM_{2.5} or NO_x emissions budgets for transportation conformity.

IV. STAFF RECOMMENDATION

CARB staff has reviewed the Maintenance Plan for the Chico Nonattainment Area and consulted with District staff during this review. CARB staff finds that the Maintenance Plan meets all applicable Act requirements. The monitoring data shows that the area has attained the 35 µg/m³ 24-hour PM_{2.5} standard, and the maintenance demonstration shows that the standard will be maintained for ten years.

Therefore, staff recommends that the Board adopt the *Chico, CA/Butte County PM_{2.5} Nonattainment Area Redesignation Request and Maintenance Plan* as a revision to the California SIP for submittal to U.S. EPA. In addition, CARB staff recommends that the Board approve the District's request that the Chico Nonattainment Area be redesignated from nonattainment to attainment for the federal 35 µg/m³ 24-hour PM_{2.5} standard.