

**State of California**



**California Environmental Protection Agency**

**AIR RESOURCES BOARD**

**Staff Report**

**Town of Mammoth Lakes  
PM<sub>10</sub> Maintenance Plan and  
Redesignation Request**

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## TABLE OF CONTENTS

<b>I.</b>	<b>BACKGROUND.....</b>	<b>1</b>
<b>II.</b>	<b>REDESIGNATION REQUIREMENTS .....</b>	<b>2</b>
<b>III.</b>	<b>EVALUATION OF THE MAINTENANCE PLAN/REDESIGNATION REQUEST ...</b>	<b>3</b>
	A. Attainment of the Standard.....	3
	B. Fully Approved SIP.....	5
	C. Attainment Results from Permanent and Enforceable Emission Reductions ....	5
	D. Maintenance Plan Provides for Continuing Attainment .....	6
	1. Attainment Year Emission Inventory.....	6
	2. Maintenance Demonstration.....	7
	3. PM <sub>10</sub> Monitoring Network.....	8
	4. Verification of Continued Attainment .....	8
	5. Contingency Plan .....	8
	E. Motor Vehicle Emission Budgets.....	9
<b>IV.</b>	<b>STAFF RECOMMENDATION .....</b>	<b>10</b>

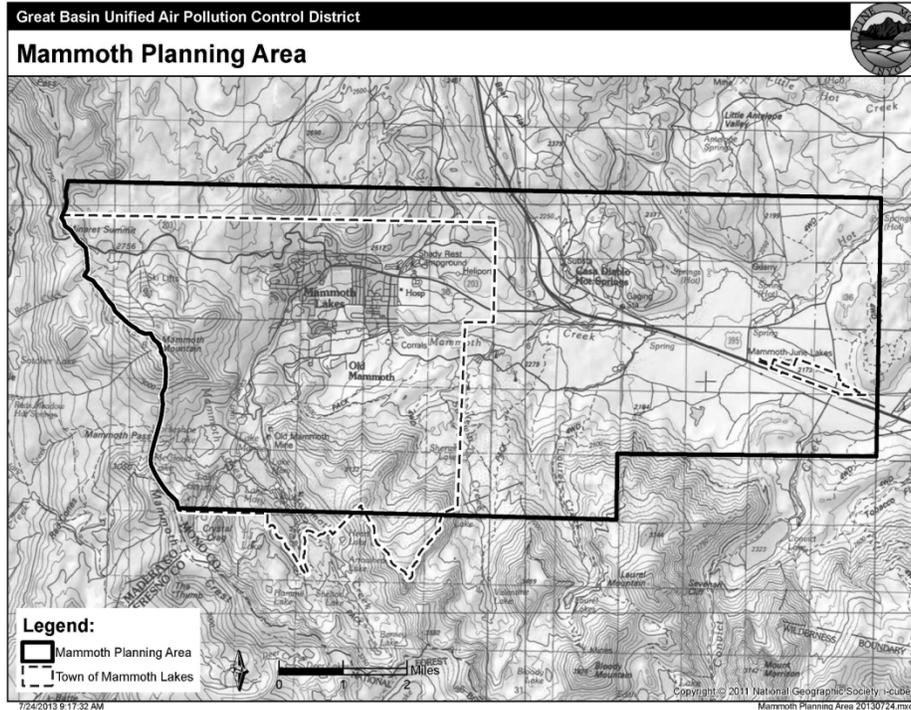
## I. BACKGROUND

The Town of Mammoth Lakes (Mammoth Lakes), referred to as the Mammoth Lakes Planning Area in U.S. Environmental Protection Agency (U.S. EPA) rulemaking, was designated as nonattainment for the 24-hour particulate matter less than 10 microns (PM<sub>10</sub>) National Ambient Air Quality Standard (standard) on November 15, 1990. The nonattainment area covers approximately 68 square miles within the Great Basin Unified Air Pollution Control District (District) and encompasses almost all of the incorporated portion of Mammoth Lakes and a portion of unincorporated Mono County. The unincorporated portion of the nonattainment area includes the Mammoth Yosemite Airport. Figure 1 shows the boundaries of the nonattainment area and the incorporated portion of Mammoth Lakes.

The District and Mammoth Lakes adopted an Air Quality Management Plan (1990 Plan) to attain the 24-hour PM<sub>10</sub> standard in November 1990. The 1990 Plan focused emission control requirements on two area source categories that were determined during earlier air quality monitoring and analysis to be primarily responsible for exceedances of the standard in the winter: residential wood combustion and road sanding with volcanic cinders (road cinders). The 1990 Plan committed to long-term PM<sub>10</sub> monitoring at a location found to be significantly impacted by emissions from both of these area sources. Since 1984, the site chosen for monitoring has been situated in a commercial area (Gateway Center) near the western edge of town. This site has hosted Federal Reference Method (FRM) monitors and Federal Equivalent Method (FEM) monitors continuously except for a two year period from 1998 to 2000 when the roof upon which the station was installed was replaced during building remodeling. Currently, the District maintains one FRM filter-based monitor and one non-certified continuous PM<sub>10</sub> monitor at the Gateway Center site.

*The 2014 Update to the Air Quality Maintenance Plan and Redesignation Request for the Town of Mammoth Lakes* (Maintenance Plan/Redesignation Request) adopted by the District Board on May 5, 2014, reports that no exceedances of the 24-hour PM<sub>10</sub> standard of 150 µg/m<sup>3</sup> have been recorded at the site since 1993. Analysis of air quality data accessed through U.S. EPA's Air Quality System shows that the number of exceedances per year during the 2010-2012 averaging period to be less than 1.0. Although two exceedances of the standard were recorded in 2013, these occurred during the height of the Aspen Fire near Fresno that pushed smoke into the Mammoth Lakes area. Regardless, these two exceedances did not cause Mammoth Lakes to violate the PM<sub>10</sub> standard under U.S. EPA regulations. These regulations trigger a violation of the PM<sub>10</sub> standard when four or more exceedances are recorded in a three calendar year period.

Figure 1. Map of the Mammoth Lakes Planning Area PM<sub>10</sub> Nonattainment Area



## II. REDESIGNATION REQUIREMENTS

The federal Clean Air Act (Act) authorizes the U.S. EPA to redesignate an area from nonattainment to attainment if a number of requirements are satisfied. These requirements, as listed in Section 107(d)(3)(E) of the Act, are:

1. The area has attained the standard;
2. The applicable implementation plan for the area is fully approved under Section 110(k) of the Act;
3. The improvements in air quality are due to permanent and enforceable emission reductions resulting from implementation of the applicable implementation plan;
4. The area has a fully approved maintenance plan satisfying the requirements of Section 175A of the Act; and
5. The state in which the area is located has met all applicable requirements under Section 110 and Part D of the Act.

U.S. EPA guidance further explains the redesignation requirements including the required elements of approvable maintenance plans<sup>1</sup>. Each PM<sub>10</sub> maintenance plan

<sup>1</sup> 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. <http://www.epa.gov/ttn/oarpg/t5/memoranda/redesignmem090492.pdf>

must provide for continued maintenance of the PM<sub>10</sub> standard for twenty years after redesignation and include the following components:

1. Attainment emission inventory;
2. Maintenance demonstration;
3. Commitment to continued operation of the monitoring network;
4. Commitment to verification of continued attainment; and
5. Contingency plan to promptly correct any violation of the PM<sub>10</sub> standard that occurs after the area has been redesignated.

### **III. EVALUATION OF THE MAINTENANCE PLAN/REDESIGNATION REQUEST**

Based on review of the District Maintenance Plan/Redesignation Request and supporting technical analysis, ARB staff concurs that the Maintenance Plan/Redesignation Request meets the Act's requirements. The following sections summarize ARB staff findings and conclusions with respect to the required elements of the Maintenance Plan/Redesignation Request.

#### **A. Attainment of the Standard**

As shown in Table 1, PM<sub>10</sub> air quality improved significantly over the first few years of implementation of the 1990 Plan in Mammoth Lakes. PM<sub>10</sub> is measured at a single monitoring station at the Gateway Center. The Gateway Center site lies downslope from most residential areas and adjacent to the intersection of Main Street and County Road 203. Air within the ground-level mixing layer on cold, still winter nights in mountainous terrain tends to cool through ground contact more than air aloft, resulting in downhill flows that behave somewhat like water in surface runoff flows but with flow depths measured in tens of meters. These air "surface runoff flows" entrain wood smoke and, in the absence of vertical mixing, transport the smoke and its PM<sub>10</sub> load downhill to pool in areas of level terrain. The Gateway Center monitoring site lies at the toe of Mammoth Mountain and the edge of the Long Valley Caldera, a flat, wide bowl to the east of Mammoth Lakes. PM<sub>10</sub> concentrations from vehicle-entrained road cinders are typically highest adjacent to heavily-traveled arterial streets. Both of these phenomena make the Gateway Center site a good candidate for sampling the highest PM<sub>10</sub> impacts from residential wood combustion and road sanding in the community.

Table 1 lists PM<sub>10</sub> monitoring data using several metrics for tracking PM<sub>10</sub> air quality year by year. These metrics include the highest 24-hour average PM<sub>10</sub> concentration recorded during each year, the estimated number of exceedance days per year for the 24-hour PM<sub>10</sub> standard, and the 3-year average of estimated numbers of exceedance days per year for use in determining attainment of the 24-hour PM<sub>10</sub> standard. The 24-hour PM<sub>10</sub> standard is met when the estimated number of exceedance days recorded over a three-year period average one or less per year.

**Table 1. Peak 24-Hour Average PM<sub>10</sub> Per Year and Estimated PM<sub>10</sub> Exceedance Days Per Year and Per Three-Year Average**

Year	Peak 24-Hour PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )	Estimated Exceedances Days Per Year	3-Year Average of Estimated Exceedance Days Per Year
1988	166	6.2	
1989	163	7.1	
1990	161	12.0	8.4
1991	134	0	6.4
1992	138	0	4.0
1993	178	6.4	2.1
1994	92	0	2.1
1995	122	0	2.1
1996	74	0	0
1997	112	0	0
1998 <sup>1</sup>	106	*	*
1999 <sup>1</sup>	- <sup>2</sup>	*	*
2000 <sup>1</sup>	70	*	*
2001	134	*	*
2002 <sup>1</sup>	129	*	*
2003 <sup>1</sup>	74	*	*
2004	86	0	*
2005	85	0	*
2006	78	0	0
2007	67	0	0
2008	138	*	*
2009	116	0	*
2010	100	0	*
2011	101	0	0
2012	56	*	*

(1) Monitoring data for these years do not meet U.S. EPA completeness standards

(2) Monitoring discontinued during building remodeling.

PM<sub>10</sub> monitoring has been conducted at the Gateway Center site for more than the duration needed to determine air quality status as specified by U.S. EPA regulation defining the PM<sub>10</sub> standard. PM<sub>10</sub> monitoring began at this location on April 17, 1988, with 1-in-6 day filter sampling. Monitoring was suspended between August 23, 1998, and September 10, 2000, while the roof upon which the station is mounted was replaced during building remodeling. The frequency of PM<sub>10</sub> filter monitoring was increased from a 1-in-6 day schedule to a 1-in-3 day schedule in 2001, and continuous monitoring commenced in 2008 at this site.

The last three year period during which the 24-hour PM<sub>10</sub> standard was violated was 1993-1995 at Mammoth Lakes. As Table 1 indicates, peak 24-hour PM<sub>10</sub> concentrations have remained below the 150 µg/m<sup>3</sup> standard since monitoring recommenced in 2000 and below 100 µg/m<sup>3</sup> for more than 50 percent of the years with adequate datasets in the past decade. U.S. EPA regulation defines a violation of the 24-hour PM<sub>10</sub> standard as 4 or more exceedances recorded in a three year period.

## **B. Fully Approved SIP**

The 1990 Plan is a fully approved portion of the California SIP. The 1990 Plan was submitted to U.S. EPA on September 11, 1991, and subsequent amendments, primarily of an administrative nature, were forwarded to U.S. EPA on January 9, 1992. In a Direct Final Rule Notice published in the June 24, 1996, Federal Register, U.S. EPA fully approved the 1990 Plan as amended.<sup>2</sup>

## **C. Attainment Results from Permanent and Enforceable Emission Reductions**

The substantial decline in peak winter day PM<sub>10</sub> concentration shown in Table 1 between 1991 and 1995 is due to the implementation of control measures contained in the 1990 Air Quality Management Plan. Studies conducted prior to development and adoption of the 1990 Plan estimated that up to 93 percent of ambient PM<sub>10</sub> on some exceedance days was generated by fireplaces and woodstoves, and that up to 44 percent on other exceedance days was produced by the entrainment of pulverized road sanding agents (road cinders) after roads became free of ice.

Mammoth Lakes ordinances adopted to implement the 1990 Plan reduced residential wood-burning emissions by requiring permanent replacement of non-U.S. EPA- certified woodstoves with certified units upon property resale, requiring the removal of some wood-burning devices by limiting the number of devices per residence to one, and by instituting no burn days when calm or stagnant meteorological conditions were forecasted in winter months.

Data collected and analyzed by the District and Mammoth Lakes between 1990 and 1994 demonstrated measureable reductions in the PM<sub>10</sub> wood smoke emission inventory for the nonattainment area. Over this time span, the total number of wood-burning devices declined from 5,946 to 5,749, and the fraction of these that were U.S. EPA-certified rose from 1 percent to 35 percent.<sup>3</sup> In December 2006, Mammoth Lakes amended these ordinances to eliminate the operational exemption from no burn day requirements originally granted to U.S. EPA-certified devices. Starting in 2007, all wood-burning devices in the nonattainment area are required to be shut down on no

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<sup>2</sup> Federal Register, Vol. 61, No. 122, June 24, 1996, pp. 32341-32345

<sup>3</sup> Taylor, Bill, Town of Mammoth Lakes, Letter to Duane Ono, Great Basin Unified APCD, March 2, 1995

burn days. Emission inventories compiled by the District report that PM<sub>10</sub> emissions from residential wood-burning declined by 54 percent between 1990 and 2012.

Also due to the 1990 Plan, PM<sub>10</sub> emissions from the re-entrainment of road cinders were controlled in Mammoth Lakes ordinances adopted in 1990 by requiring the use of high-efficiency vacuum street sweepers for cinder removal and the enforcement of a traffic volume limit within the boundaries of the incorporated area through VMT-reduction permit conditions on new development.

Prior to 1989, Mammoth Lakes did not remove road cinders from public streets and roads (as indicated by the 1990 Plan emission inventory calculations), but instead allowed cinders to be pulverized and removed by entrainment and transport of road surfaces by passing vehicles. Applicable emission control guidelines published prior to 1990 estimated the control efficiency of vacuum street sweepers to be 34 percent, which – at the time – was believed to be the most effective control technology for reducing PM<sub>10</sub> emissions from public streets with high loadings of sand and silt.<sup>4</sup> This control efficiency was used in the attainment demonstration of the 1990 plan, based on Mammoth Lakes' commitments to purchase and use these sweepers in a program of early road cinder removal as sanded roads became free of ice. After the high efficiency vacuum street sweepers were purchased, a test of the effectiveness of the vacuum street sweeper program in the winter of 1993-1994 revealed that road cinder emissions were reduced by 68 percent, resulting in greater control of emissions and lower residual impacts on air quality than had been estimated in the 1990 Plan.<sup>5</sup>

#### **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 in this Plan for the representative attainment year (2012) and for the projected full build-out year (2030) when peak winter day PM<sub>10</sub> emissions will reach a maximum level.

##### **1. Attainment Year Emission Inventory**

As the standard being addressed in the Maintenance Plan/Redesignation Request is the 24-hour PM<sub>10</sub> standard, and as all historical exceedances of this standard occurred during winter months, the emission inventories contained in this Plan all report peak winter day PM<sub>10</sub> emissions. PM<sub>10</sub> monitoring data from Mammoth Lakes demonstrates

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<sup>4</sup> Control of Open Fugitive Dust Sources; prepared by Chatten Cowherd et. al. for U.S. Environmental Protection Agency; U.S. EPA-450/3-88-008; September 1988

<sup>5</sup> Street Sweeper Efficiency Study for the Town of Mammoth Lakes; prepared by Charles Satterfield, Satterfield & Associates, for the Town of Mammoth Lakes; June 13, 1994

that the last violation of the standard occurred in 1993, and that peak winter day concentrations each year have not varied substantially between 2005 and 2012. As a result, the starting point for inventory tracking in the plan is 2012, the most recent year of complete data at the time that drafting of the plan commenced.

A series of analyses determining the speciation of peak winter day PM<sub>10</sub> also demonstrated that two sources – residential wood combustion and road sanding – accounted for more than 95 percent of ambient PM<sub>10</sub> on these days in 1990, and more than 90 percent in 2012. These findings are supported by the dominance of PM<sub>10</sub> emissions from these two sources in the emission inventories. Although PM<sub>10</sub> emissions from residential wood combustion and road sanding have each decreased by approximately 33 percent since 1990 - according to the emission inventory - the magnitudes of emissions from these sources continue to overwhelm all other sources in 2012. The result of this dominance is that emission inventory analysis reported in the Maintenance Plan/Redesignation Request continues to focus on these two sources. A tabulation of peak winter day PM<sub>10</sub> emissions by source category and milestone year that quantifies the dominance discussed above is shown in Table 2.

**Table 2. Peak 24-hour PM<sub>10</sub> Emissions (kg/winter day)**

<b>Source Category</b>		<b>2012</b>	<b>2030</b>
Residential Wood Combustion		850	802
Road Dust and Vehicle Emissions		3,466	4,319
Industrial Sources		8	8
<b>TOTAL</b>		<b>4,324</b>	<b>5,129</b>

Note: ARB customarily reports emission inventory in pounds or tons per day or year. The Maintenance Plan/Redesignation Request reported this inventory in kilograms per day.

## **2. Maintenance Demonstration**

In order to demonstrate maintenance of the PM<sub>10</sub> 24-hour standard through the year 2024, the District compiled an emission inventory for an attainment year (2012) and formulated projections for the build-out year (2030) of the Mammoth Lakes 2007 General Plan. The attainment year and projected inventories represent winter emissions which reflect the nature of the PM<sub>10</sub> problem in the area. The Maintenance Plan/Redesignation Request states that residential wood combustion and resuspended road dust comprise almost all of the PM<sub>10</sub> emissions during winter days. This statement is supported by chemical mass balance (CMB) analyses that were conducted in 1990 and 2012.

The District used the recent CMB analyses in conjunction with recent high winter days to determine if the PM<sub>10</sub> standard would be maintained through the 10-year maintenance period. Despite the increases in road dust and vehicle emissions forecast, the Maintenance Plan/Redesignation Request demonstrates that the PM<sub>10</sub> standard will

be maintained through 2030. The 2030 timeframe provides ample time for the U.S. EPA approval process and still allows for a 10-year maintenance period.

### **3. PM<sub>10</sub> Monitoring Network**

The existing PM<sub>10</sub> monitoring network in Mammoth Lakes consists of the single station located at the Gateway Center commercial cluster. The District commits in the Maintenance Plan/Redesignation Request to continue daily PM<sub>10</sub> monitoring for the twenty year term required of an approvable maintenance plan. Daily PM<sub>10</sub> monitoring using a continuous method is also a critical element in the Mammoth Lakes' residential wood combustion tracking and control program.

### **4. Verification of Continued Attainment**

The District commits in the Maintenance Plan/Redesignation Request to verify continued attainment through the compilation and submittal of progress reports to U.S. EPA every third year starting in 2017. The progress reports will contain emission inventory updates, air quality trend assessments, modeling performance re-evaluations, and additional information that may be relevant to the air quality program of Mammoth Lakes. Eight years after designation to attainment, the District also commits to revisiting the SIP to address the second 10-year maintenance cycle.

### **5. Contingency Plan**

The Act requires a maintenance plan to include contingency provisions for prompt correction of any PM<sub>10</sub> standard violation that might occur after the area has been redesignated to attainment. If a violation of the standard occurs, the District will determine whether the violation was due to an exceptional event or a controllable source. If the violation was due to a controllable source, within 18 months, the District and Mammoth Lakes will adopt additional control measures related to residential wood smoke or volcanic cinders. The District believes that the need to exercise contingency measures is small given the ample attainment margin demonstrated by the ambient air quality monitoring data collected since 2003 showing peak winter 24-hour PM<sub>10</sub> concentrations generally hovering between 90 and 110 µg/m<sup>3</sup>.

In addition, while not needed to show maintenance, the Maintenance Plan/Redesignation Request incorporates several amendments to District Rule 431 (Particulate Emissions) that increase the stringency of the Mammoth Lakes residential wood combustion requirements that will further reduce emissions by eliminating exemptions for burning on no burn days, prohibit wood-burning devices in new commercial buildings, and allow only pellet stoves in new multi-family structures. These amendments will cause the currently flat-lined peak winter day PM<sub>10</sub> concentrations to

begin dropping, potentially resulting in larger compliance margins and further reducing the potential for use of contingency measures.

### **E. Motor Vehicle Emission Budgets**

The Act requires that transportation plans, programs, and projects receiving federal funding or requiring federal approval must be found to be fully consistent with the applicable SIP. The federal Transportation Conformity Rule requires SIPs to specify on-road motor vehicle emission budgets (transportation conformity budgets) that are consistent with the attainment and maintenance demonstrations in the SIP.<sup>6</sup> The conformity regulation requires departments of transportation to demonstrate that emissions from applicable portions of regional transportation plans and programs do not exceed these emissions budgets.

The transportation conformity budgets in PM<sub>10</sub> SIPs must include emissions from several categories of sources that are integral components of on-road infrastructure construction, maintenance, and use. These source categories are identified in the Maintenance Plan/Redesignation Request as vehicle exhaust, vehicle wear (e.g., abrasive generation of particles from brake linings, tire surfaces, etc.), re-entrained road dust, and re-entrained traction agents (road cinders). Under U.S. EPA regulation, road construction fugitive dust may be excluded from conformity budgets if the applicable SIP does not identify this source as being significant.<sup>7</sup> PM<sub>10</sub> emissions from source categories included in the budgets must be reported in the units of measure upon which the SIP emission inventories are based. For the Maintenance Plan/Redesignation Request, this unit is kilograms (kg) per peak winter day.

Table 3 shows the District-adopted transportation conformity budgets for PM<sub>10</sub> peak winter day emissions for the Mammoth Lakes Planning Area. If U.S. EPA determines these budgets to be adequate, future transportation plan amendments and updates in Mammoth Lakes will need to conform to these budgets. Mammoth Lakes must ensure that the aggregate peak winter day transportation PM<sub>10</sub> emissions in the Planning Area do not exceed these levels when approving new transportation plans and transportation programs, even if the mix of projects changes or growth increases. These budgets will remain in effect until other budgets are found adequate through approval by U.S. EPA.

During the 30-day public comment period prior to District Board adoption of the Maintenance Plan/Redesignation Request, District staff modified the motor vehicle emission budgets to respond to comments from U.S. EPA. As a result, the version of Maintenance Plan/Redesignation Request considered and adopted by the District Board was not the version released to the general public at the commencement of the public comment period. To fully comply with the requirements for public hearings on SIP revisions in U.S. EPA regulations<sup>8</sup>, ARB is providing a full 30-day comment period and

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<sup>6</sup> The Transportation Conformity Regulation is found at 40 CFR Parts 51 and 93.

<sup>7</sup> 40 CFR 93.122(e)(1)

<sup>8</sup> 40 CFR 50.102(a) (Public Hearings)

public hearing on the District-adopted version of the Maintenance Plan/Redesignation Request.

**Table 3. Motor Vehicle Emission Budgets for Maintenance of the 24-hour PM10 NAAQS**

Motor Vehicle Emissions (kg/peak winter day)	Year	
	2012	2030
Road Dust & Vehicle Emissions (Incorporated Portion)	2,531	3,154
Road Dust & Vehicle Emissions (Unincorporated Portion)	935	1,165
Total	3,466	4,319

#### **IV. STAFF RECOMMENDATION**

ARB staff has reviewed the Maintenance Plan/Redesignation Request for Mammoth Lakes and consulted with District staff during this review. ARB staff finds that the Maintenance Plan/Redesignation Request meets all applicable Act requirements. The monitoring data shows that the area attained the 24-hour PM<sub>10</sub> standard in 1994, and the maintenance demonstration shows that the standard will be maintained for ten years.

Therefore, staff recommends that the Board adopt the *2014 Update to the Air Quality Maintenance Plan and Redesignation Request for the Town of Mammoth Lakes* as a revision to the California SIP for submittal to U.S. EPA.