



GREAT BASIN UNIFIED AIR POLLUTION CONTROL DISTRICT
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Town of Mammoth Lakes Air Quality Management Plan
2014-2016 TRIENNIAL PROGRESS REPORT
December 2017

Summary

This document provides a progress report on particulate matter 10 microns or less in diameter (PM10) air quality trends for the Town of Mammoth Lakes (Town). This progress report is the first since the adoption of the 2014 Air Quality Maintenance Plan (2014 AQMP) for the Town of Mammoth Lakes, which was a revision to the 1990 Air Quality Management Plan (1990 AQMP) and included a request of the United States Environmental Protection Agency (US EPA) for redesignation of the Mammoth Lakes Planning Area as in attainment for the PM10 National Ambient Air Quality Standard (Federal Standard) based on monitoring data and modeling analysis. The US EPA approved the 2014 AQMP and redesignated the Mammoth Lakes Planning Area a maintenance area in attainment for the PM10 Federal Standard on November 2, 2015.

In the 2014 AQMP, the Town of Mammoth Lakes and Great Basin Unified Air Pollution Control District (District) committed to submitting progress reports every third year starting in 2017 to track the continuing progress of the PM10 maintenance plan. As specified in the 2014 AQMP, this progress report includes an update on PM10 air quality and an updated peak daily emissions inventory for all sources in the planning area. Air quality trends and emissions analyses continue to demonstrate that the adopted control measures for the Town of Mammoth Lakes are sufficient to maintain compliance with the PM10 Federal Standard.

Area Description and Population

The Town of Mammoth Lakes is located in the southern portion of Mono County, California. Nestled on the eastern slopes of the Sierra Nevada mountains, the Town is at an elevation of 7,861 feet (2,396 m) above sea level. The Town was incorporated in 1984 and has grown from a

permanent population of 4,785 in 1990 to 8,234 in 2010. Mammoth Mountain ski area is included in the Town boundaries and attracts 1.2 to 1.5 million skiers each winter. Major winter weekends see the population of the Town swell to around 35,000 people.

The Mammoth Lakes Planning Area, the area identified by the US EPA as the nonattainment area, covers approximately 68 square miles and encompasses almost all of the incorporated portion of the Town of Mammoth Lakes and a portion of unincorporated Mono County, including the Mammoth Yosemite Airport. The majority of particulate matter contributions originate from within the Town boundary. All of the planning area is located within the District. Figure 1 shows the boundaries of the Mammoth Lakes Planning area.

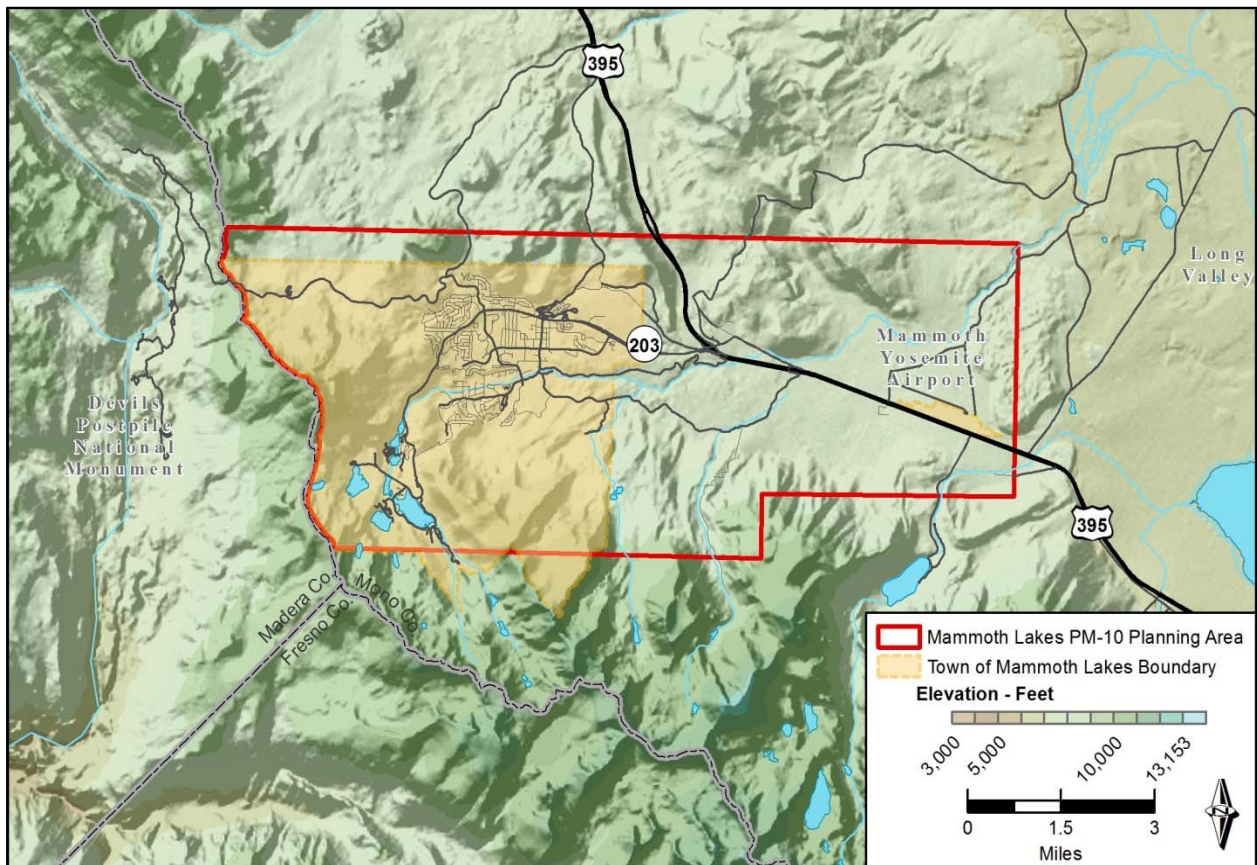


Figure 1. Mammoth Lakes Planning Area and Town of Mammoth Lakes Boundary

Background

The PM10 issue in the Town of Mammoth Lakes is primarily caused by smoke from wood stoves and fireplaces, as well as from traffic related dust and volcanic cinders used on roadways for traction control during the winter. High particulate matter levels are usually associated with calm winter days with little wind. In the past five years, wildfires have resulted in infrequent but high levels of particulate matter during the summer and early fall.

The District has conducted particulate matter monitoring in the Town of Mammoth Lakes since 1979. In 1987, the US EPA revised the Federal Standard for particulate matter (52 FR 24634). The revision established a 24-hour Federal Standard of 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for PM10, particulate matter 10 microns or less in diameter. Soon after, based on the monitoring conducted by the District, the US EPA classified the Town of Mammoth Lakes as a Group I area with a greater than 95% probability of violating the Federal Standard (52 FR 29384) and required the District to develop a State Implementation Plan (SIP) that included control measures to bring the area into attainment with the Federal Standard.

From 1985 to 1990, monitoring in the Town of Mammoth Lakes by the District recorded 10 violations of the 24-hour PM10 Federal Standard. Monitoring at that time was conducted on a once-every-six-day cycle and extrapolation of the data predicted 11.2 expected violations of the Federal Standard per year. Joint investigation by the Town of Mammoth Lakes and the District found the high PM10 levels were largely caused by particulate emissions from residential wood combustion and road dust entrained into the air by vehicles on roads treated with volcanic cinders during the winter. On November 15, 1990, the Mammoth Lakes Planning Area was designated as a moderate nonattainment area for the 24-hour PM10 Federal Standard (56 FR 11101).

In November 1990, the District and Town of Mammoth Lakes jointly adopted the 1990 Air Quality Management Plan (1990 AQMP) for the Town of Mammoth Lakes to fulfill US EPA's requirement of development of a SIP. The 1990 AQMP included particulate emissions regulations adopted in District Rule 431 and Town of Mammoth Lakes Municipal Code Chapter 8.30 that: 1) regulated the installation of wood stoves and other solid fuel appliances, 2) instituted voluntary and mandatory no-burn days for fireplaces and woodstoves, 3) required street sweeping to clean up the cinders on the roads after snow events, and, 4) limited the peak traffic volume for future developments in the Town. After several amendments the US EPA approved the 1990 AQMP in June 1996.

Implementation of the measures included in the 1990 AQMP resulted in an immediate and significant decline in PM10 levels in the planning area. Prior to any control measure implementation, monitoring predicted approximately eleven (11) exceedances of the Federal Standard per year. Following implementation, only two (2) exceedances of the PM10 Federal Standard were recorded between 1990 and 1994 and zero (0) exceedances were recorded from 1994 to 2012.

In 2013, following 23 years of air quality improvement, the Town and District staffs worked cooperatively to revise the 1990 Air Quality Maintenance Plan to: address improved air quality; incorporate the revised General Plan for the Town of Mammoth Lakes; update traffic modeling for the Town; update the chemical mass balance study used in the original AQMP; revise the District Rules; and request the Mammoth Lakes Planning Area be redesignated as attainment for the PM10 Federal Standard. The update contained several regulatory amendments including: 1) prohibiting installation of solid fuel appliances, with the exception of pellet stoves, in new multi-unit developments in the Town of Mammoth Lakes, 2) increasing the allowable peak traffic volume for new developments in the Town from 106,600 to 179,708 vehicle miles travelled per day based on a revised air quality analysis, 3) modification of the mandatory curtailment to include all wood burning appliances, except pellet stoves, as EPA certified stoves had previously been exempted under Town regulations, and, 4) revising penalties for violations of District Rule 431 consistent with the Town Municipal Code.

The request for attainment redesignation incorporated in the revision demonstrated, as required by Section 107(d)(3)(E) of the Clean Air Act, that: 1) the monitored area has achieved attainment of the Federal Standard, 2) the area has a fully approved State Implementation Plan, 3) the improvement in air quality is due to permanent and enforceable reductions in emissions, and, 4) the state has submitted, and U.S. EPA has approved, a maintenance plan for the area.

On November 6, 2013, the Town of Mammoth Lakes adopted and approved the proposed maintenance plan and revisions to Municipal Code Chapter 8.30. On May 5, 2014 the Great Basin Unified Air Pollution Control District Governing Board adopted and approved the proposed maintenance plan and adopted revisions to District Rule 431 making the District rule consistent with the requirements contained in Chapter 8.30 of the Town Municipal Code. District Rule 431 allows the District to enforce air quality regulations governing residential wood combustion and road dust in the Town.

The 2014 Air Quality Maintenance Plan (2014 AQMP) and redesignation request was adopted by the State of California Air Resources Board on September 18, 2014. The US EPA approved the 2014 AQMP and redesignated the Mammoth Lakes Planning Area a maintenance area in attainment for the PM10 Federal Standard on November 2, 2015 (80 FR 60049).

As detailed in the 2014 AQMP, following attainment redesignation, the Town and the District have committed to the continuation of the air quality program in the Mammoth Lakes Planning Area through the continued implementation of control measures, the continuation of ambient air quality monitoring and in providing triennial updates on the progress of the plan to continue to maintain the Federal Standard and to improve compliance with the more stringent California Ambient Air Quality Standard for PM10 (State Standard). The progress updates fulfill a requirement from the US EPA for areas to track the progress of maintenance plans (Calcagni, 1992). The 2014 AQMP contingency provisions incorporate a process for identifying new or more stringent control measures in the event of a future monitored Federal Standard violation.

Ambient PM10 Conditions and Trends

This section contains an update of ambient PM10 conditions and trends for the Town of Mammoth Lakes through the end of the 2016 calendar year. The PM10 trend after many years of improvement has shown a general stabilization in the past decade at a level sufficient to maintain compliance with the PM10 Federal Standard. Figure 2 shows the trend of quarterly PM10 averages from 1990 to 2016, with a gradual decline and leveling over the past decade. Although the average PM10 values have leveled, the trend of the maximum daily PM10 values, shown in Figure 2, indicates that peak concentrations have started to increase since 2008. Upon closer examination this trend is due in part to increased magnitude of non-winter PM10 events caused by summer wildfires. Figure 3 shows that for winter months (November to March), the average winter and peak winter concentration continue to be generally decreasing.

From 1994 to 2012 there were zero (0) exceedances of the 24 hour PM10 Federal Standard. As shown in Table 1, since 2012 through the end of 2016 there have been two (2) exceedances of the Federal Standard. Both federal exceedances were recorded in 2013 and occurred during the height of the Aspen Fire on the west side of the Sierra Nevada that pushed smoke into the Mammoth Lakes area. The two federal exceedances were addressed by US EPA's Exceptional Events Rule (72 FR 13560) which allows for the exclusion of violation days that meet specific criteria. Exceptional events are defined by US EPA as unusual or naturally occurring events that affect air quality but are not reasonably controllable in order to attain and maintain the Federal Standard. Exceptional events must be approved by US EPA and typically include wildfires, stratospheric ozone intrusions and volcanic and seismic activities. Although violations recognized as exceptional events by US EPA do not count toward or against an area in meeting the Federal Standard, that does not provide relief to residents and visitors exposed to high concentrations of particulate matter due to wildfires. Figure 5 shows the increased frequency and magnitude of wildfire events that have impacted the Town of Mammoth Lakes in the past five years.

The 2014 AQMP does not address or contain control or contingency measures related to wildfire impacts. The mitigation measures contained in the 2014 AQMP are specifically for reductions in impacts from winter wood smoke and road dust and cinders. However, to address wildfire impacts to public health in the Town of Mammoth Lakes and throughout the District, an Emergency Air Monitoring Program was established by the District in 2015. Health advisories are issued based on hourly PM10 values during wildfire events under District Rule 701, Air Episode Plan, to protect public health.

Year	Number of Federal Exceedances (Daily PM10 > 150 µg/m ³)	Number of State Exceedances (Daily PM10 > 50 µg/m ³)
2010	0	31
2011	0	28
2012	0	4
2013	2*	32
2014	0	3
2015	0	10
2016	0	14

* Both Federal Exceedances in 2013 were treated under US EPA Exceptional Event Rule

Although the PM10 Federal Standard continues to be met, the more stringent State Standard for PM10, set at 50 µg/m³ for 24 hours, is still being violated as shown in Table 1 and Table 2. The number of monitored State Standard violations was as high as 88 exceedance days in 1990, the year the first AQMP was adopted. Violations of the State Standard have declined since then. Table 2 shows the number of state exceedances by month from 2010-2016. The total number of state exceedances per year has shown a slight decrease, even with summer wildfire events. Exceedances of the State Standard are still occurring during winter months and are attributable to traditional winter wood smoke and traffic related dust and cinders. Table 2, highlights the increased frequency at which the State Standard is violated during the summer. All state exceedances that have occurred in summer months since 2013 are attributable to wildfire events.

Year	Number of PM10 State Exceedances (daily average PM10 > 50 µg/m ³)												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
2010	9	6	8	2	0	0	0	0	0	0	2*	4	31
2011	16	7	2	0	0	0	0	0	0	0	1	2	28
2012	1	0	1	0	0	0	0	0*	0*	0	0	2	4
2013	13	1	2	0	0	0	7	5	0	0	0	4	32
2014	0	0	0	0	0	0	0	2	1	0	0	0*	3
2015	0	0	0	0	0	0	0	3	4	0	0	3	10
2016	4	5	0	0	0	0	0	0	1	0	0	4	14
Total	43	19	13	2	0	0	7	10	6	0	3	19	122

Data represents maximum daily value of Partisol or FDMS TEOM monitor

* Data capture issues

Figure 2. Mammoth Lakes PM10 Quarterly Peaks & Averages (1990-2016)

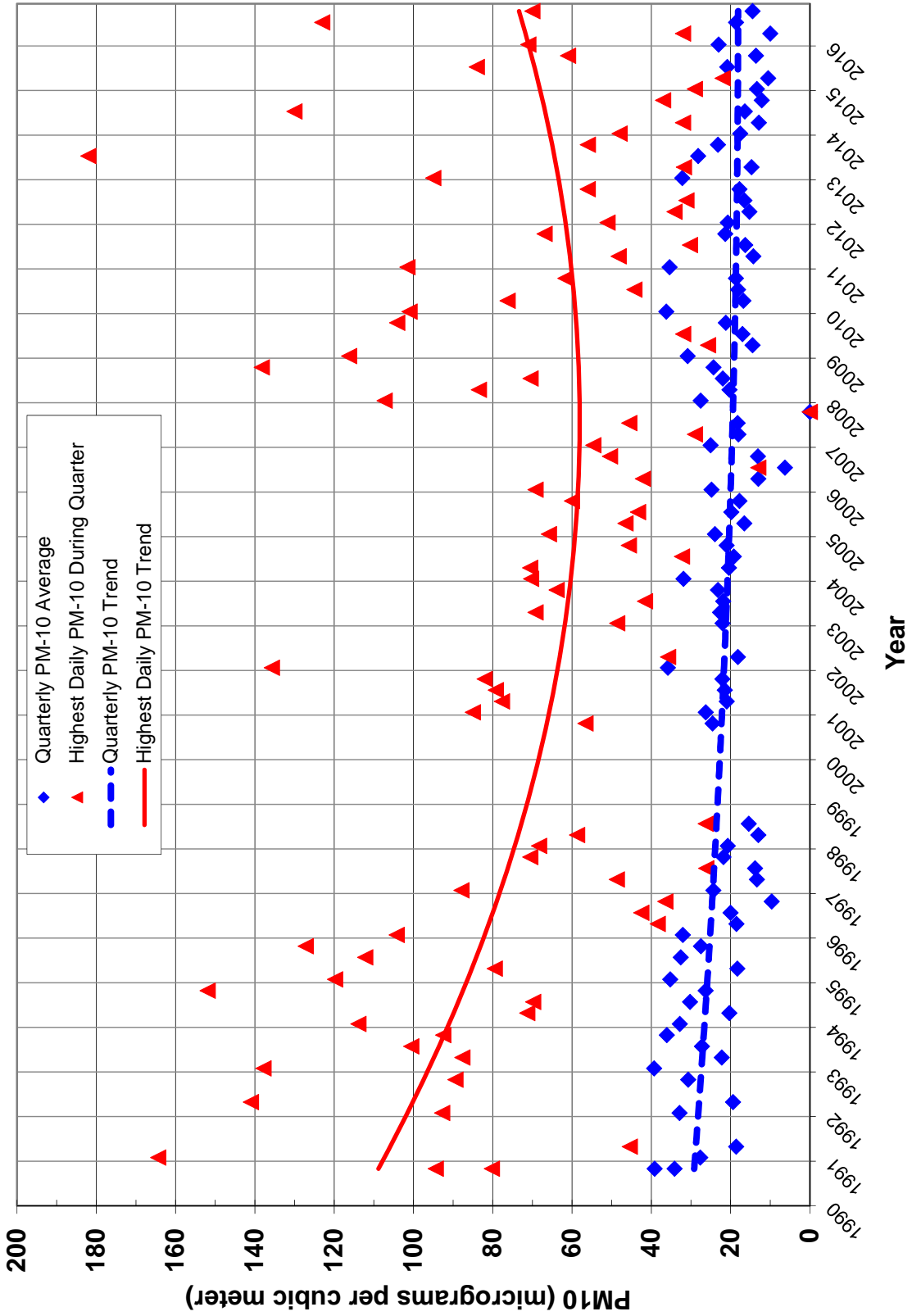


Figure 3. Mammoth Lakes PM10 Winter Season Peaks & Averages (1990-2016)

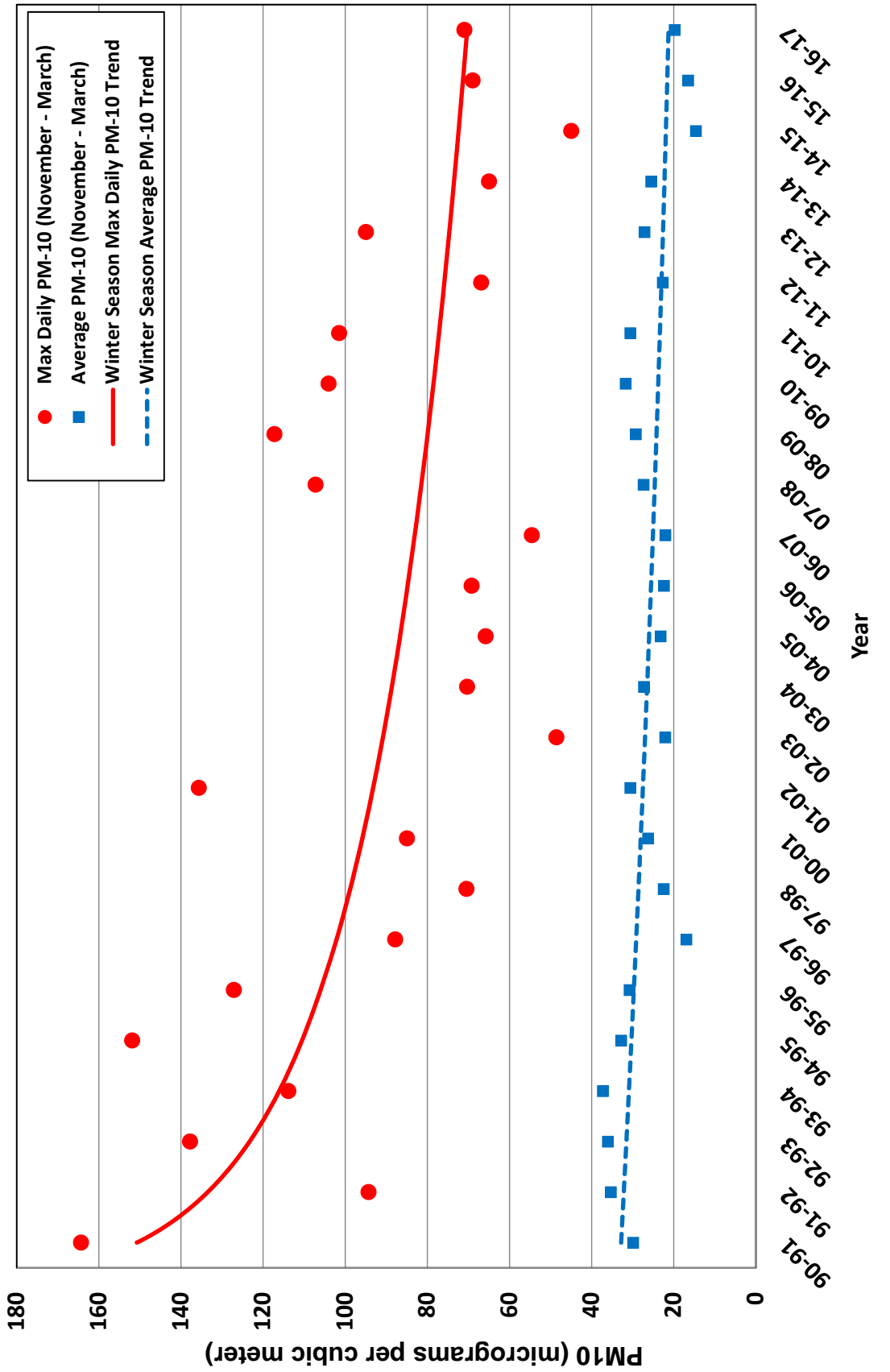


Figure 4. Mammoth Lakes Daily Average PM10 (2014-2016)

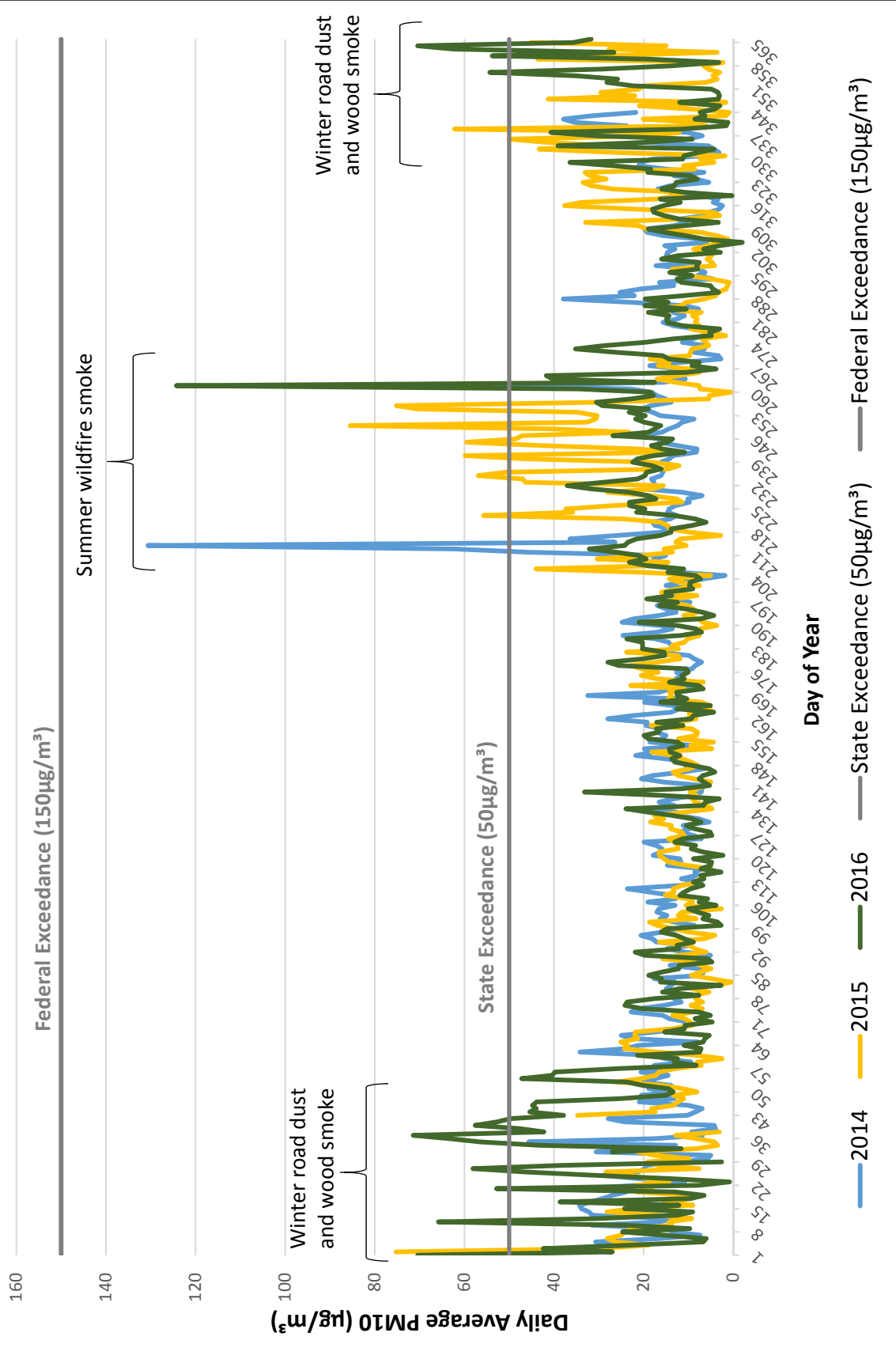
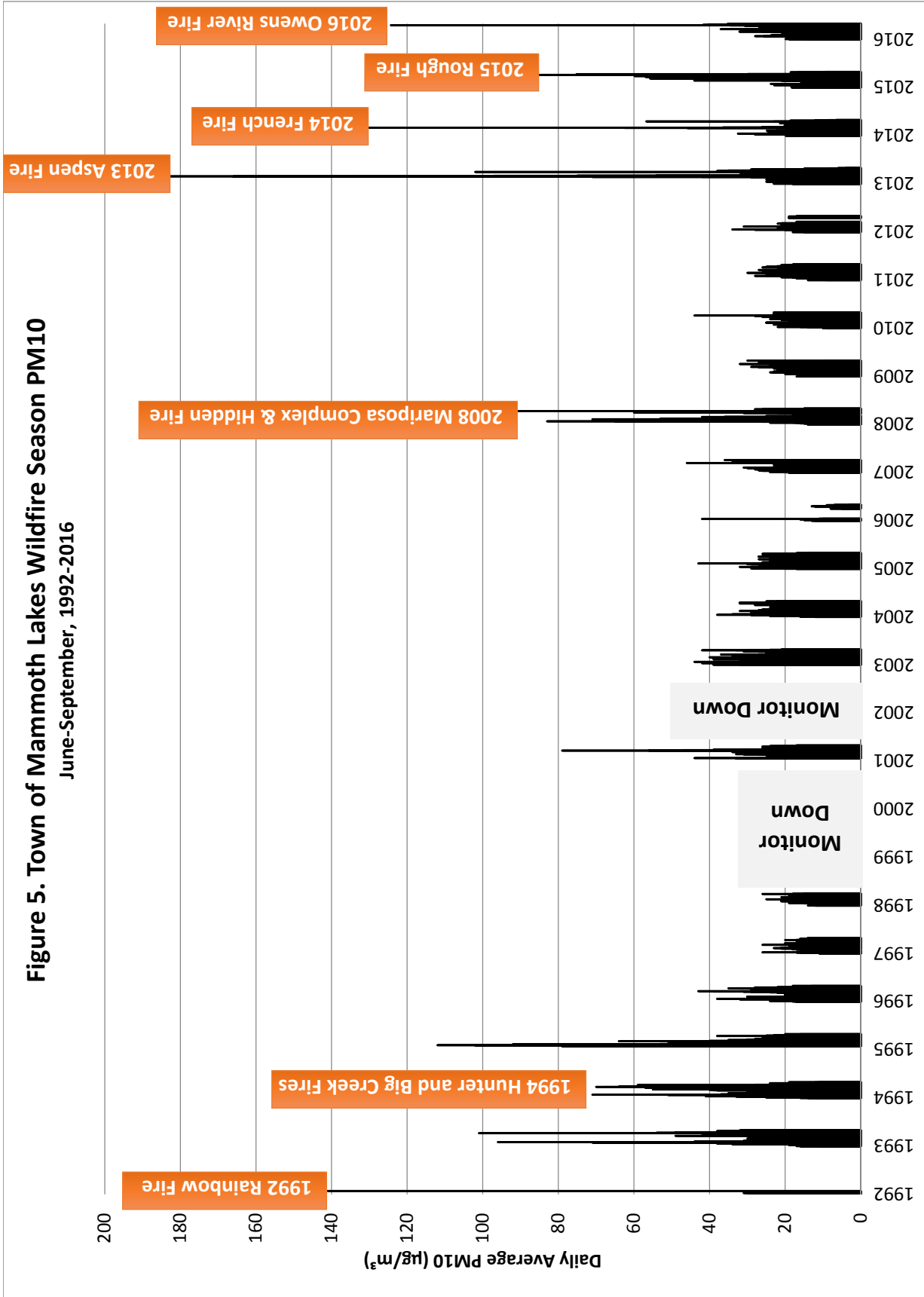


Figure 5. Town of Mammoth Lakes Wildfire Season PM10
June-September, 1992-2016



Emissions Inventory

The section describes the Mammoth Lakes Planning Area PM10 emissions estimates for residential wood combustion, resuspended road dust, cinders, mobile source tailpipe emissions and point sources. These emissions were estimated for the peak winter period when roadway travel from visitors and residential wood combustion is the greatest. Other PM10 emission sources such as construction and windblown fugitive dust are minimal in the peak winter period due to weather conditions and snow cover. The methodology and data used to determine emissions is discussed for each source type and details are included in Appendix A.

The current total PM10 peak emissions on a winter day in the Town of Mammoth lakes are 3,448 kg/day in the Town and 4,096 kg/day in the planning area boundary. Updated estimates of total emissions for the Mammoth Lakes Planning Area are shown in Table 3. Peak 24-hour PM10 emissions estimates for the entire planning area have decreased slightly, approximately 5%, since the last emissions estimate conducted in 2012 for the 2014 AQMP. This decrease is mostly attributed to a decrease in out-of-town vehicle miles traveled (VMT) due to a correction that reduced the roadway length estimate. The in-town emissions inventory increased slightly, by 2%, since 2012. The increase is attributable to an increase in resuspended road dust and cinders associated with increased vehicle miles traveled in the Town and an increase in tail-pipe, tire wear, and brake wear emissions is due to an increase in emission factors and increased in-town vehicle-miles-traveled (VMT) (see Appendix A). The decrease in residential wood combustion emissions is reflective of device change-outs to more efficient devices and cleaner fuel sources.

Emission Source	2017 Inventory (kg/day)		2012 Inventory (kg/day)		% Difference	
	In-Town	Planning Area Total	In-Town	Planning Area Total	In-Town	Planning Area Total
Residential Wood Combustion	761	761	850	850	-11.7%	-11.7%
Road Dust and Cinders	2,673	3,316	2,522	3,455	5.6%	-4.2%
Tailpipe, Tire & Brake Wear	10	12	9	11	10.0%	8.3%
Industrial Sources	4	8	4	8	0.0%	0.0%
Total	3,448	4,096	3,385	4,324	1.8%	-5.6%

Woodburning and resuspended road dust comprise almost all the PM10 emissions during the winter. Motor vehicle exhaust, tire wear and industrial sources do not contribute significantly to the total estimated emissions.

Table 4 shows the trend of estimated in-town emissions from 1990 through 2017, as well as the projected 2030 emissions. The 2014 AQMP estimated peak emissions of 3,385 kg/day of PM10 in 2012, a 20% reduction in emissions since 1990 despite a population increase from 4,785 in 1990 to 8,234 in 2010. The slight increase from 2012 to 2017 in estimated peak emissions remains below the projected peak emissions for 2030.

Emission Source	1990 (kg/day)	2012 (kg/day)	2017 (kg/day)	2030 (kg/day)¹
Residential Wood Combustion	1,839	850	761	802
Road dust/cinders	2,390	2,522	2,673	3,143
Tailpipe, tire & brake wear	23	9	10	11
Industrial (in-Town)	1	4	4	4
Total	4,253	3,385	3,448	3960

¹ The projected emission inventory for 2030 are based on a modeling analysis performed for the 2014 AQMP that included currently implemented control measure for residential wood combustion and changes to peak daily traffic volume.

Conclusion

Air quality trends and emissions analyses continue to demonstrate that the adopted control measures for the Town of Mammoth Lakes are sufficient to maintain compliance with the PM10 Federal Standard as the 2014 AQMP outlined. Additional time is needed to evaluate progress toward increased compliance with the California state PM10 standard.

The District will continue to maintain monitoring network integrity and, with the Town, will continue to monitor PM10 in order to: 1) verify the attainment status of the area as required by the US EPA and, 2) to implement the no-burn day program, which relies on PM10 monitoring. Per the procedures in the 2014 AQMP, if a monitored violation of the PM10 Federal Standard occurs in the Town of Mammoth Lakes or the surrounding nonattainment area, the Town and the District will investigate the cause of the violation. If the event is not an exceptional event, within 18 months of the violation, the Town and District will adopt additional control measures needed to meet the federal PM10 standard.

APPENDIX A

2017 Emissions Inventory Update

The section describes the details and methodology for the updated 2017 Mammoth Lakes Planning Area PM10 emissions estimates for residential wood combustion, resuspended road dust, cinders, mobile source tailpipe emissions and point sources. Total Peak 24-hour emissions are presented in Table A6.

Residential Wood Combustion

Residential wood combustion emissions are released from wood-burning fireplaces, woodstoves, and pellet stoves when they are operating. These combustion products, or emissions, are released in the form of aerosols and particulate matter into the atmosphere. Total emissions are dependent on the combustion device types, the combustion device counts, and the amount of fuel used.

The baseline numbers of fireplaces, woodstoves, and pellet stoves from the 2014 AQMP were updated using data provided by the Town of Mammoth Lakes from building permit records for July 2013 through June 2017. Devices were categorized by both type and residence type (single- or multi-family home). Fuel usage data is based on a survey conducted during the winter of 2012-2013 for the 2014 AQMP. Emissions from residential wood combustion were calculated using emission factors from the State of California Air Resources Board Process Methodology for Residential Wood Combustion (CARB, 2015). Device counts, fuel usage rates and emissions estimates are presented in Table A1.

The following assumptions were used when categorizing the devices:

- All newly permitted devices were assumed to be US EPA Phase II Certified;
- The “Woodstoves (EPA)” category includes all US EPA Phase II certified wood-burning devices;
- The “Woodstoves (uncertified)” category includes all non-certified wood-burning inserts and stoves;
- The “Fireplaces” category includes all non-certified wood-burning fireplaces;
- The “Pellet Stoves” category includes all pellet stoves and pellet stove inserts;
- Gas-burning devices were excluded from the inventory; and
- All building permits involving wood-burning devices with “unit” as part of the location address were assumed to be multi-family residences. Multi-family residences were then apportioned to condominiums and mobile homes/apartments based on the 2014 AQMP distribution.

Roadway Emissions

Roadway PM10 emissions include resuspended road dust, tailpipe emissions, tire wear, and brake wear emissions from vehicles traveling in the Mammoth Lakes Planning Area (MLPA). Emission factors were calculated in terms of grams per mile (g/mile) for each emission category and then multiplied by peak winter average daily vehicle miles traveled (VMT) to determine daily emissions. VMT was estimated for travel on roads within the Town of Mammoth Lakes

(in-town) and travel on highway California State Route (SR) 203 and U.S. Route 395 (out-of-town). In-town VMT for existing conditions was obtained from the Mammoth Mobility Element Transportation Impact Analysis. Out-of-Town VMT was estimated using average daily traffic from Caltrans for winter months in 2016 and the roadway segment lengths for SR 203 and US 395. Roadway emissions are presented in Table A2.

Resuspended Road Dust

The PM10 emission estimate for resuspended road dust is based on CARB Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust (CARB, 2016). This methodology is based on United States Environmental Protection Agency (USEPA) AP-42, Chapter 13.2.1. The emission factor is calculated as:

$$\text{Emission Factor} \left(\frac{g}{VMT} \text{ or } \frac{lb}{VMT} \right) = k(sL)^{0.91} \times (W)^{1.02}$$

Where,

k: particle size multiplier (g/VMT or lb/VMT) (defined in AP-42 as 1 g/VMT for PM10)

sL: roadway-specific silt loading (g/m²)

W: average weight of vehicles traveling on the road (California statewide default = 2.4 tons)

The silt loading factor was assumed to equal 8.7 g/m², as provided in the 1990 and 2014 AQMP. With these inputs, the emission factor was calculated as 17.49 g/VMT. The emission factor calculation and resulting emissions from in-town and out-of-town resuspended road dust are presented in Table A3.

Tailpipe, Tire Wear, and Brake Wear

PM10 emissions from mobile source tailpipe, tire wear, and brake wear were estimated using CARB's latest emission factor model, EMFAC2014 (CARB, 2014). Tailpipe emission factors are dependent on vehicle speed. Consistent with the 2014 AQMP, it was assumed that vehicles travel in-town at a speed range of 5 to 45 miles per hour (mph) and out-of-town at a higher speed range of 5 to 65 mph. PM10 emission factors for these speed ranges were estimated by dividing the total daily PM10 emissions by total daily VMT for Mono County in the Winter period as output by EMFAC2014. Emission factors in g/VMT were then combined with the in-town VMT and out-of-town VMT to develop emission estimates. Emission factors and resulting emissions are presented in Table A4.

Tire wear and brake wear emission factors are not speed dependent. Emission factors for tire wear and brake wear were estimated as the VMT-weighted average of all vehicle types in Mono County. Emission factors in g/VMT were then combined with the in-town VMT and out-of-town VMT to develop emission estimates. Emission factors and resulting emissions are presented in Table A4.

Point Sources

The District issues permits to operate for stationary or point sources within the Mammoth Lakes Planning Area. Based on permitted sources, these emission sources include concrete batch plants, boilers, and diesel engines located at four in-town locations and six out-of-town locations. Emissions for point sources are shown in Table A5.

Table A 1. Residential Wood Combustion Emissions, Town of Mammoth Lakes 2017 Inventory												
Device Type	Emission Factor ¹ (g PM10/kg fuel)	Condominium			Single-Family			Mobile Homes and Apartments			Total Daily Emissions (lb/day)	Total Daily Emissions (kg/day)
		Fuel Burned ² (kg/device/day)	Number of Devices ³	PM10 Emissions (lb/day)	Fuel Burned ² (kg/device/day)	Number of Devices ³	PM10 Emissions (lb/day)	Fuel Burned ² (kg/device/day)	Number of Devices ³	PM10 Emissions (lb/day)		
Fireplace	11.8	19	200	99	27	0	0	19	0	0	99	45
Woodstove (non-certified)	15.3	19	52	33	27	73	66	19	4	3	102	46
Woodstove (EPA certified) ⁴	7.3	19	3,254	995	19	1,305	399	19	191	58	1,452	659
Pellet	1.5	9	524	16	11	184	7	14	28	1	24	11
Total										1,677	761	

Notes:

- ¹ Emission factors obtained from CARB Miscellaneous Process Methodology 7.1 for Residential Wood Combustion. Available at: https://www.arb.ca.gov/ei/areasrc/fullpdf/full7-1_2011.pdf.
- ² Fuel burned was obtained from Table 5-3 and Table 5-4 of the Town of Mammoth Lakes 2014 AQMP. Cord density is assumed to be 800 kg/cord, consistent with the 2014 AQMP.
- ³ Number of devices were estimated by modifying device counts in Table 5-1 of the Town of Mammoth Lakes 2014 AQMP with device change out and installation permits from the Town of Mammoth Lakes Building Permits Department for July 1, 2013 through June 30, 2017.
- ⁴ EPA certified indicates that the wood-burning device meets EPA Phase II emission regulations.

Table A2. Out-of-Town Vehicle Miles (VMT) Traveled, Town of Mammoth Lakes 2017 Inventory

Highway Route	Direction	Segment Length ¹ (miles)	Average Daily Traffic ² (# vehicles/day)				Average Winter Daily VMT (miles/day)
			Jan-16	Feb-16	Mar-16	2016 Winter Average	
203	Eastbound	1.55	3,953	4,224	4,286	4,155	6,440
203	Westbound	1.55	3,885	4,269	4,492	4,216	6,535
Subtotal						8,371	12,975
395	Northbound	7.16	1,441	--	1,891	1,666	11,929
395	Southbound	7.24	1,634	--	--	1,634	11,830
Subtotal						3,300	23,759
Total						Total	36,734

Notes:

- 1 Road segment length measured based on Google Earth Aerial Imagery.
- 2 Data obtained from Caltrans Daily Detail Counts for All Vehicles. Station 921 used for Hwy 203. Station 907 used for Hwy 395.

Table A3. Resuspended Road Dust and Cinders Emissions, Town of Mammoth Lakes 2017 Inventory

Road Type	Particle Size Multiplier ¹ , k (g/VMT)	Silt Loading ² , sL (g/m ²)	Average Vehicle Weight ¹ , W (tons)	PM10 Emission Factor ¹ (g/mile)	Mammoth Lakes Planning Area VMT ^{3,4} (miles/day)	PM10 Emissions (lb/day)	PM10 Emissions (kg/day)
In-Town	1	8.7	2.4	17.49	152,844	5,893	2,673
Out-of-Town	1	8.7	2.4	17.49	36,734	1,416	642
Total					Total	7,310	3,316

Notes:

- 1 PM10 road dust emission factor is estimated using methodology, particle size multiplier, and average vehicle weight from CARB Miscellaneous Process Methodology 7.9 (CARB, 2016)
- 2 Silt loading obtained from Town of Mammoth Lakes 1990 Air Quality Management Plan.
- 3 In-Town Vehicle Miles Traveled (VMT) for Existing Conditions obtained from Mammoth Mobility Element Transportation Impact Analysis by LSC Transportation Consultants, Inc.
- 4 Out-of-Town VMT on Route 203 and Route 395 estimated using CalTrans ADT and roadway length.

Road Type	Speed Range	PM ₁₀ Running Exhaust		Tire Wear Emission Factor ³ (g/mile)	Brake Wear Emission Factor ³ (g/mile)	Mammoth Lakes Planning Area VMT ^{4,5} (miles/day)	PM ₁₀ Emissions (lb/day)			PM ₁₀ Emissions (kg/day)			
		EMFAC2014 VMT ¹ (miles/day)	EMFAC2014 Emissions ¹ (tons/day)				Emission Factor ² (g/mile)	Running Exhaust	Tire Wear	Brake Wear	Total	Running Exhaust	Tire Wear
In-Town	5-45 mph	435,928	0.005	0.011	0.043	152,844	3.63	3.25	14.50	21.38	1.65	6.58	9.70
Out-of-Town	5-65 mph	949,061	0.008	0.008	0.043	36,734	0.62	0.78	3.48	4.88	0.28	1.58	2.22
Total						4.25	4.03	17.98	26.27	1.93	1.83	8.16	11.91

Notes:

- EMFAC2014 VMT and emissions represent total VMT and emissions for all of Mono County.
- Running exhaust emission factor is estimated as total emissions in Mono County divided by total VMT in Mono County.
- Tire wear and brake wear emission factors are estimated as the VMT-weighted average of emission rates for all vehicles in Mono County.
- In-Town VMT for Existing Conditions obtained from Mammoth Mobility Element Transportation Impact Analysis by LSC Transportation Consultants, Inc.
- Out-of-Town VMT on Route 203 and Route 395 estimated using CalTrans ADT and roadway length.

Facility Name	Location	Number of Source Type ¹			PM Emissions ¹		
		Concrete Batch Plant ²	Boiler	Diesel Engine	Peak Day (lb/day)	Peak Day (kg/day)	Peak Day (kg/day)
7/11 Materials	Out-of-Town	1	--	--	-- ²	-- ²	-- ²
California Department of Fish and Game - Hot Creek	Out-of-Town	--	--	1	0.09	0.04	0.04
Mammoth Hospital	Out-of-Town	--	7	2	7.54	3.42	3.42
Mammoth Mountain Ski Area	In-Town	--	4	28	9.15	4.15	4.15
Mammoth Pacific	Out-of-Town	--	--	2	0.12	0.06	0.06
Marzano & Sons	Out-of-Town	1	--	--	-- ²	-- ²	-- ²
Monache Condominium Owner's Association	In-Town	--	--	1	0.12	0.05	0.05
Verizon (Mammoth High School)	In-Town	--	--	1	0.08	0.04	0.04
Verizon California - Mammoth Lakes	In-Town	--	--	1	0.06	0.03	0.03
In-Town Total				9.4	4.3	4.3	7.8
Mammoth Lakes Planning Area Total				17.2	7.8	7.8	7.8

Notes:

- Data obtained from Great Basin Unified Air Pollution Control District emission inventory for permitted facilities in Mammoth Lakes Planning Area.
- Daily emissions from the concrete batch plants are excluded, as these emissions occur outside of the peak period.

Table A6. Peak 24-hour PM10 Emissions Summary, Town of Mammoth Lakes 2017 Inventory									
Emission Source	2017 Inventory (lb/day)		2014 AQMP Inventory (lb/day)		2017 Inventory (kg/day)		2014 AQMP Inventory (kg/day)		
	In-Town	Planning Area Total	In-Town	Planning Area Total	In-Town	Planning Area Total	In-Town	Planning Area Total	
Residential Wood Combustion	1,677	1,677	1,874	1,874	761	761	850	850	
Road Dust and Clinders	5,893	7,310	5,560	7,617	2,673	3,316	2,522	3,455	
Tailpipe, Tire & Brake Wear	21	26	20	24	10	12	9	11	
Industrial Sources	9	17	9	18	4	8	4	8	
Total	7,601	9,030	7,463	9,533	3,448	4,096	3,385	4,324	

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