PM_{10} EMISSION ESTIMATES FOR THE MEDFORD-ASHLAND AQMA

4.14.3.0: Overview

The analysis of ambient PM_{10} levels begins with an assessment of PM_{10} emissions occurring in the AQMA. Emissions are estimated for a wide variety of sources, and are summarized in four major categories.

- Major Point Sources: Are those industrial facilities with PM_{10} emissions greater than or equal to 5 tons per year.

- Area Sources: Include activities such as residential wood-heating, open burning, commercial space heating, etc.

- Non-Road Mobile Sources: Include sources such as small engines and construction equipment. As with Area Sources, the Non-Road Mobile category reflects many small individual sources that can collectively produce a significant amount of emissions in the airshed.

- On-Road Mobile Sources: Include cars and trucks, and reflects both exhaust (tailpipe) and road dust emissions.

PM_{10} emissions are estimated using many sources of information, including industrial permits, population, housing, and employment information, and estimates of motor vehicle travel in the AQMA. The PM_{10} attainment and maintenance analysis use emission estimates in three different ways. First, a "base-year" emissions inventory (EI) is created to estimate actual PM_{10} emissions occurring in the airshed. For the AQMA, the PM_{10} base-year EI is for 1998. The base-year EI serves as the foundation for the future emissions forecast, and was used in validating the performance of the air quality dispersion model. More information on the air quality dispersion modeling process can be found in Section 4.14.5.0

The *Attainment Analysis* uses a variation of the 1998 base-year EI to portray a worst-case emissions scenario for the airshed. The attainment analysis uses 1998 emissions for all source categories except major industry. For major industry, actual 1998 emissions are replaced with each facility's maximum allowable (permitted) emission level. This worst-case planning approach is required by EPA, and is designed to reflect the maximum potential for industrial PM_{10} impacts in the AQMA.

The *Maintenance Analysis* uses an emissions forecast to the year 2015, and also reflects major industry emissions at maximum allowable levels. Section 4.14.3.1 summarizes the 1998 Base-Year EI for the AQMA. The attainment analysis EI is discussed in Section 4.14.3.2. Growth factors used in the emissions forecast are summarized in section 4.14.3.3, and the maintenance analysis EI is summarized in section 4.14.3.4. The complete emissions inventory and forecast for the AQMA is included as Appendix A2.

4.14.3.1: Base Year Emissions Inventory: 1998 Actual Emissions

The 1998 Base Year Emissions Inventory estimates actual PM_{10} emissions that occurred within the AQMA from all source sectors, and serves as the basis for both the 1998 Attainment Analysis and the 2015 Maintenance Analysis.

Estimates are developed for both Annual and Daily PM_{10} emissions; annual in (tons of PM_{10} per year) and daily in (pounds of PM_{10} per day). Daily emissions are adjusted to reflect a worst-case season during the year. Typically, the worst-case season occurs in the winter (November through February). Historically, this is the time period when the daily PM_{10} standard is most likely to be exceeded.

Emissions from each source category were evaluated and adjusted accordingly to develop an appropriate inventory of winter season daily emissions. For example, emission estimates for Residential Wood Combustion were adjusted to reflect fluctuations in home heat demand during the winter. Not all emission source categories require adjustment. For example, production and emissions from major industry tend to be fairly constant throughout the year; therefore a seasonal adjustment from annual to a worst-case winter day is not needed. Some activities that occur during the summer months appear in the annual emission inventory but not in the worst-case (winter) daily emission inventory.

Another example of seasonal adjustment involves Mobile Sources. Daily emission estimates are based on annual average motor vehicle travel, adjusted for winter driving conditions and peak day commuter traffic volumes.

Summary: 1998 Emission Inventory (Actual Emissions)

Table 2 and Figures 22 through 25 show the emission inventory summary for the 1998 base-year. These reflect estimates of actual emissions in 1998, including reported actual emissions for major industry.

Table 2: 1998 Base-Year EI (Actual Emissions)

Medford-Ashland PM_{10} Emissions		
1998 Emissions	*Tons per Year*	*Pounds per Day*
Stationary Point Sources	535.4	3,274
Stationary Area Sources	685.0	13,504
Non-Road Mobile Sources	67.2	605
On-Road Mobile Sources	2,452.1	14,179
Total	3,739.8	31,561

Figure 22: Actual 1998 Annual Emissions (tons/year)

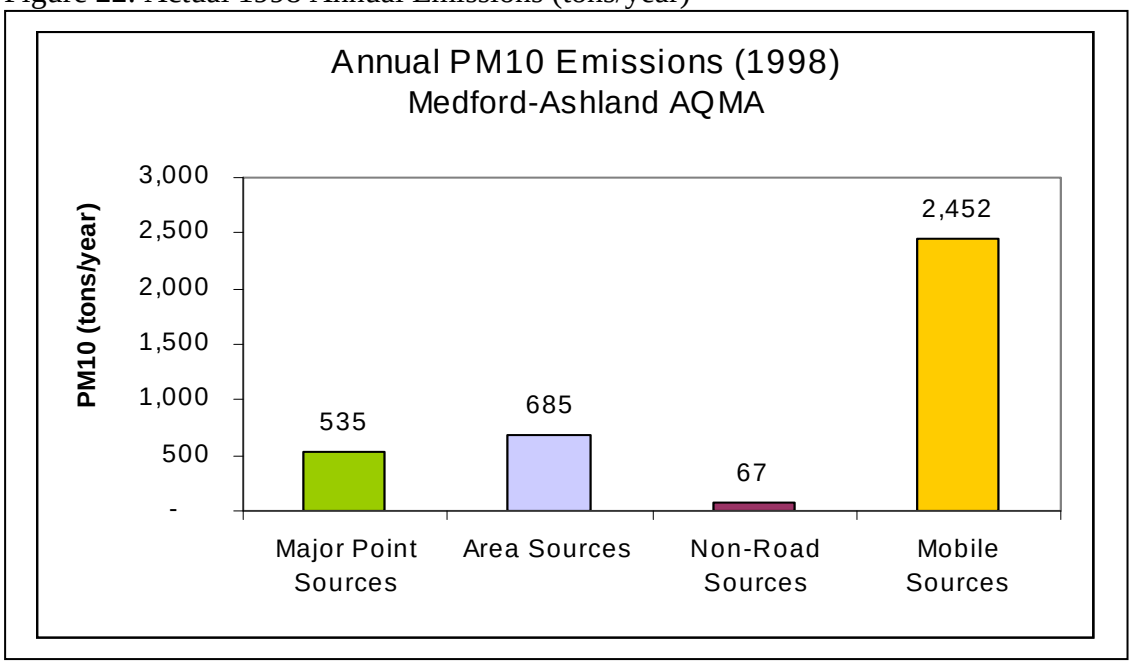


Figure 23: Percent Source Contributions (1998 Annual Emissions)

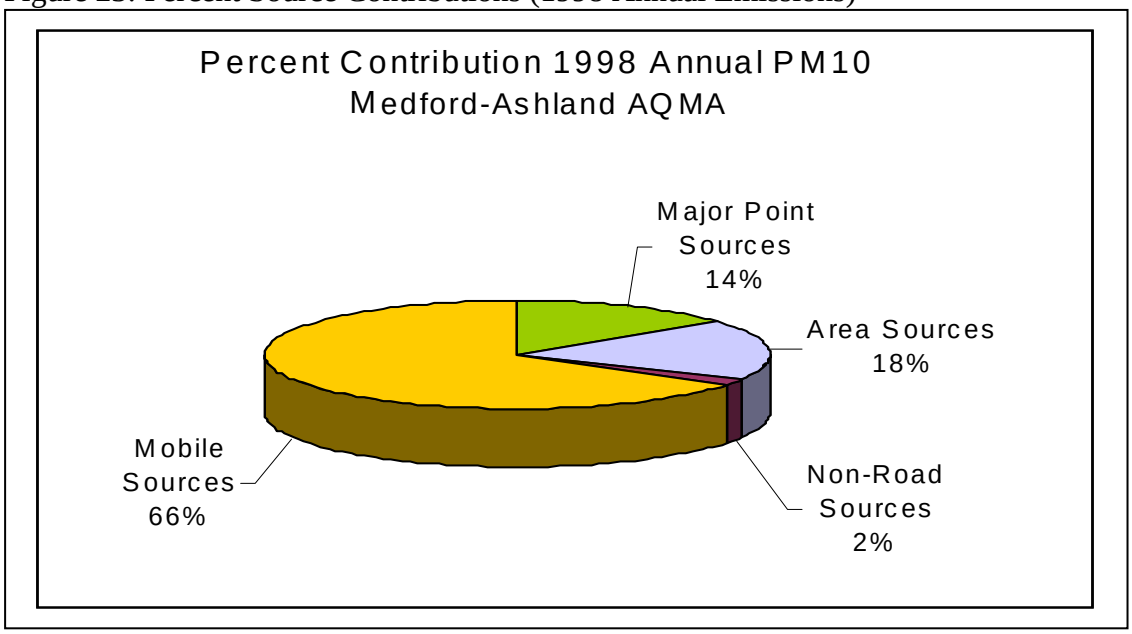


Figure 24: Actual 1998 Daily Emissions (lbs/day)

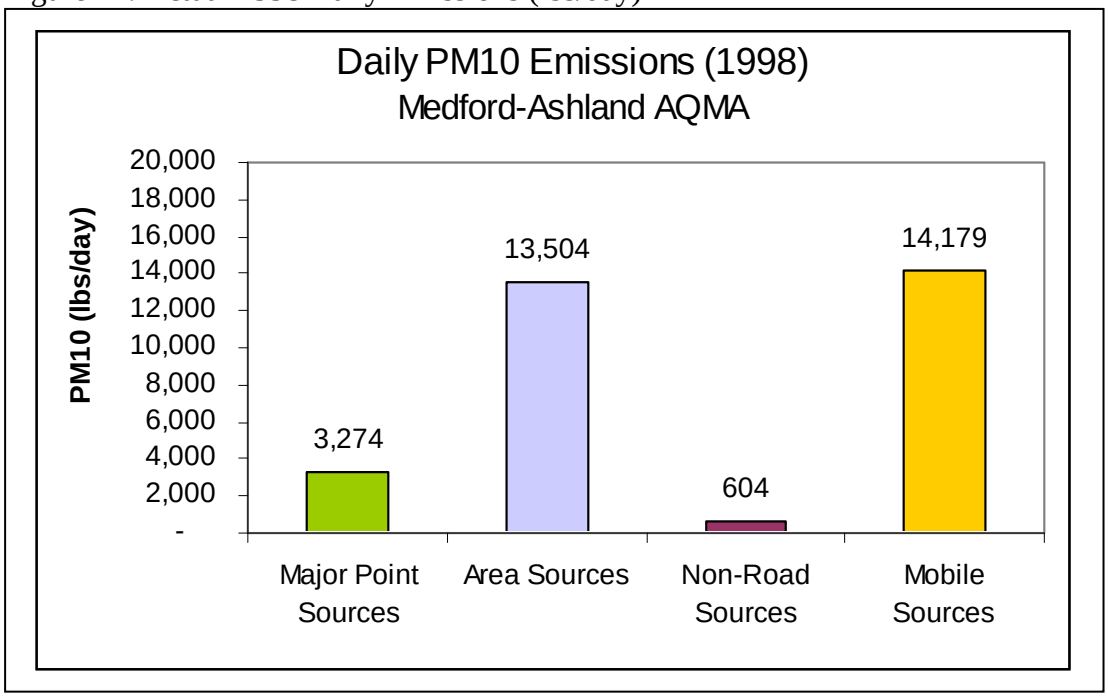
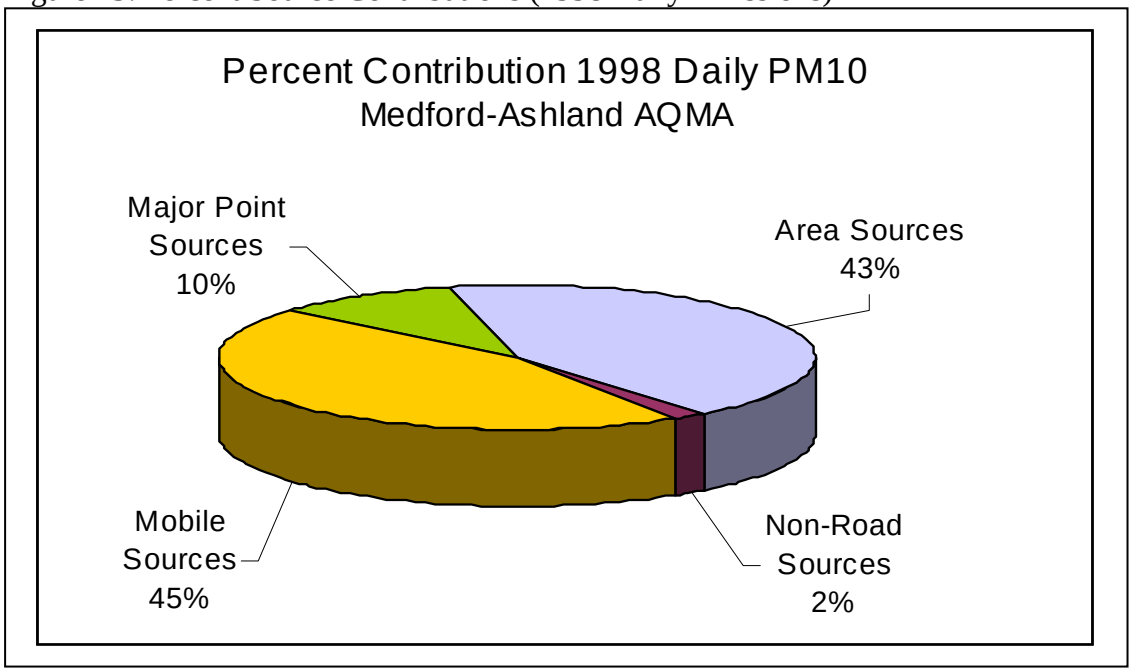


Figure 25: Percent Source Contributions (1998 Daily Emissions)



4.14.3.2: Attainment Analysis Emissions Inventory

The Attainment Analysis evaluates the current potential for impacts in the AQMA, under worst-case conditions. For this analysis, the Department used the 1998 inventory of actual emissions, substituting maximum permitted emission levels for major industry. These are the levels legally allowed in each facility's air quality permit. Figure 26 shows the difference between 1998 actual emission levels and allowable emission levels for major industry. Figures 27-30 summarize the attainment analysis EI.

Figure 26: Actual (1998) vs. Allowable Emission Levels for Major Industry.

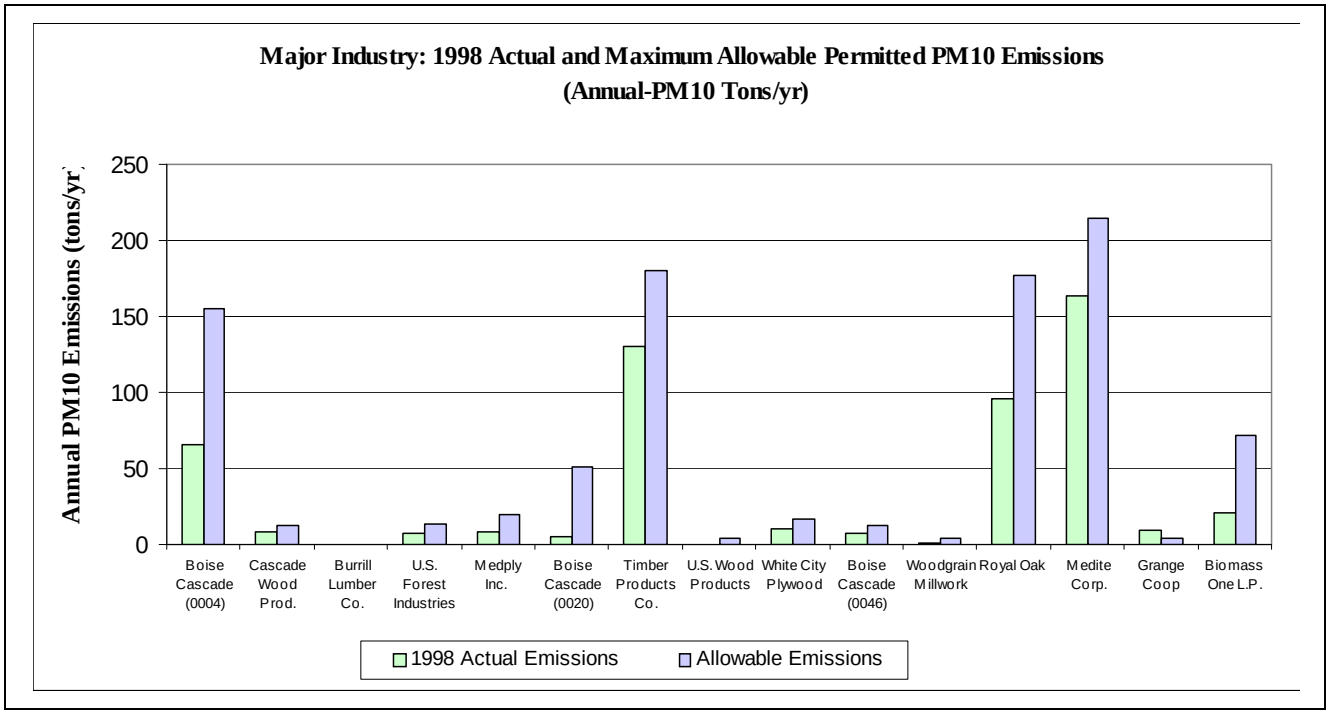


Figure 27: Attainment Analysis Emissions Estimate (Annual)

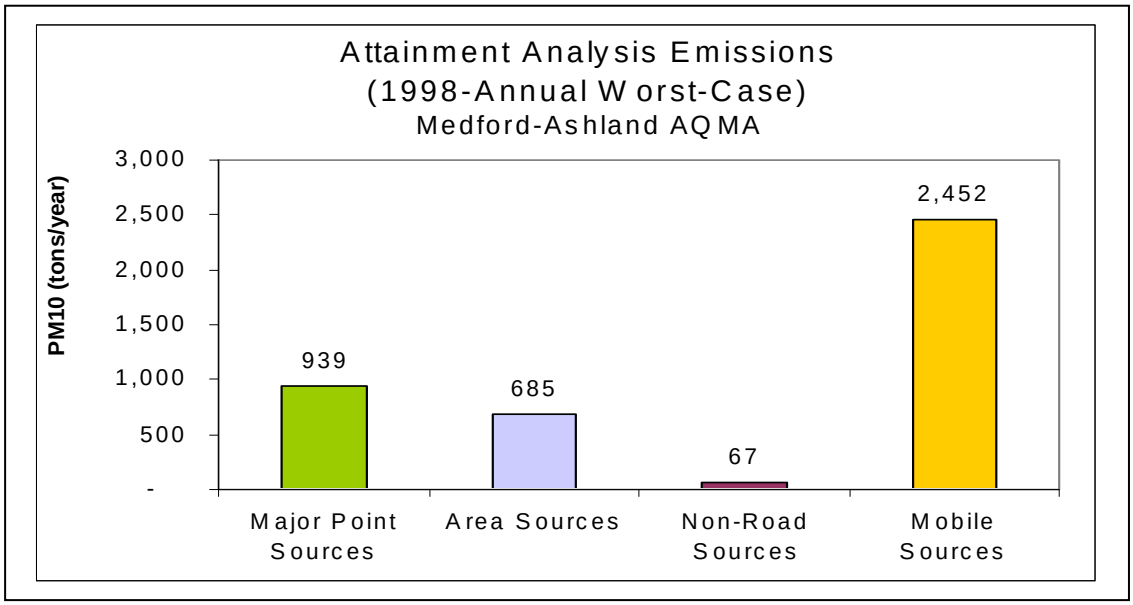


Figure 28: Percent Contribution by Source Category

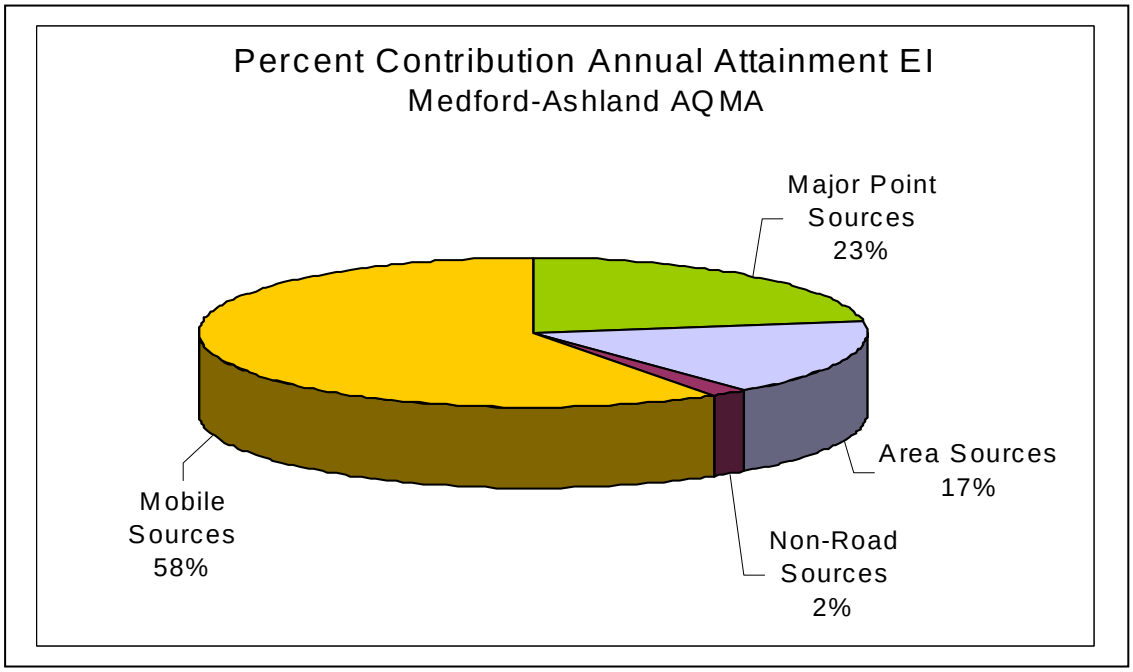


Figure 29: Attainment Analysis Emissions Estimate (Daily)

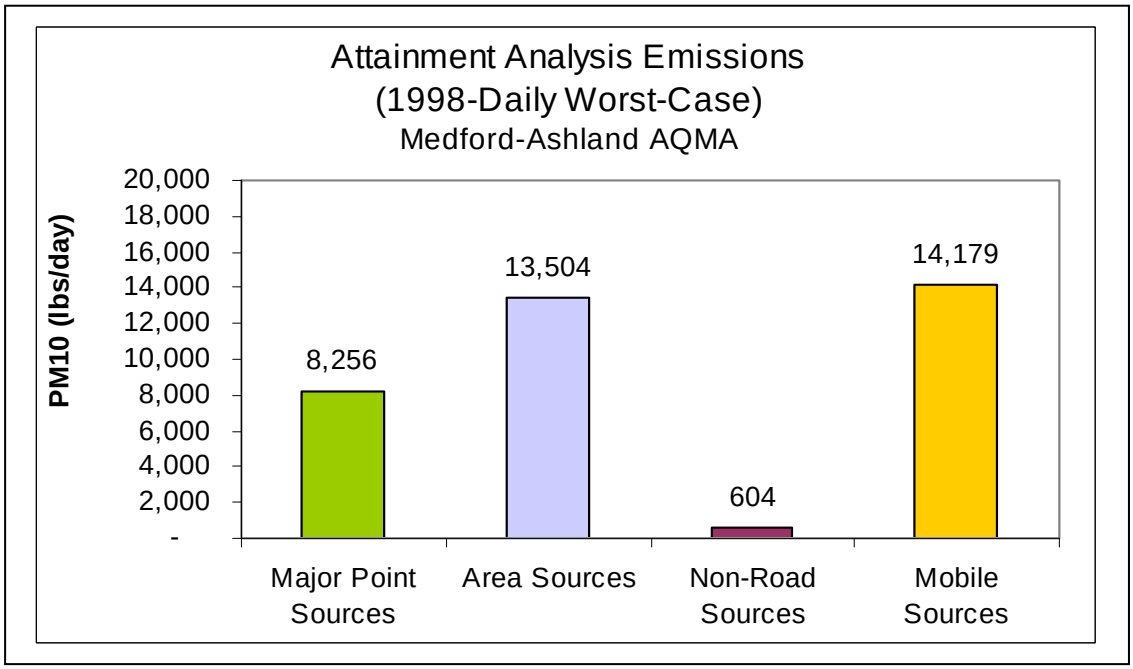
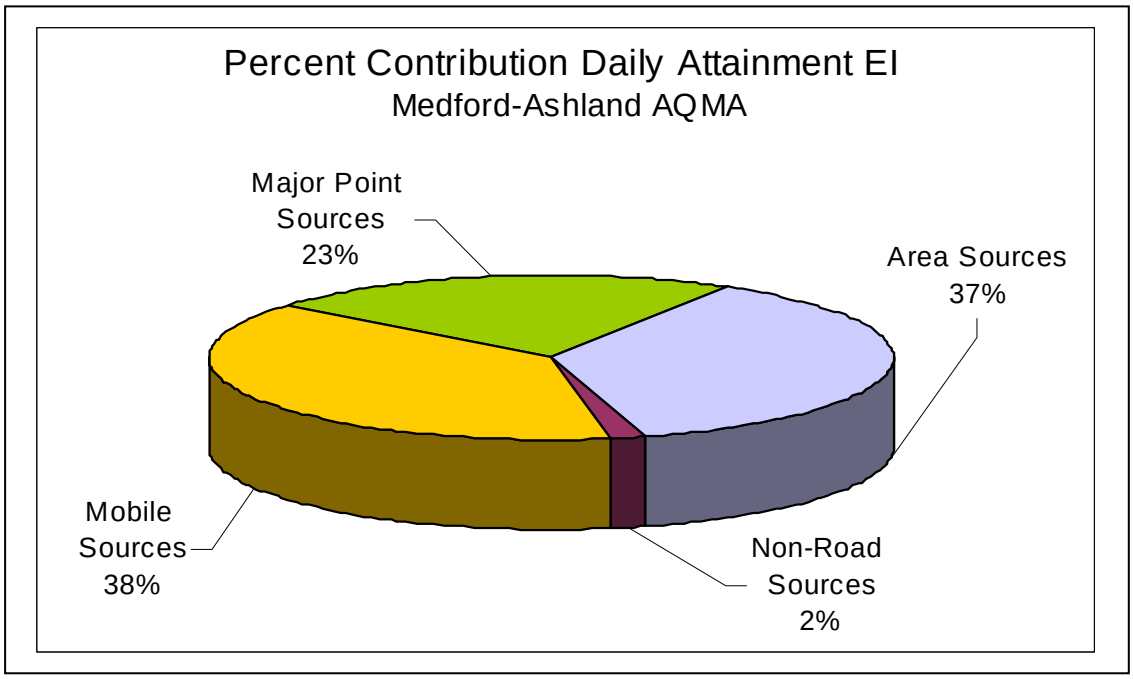


Figure 30: Percent Contribution by Source Category



4.14.3.3 Emissions Growth in the Medford-Ashland AQMA

Various growth factors were used to estimate future year PM_{10} emissions. Key indicators used in the emissions forecast include population growth, economic forecasts, increases in motor vehicle travel (vehicle-miles-traveled, or VMT) and permitted emissions for major industrial sources. By executive order from the Oregon governor, growth and economic forecasts used by state and local agencies for planning purposes must be consistent with projections from the Oregon Office of Economic Analysis (OEA). OEA met with city and county staff from Rogue Valley communities to arrive at agreed upon population and employment forecasts.

EPA requires that maintenance plans be updated every 8-10 years to account for the latest changes in growth patterns. When the Medford-Ashland PM_{10} Maintenance Plan is next updated, a new emissions projection will be done to reflect the latest population, employment, and motor vehicle travel forecast for the AQMA.

Population/Housing/Employment: Population, housing, and employment trends have been used to proportionally increase emissions from Area and Non-Road Mobile sources. Population, housing, and employment projections also influence the need for motor vehicle trips, and therefore influence the estimate of mobile emissions.

The Medford-Ashland AQMA includes both urban and rural areas, each growing at a different rate. Figure 31 illustrates the difference in average population growth rates between the urban and rural portions of the AQMA. The 20-year trend illustrated here (1976-1996) reflects an annual growth rate of approximately 2.6 percent per year for the incorporated areas of the AQMA, and a 0.5 percent per year rate in rural areas. The population of the AQMA in 1998 was estimated at 137,089 and projected to increase to approximately 173,564 by 2015. Housing units in the AQMA were estimated for 1998 at 53,837, and protected to increase to 64,101 by 2015. Table 3 shows average growth rates for key indicators in the AQMA. Figure 32 illustrates the average growth rate for AQMA population and housing.

The table and figures below reflect average growth rates for the AQMA. Each community in the AQMA has its own unique growth forecast. In developing the PM_{10} emission inventory and forecast, current and projected land use information (population and housing density, as well as VMT), was geographically allocated to each community and the rural portion of the AQMA by the Rogue Valley Council of Governments and Oregon Department of Transportation. These allocations were initially done as part of the local transportation planning process. The PM_{10} emissions inventory and forecast are consistent with this land use data.

Table 3: Key Growth Rates in the AQMA

Category	Annual Growth Rate (Linear, Non-Compounding)
Population	1.56% / year
Households	1.52%/ year
Total Employment	1.41% / year
Average AQMA Vehicle Miles Traveled	2.90% / year

Figure 31: Historic Growth Trend (Urban/Rural)

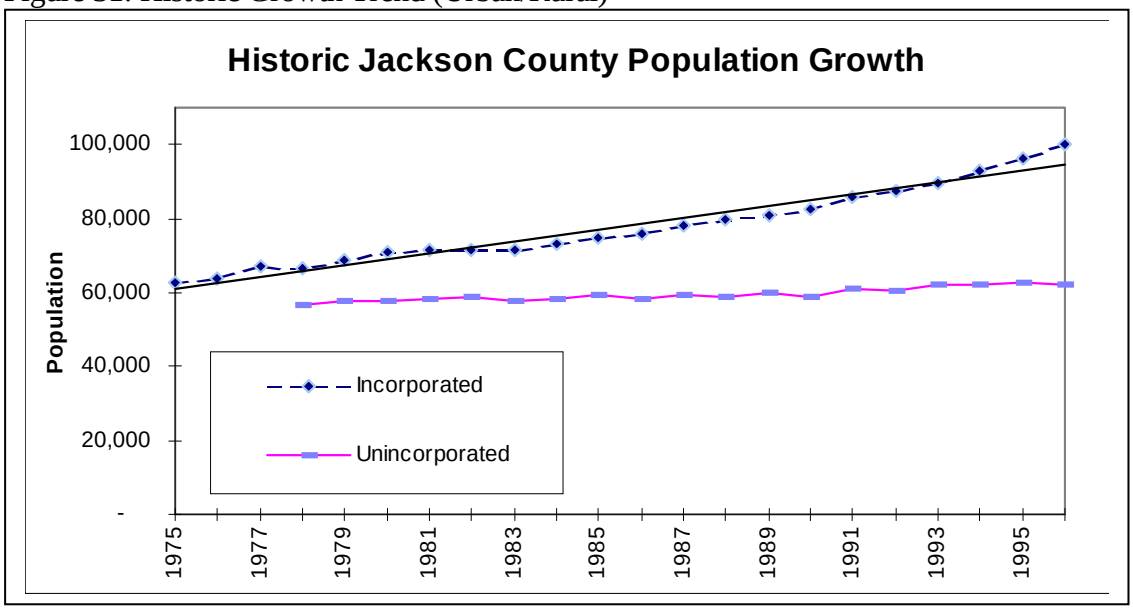
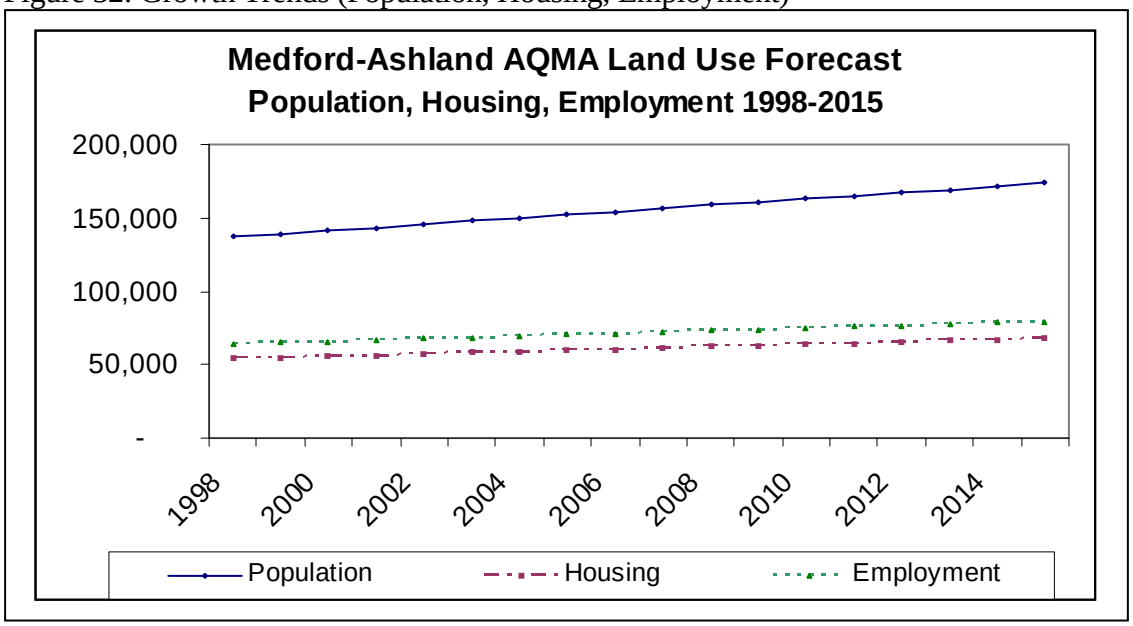


Figure 32: Growth Trends (Population, Housing, Employment)



4.14.3.4: Maintenance Analysis (2015 Emissions Forecast)

The Maintenance Analysis is based on the emissions forecast to 2015. The forecast reflects anticipated emissions growth resulting from changes in population, housing, employment, and motor vehicle travel. As in the Attainment Analysis, the Maintenance Analysis reflects major industry emissions at maximum allowable (permitted) levels.

Table 4 and Figures 33 through 36 show the maintenance emissions forecast.

Table 4: Summary of 2015 Emissions Forecast

2015 Emissions	*Tons per year*	*Pounds per Day*
Stationary Point Sources (allowable)	939	8,256
Stationary Area Sources	680	13,044
Non-Road Mobile Sources	85	765
Mobile Sources	3,754	20,999
Total	5,458	43,064

Figure 33: Maintenance Analysis Emissions Forecast (Annual)

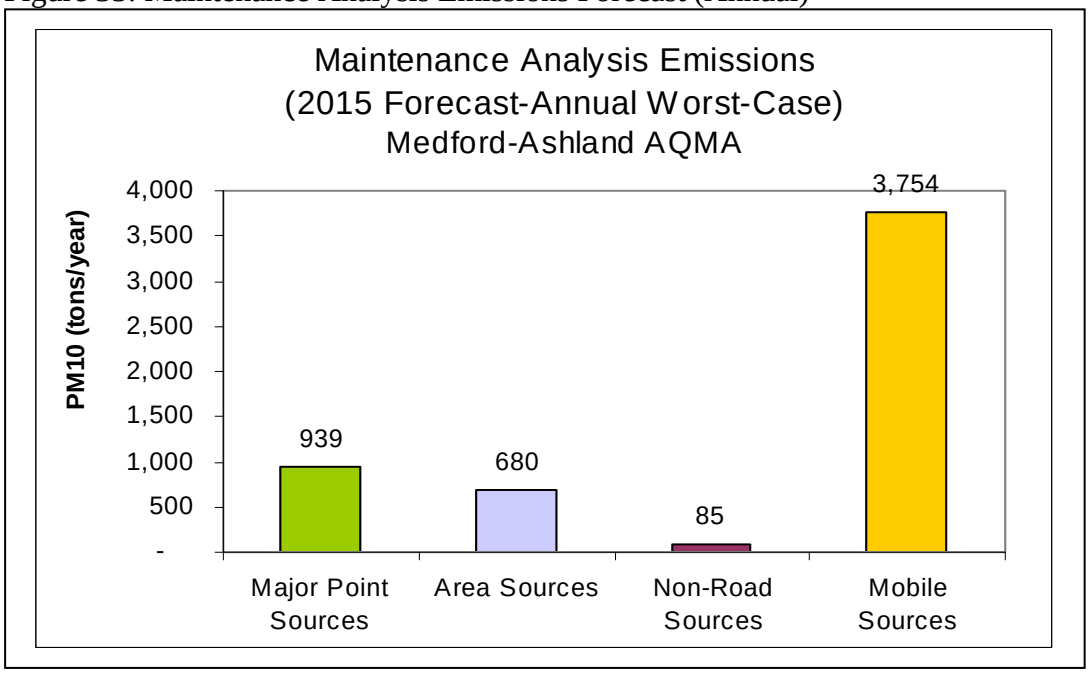


Figure 34: Percent Contribution by Source Category (Annual)

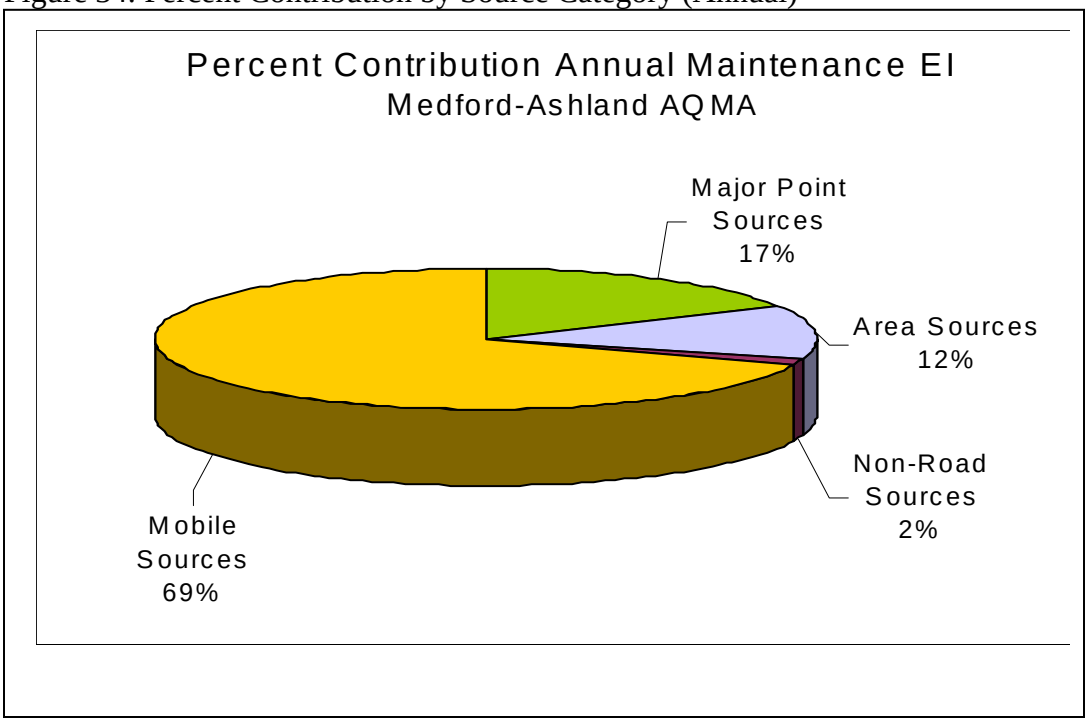


Figure 35: Maintenance Analysis Emissions Forecast (Daily)

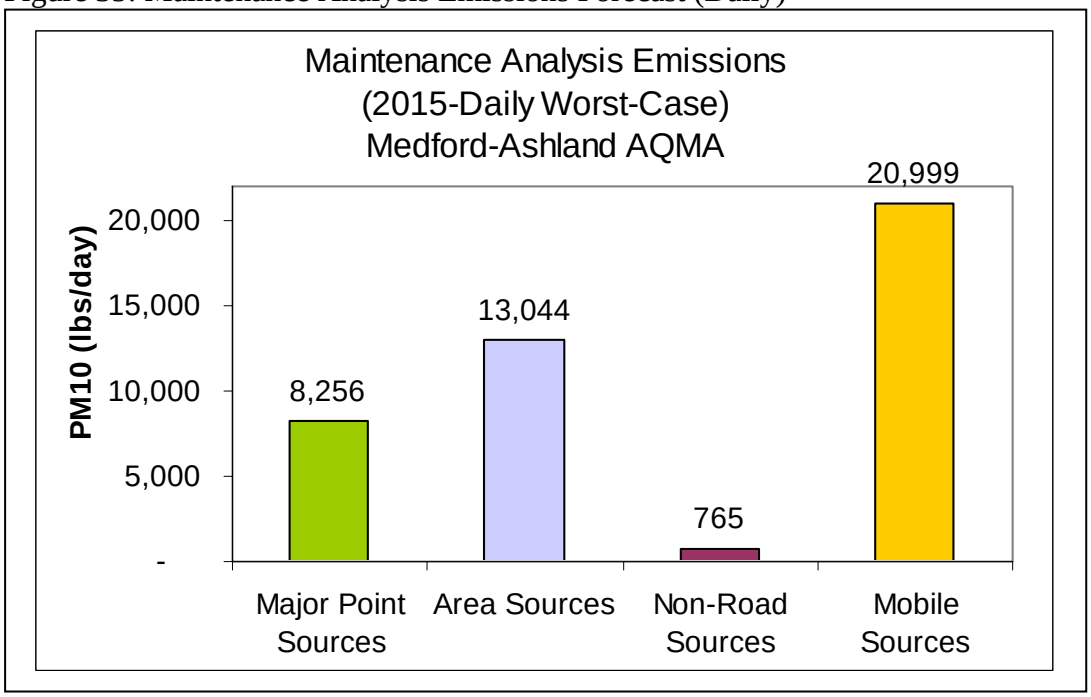
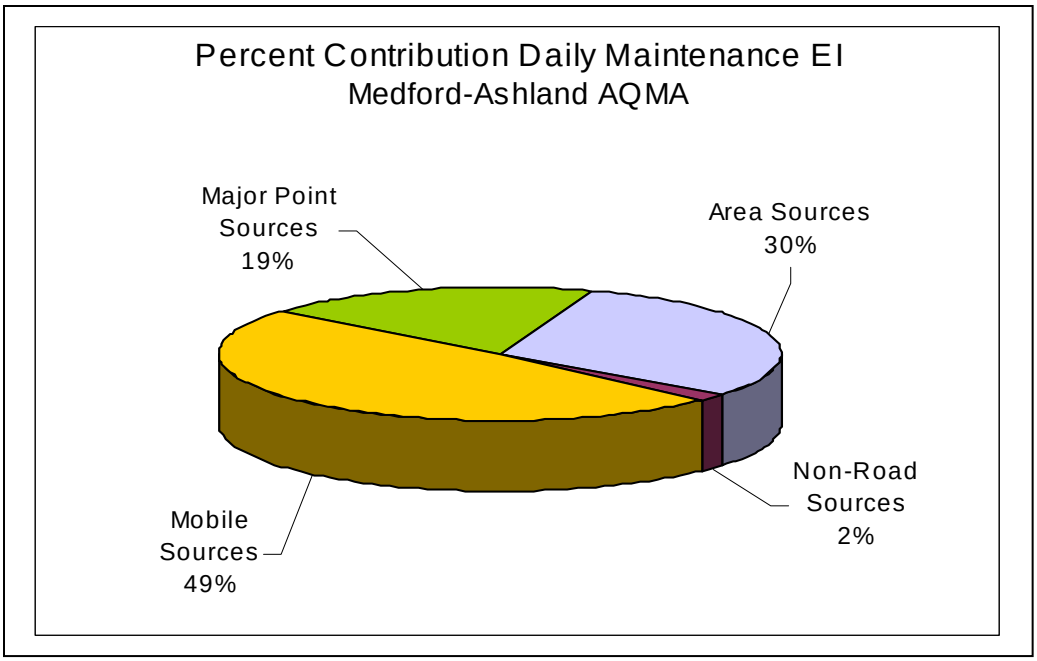


Figure 36: Percent Contribution by Source Category (Daily)



Comparison: 1998 Actual, Attainment Analysis (1998), 2015 Maintenance Analysis

Figures 37 and 38 below compare the three emission inventories used in the PM_{10} planning process (1998 base-year, 1998 worst-case attainment emissions and 2015 worst-case emissions forecast).

Figure 37: Emissions Comparison (Annual): Base year, Attainment EI, Maintenance EI

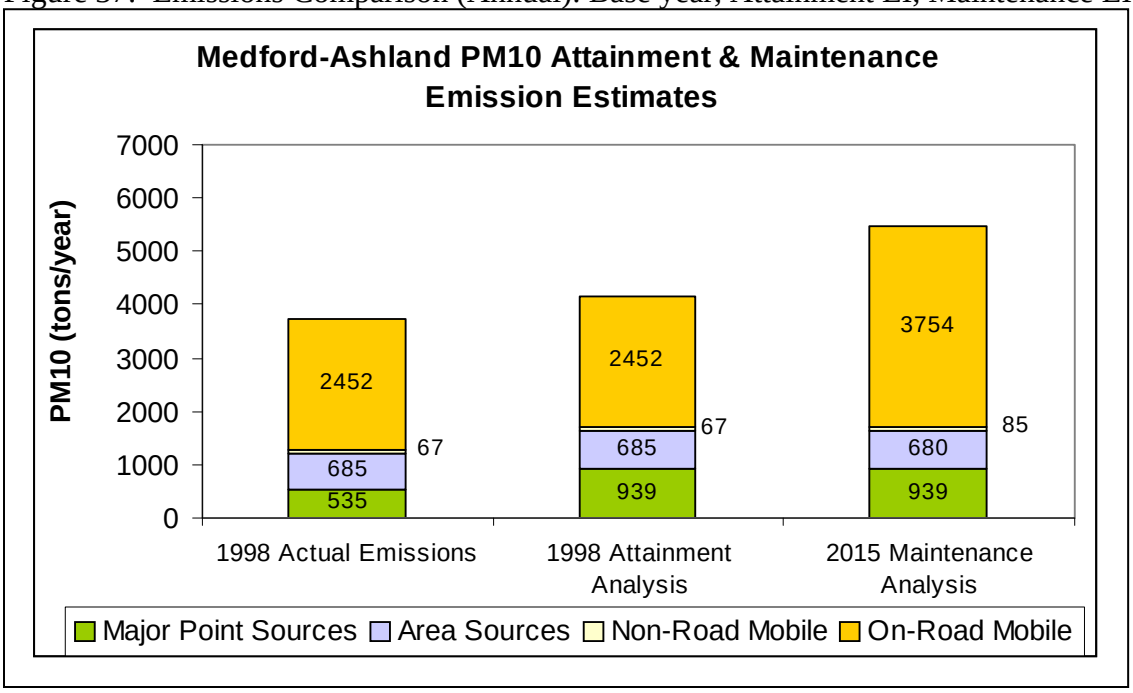
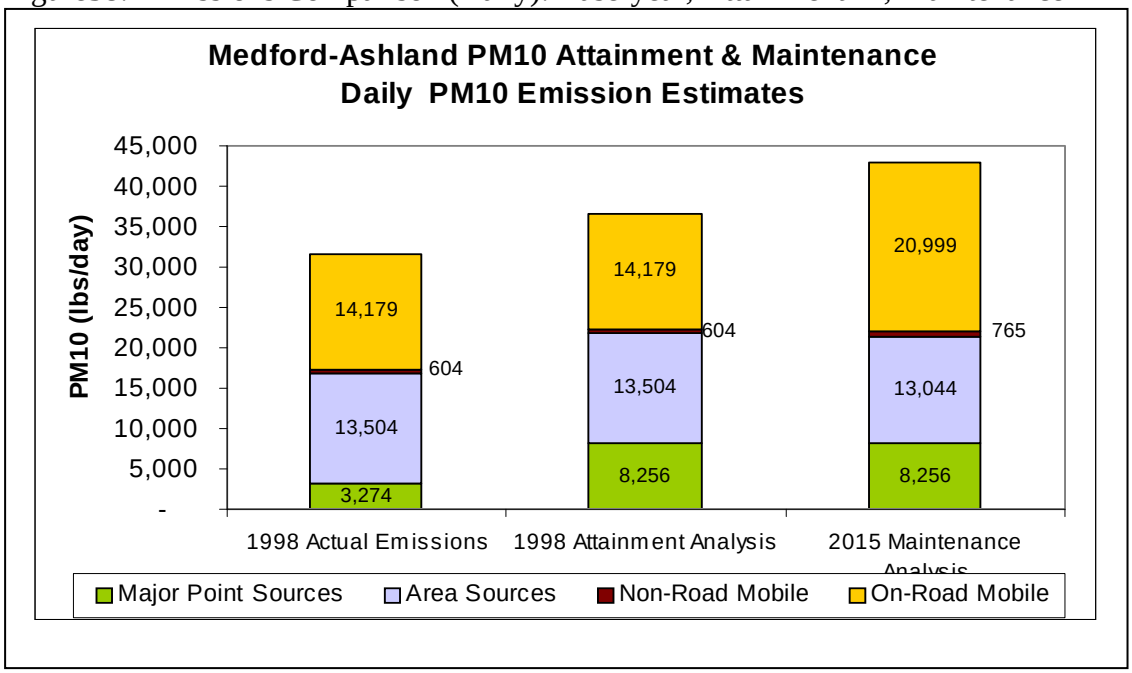


Figure38: Emissions Comparison (Daily): Base-year, Attainment EI, Maintenance EI



4.14.3.5 Geographic Distribution of Emissions (Spatial Allocation)

After emissions are estimated for each source category they are distributed geographically over the AQMA. The dispersion model uses a one-kilometer (1 Km) by one kilometer (1 Km) grid system to apportion emissions within the AQMA. Each grid is approximately 0.62 miles square. Each major industrial facility is assigned geographic coordinates using latitude and longitude information. Mobile source emissions are distributed to each grid based on road network and other information from the travel model. Area and Non-Road emissions are allocated to the grid system based on land use factors such as population, housing, and employment densities, as well as land use patterns (i.e. residential, commercial, and agriculturally zoned lands).

Figures 39 and 40 show an illustration of the spatial allocation of emissions for the 2015 maintenance analysis. The model uses these emission density maps together with meteorology to estimate ambient PM_{10} concentrations within the AQMA. The modeling analysis is discussed further in Section 4.14.5.0.

Figure 39: Medford-Ashland AQMA Boundary and Modeling Grid Domain

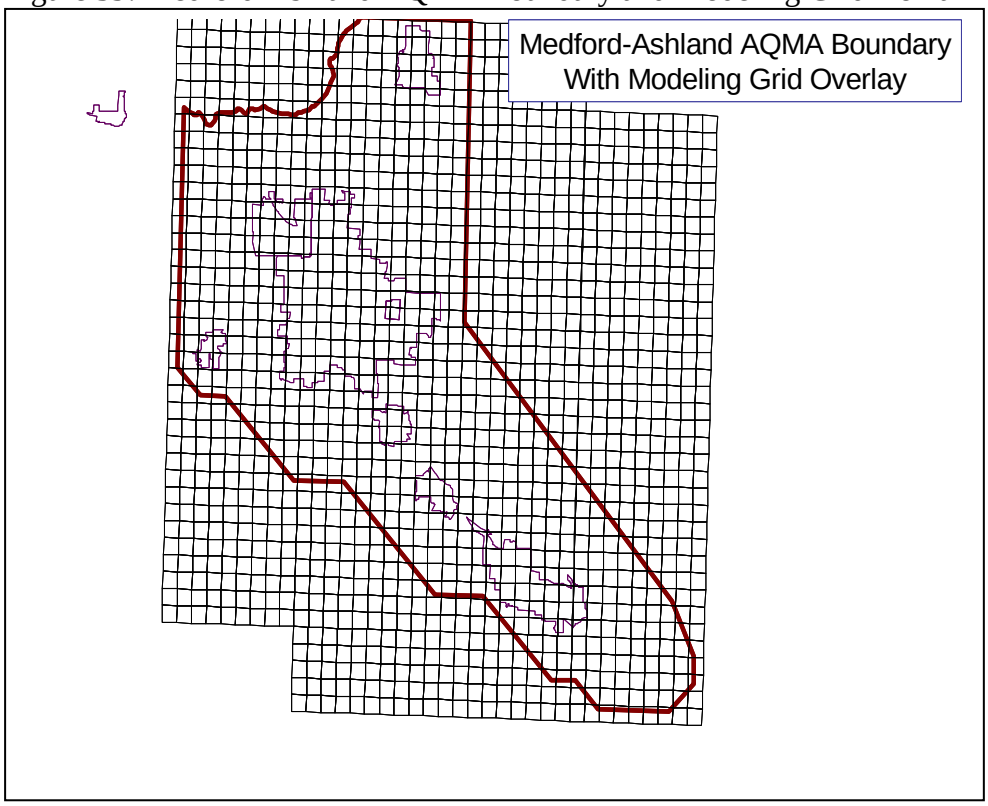
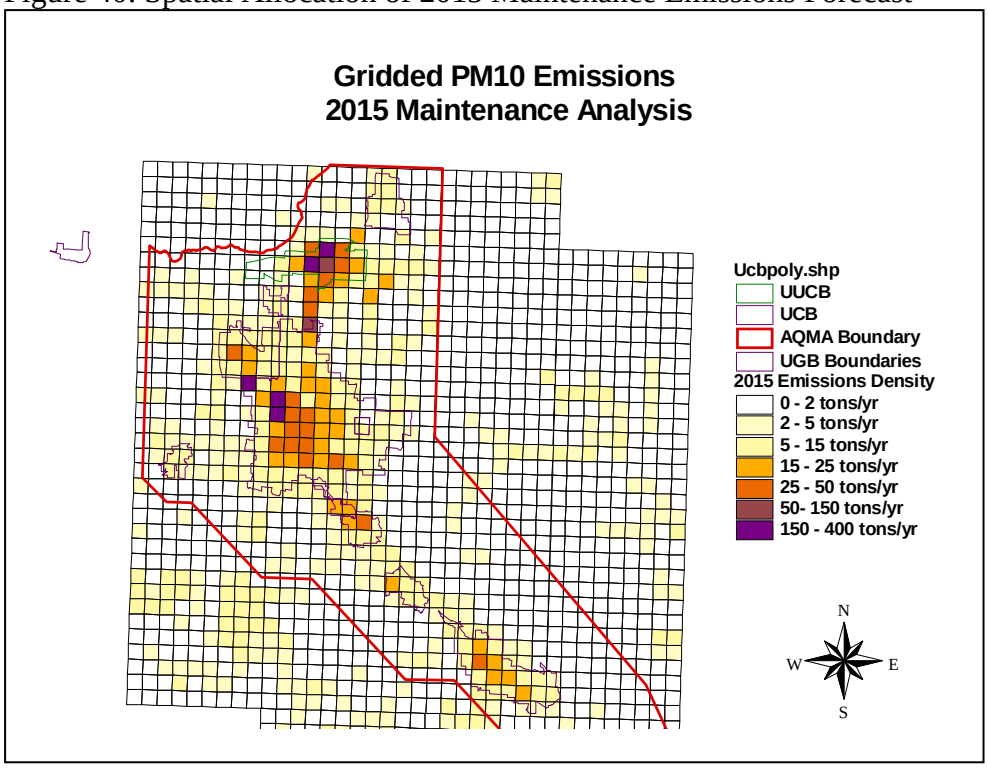
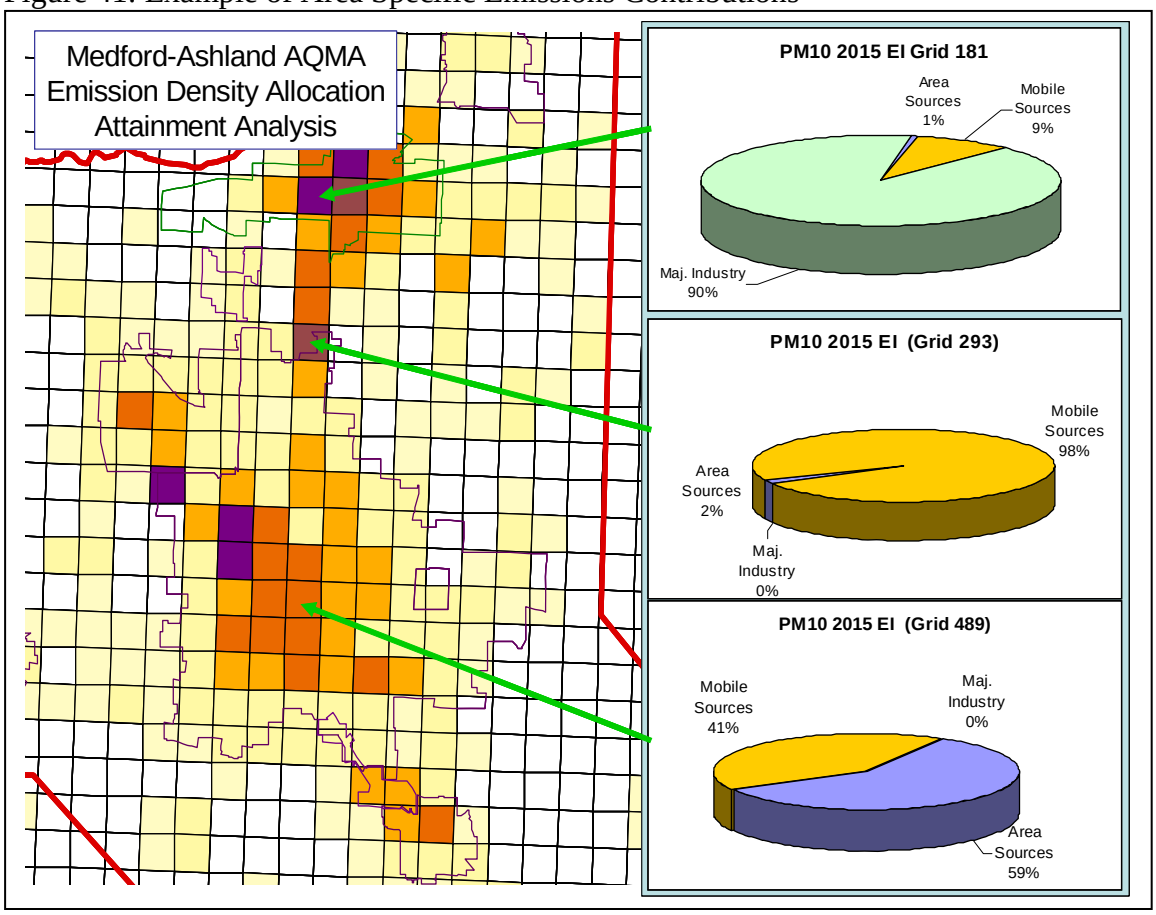


Figure 40: Spatial Allocation of 2015 Maintenance Emissions Forecast



The emission sources that most significantly contribute to ambient PM_{10} impacts can vary greatly depending upon location in the AQMA. Figure 41provides an example of three areas within the AQMA where different emission source categories play a key role in PM_{10} impacts.

Figure 41: Example of Area Specific Emissions Contributions



4.14.3.6: Source Category Emission Summaries

MAJOR INDUSTRY

Within the Medford-Ashland AQMA, major point sources are defined as stationary industrial facilities emitting 5 tons per year or more of PM_{10}. Emission information is compiled from each facility's operating permit issued by the Department. Smaller sources that emit less than 5 tons per year of PM_{10} are assigned to the "area source" category.

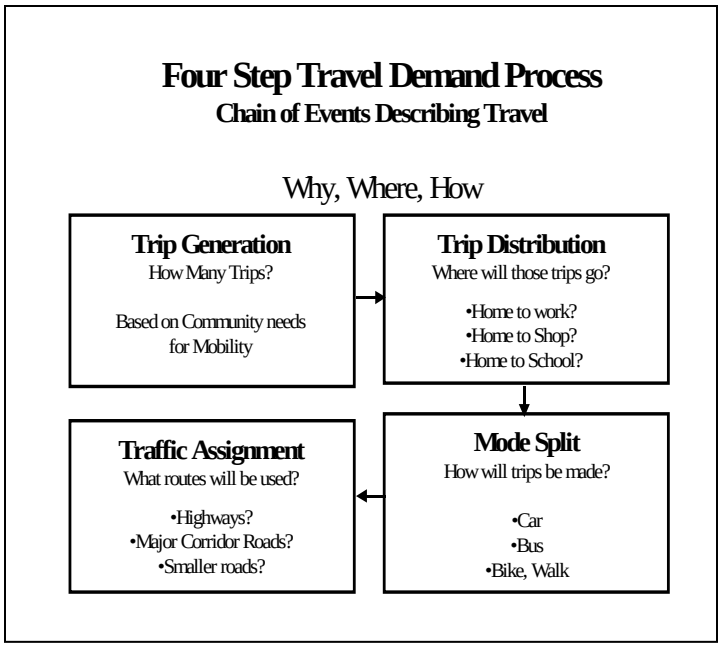
Emissions for major point sources can be considered in one of three ways: (a) actual emissions; (b) permitted emissions that reflect current operating needs (otherwise known as the Plant Site Emission Limit or "PSEL"; or (c) their maximum allowable permitted level. Actual emission levels are typically much lower than permitted limits. A facility can however increase emissions to allowable levels without evaluating the impact of the

increase on air quality. Therefore, EPA requires that PM_{10} attainment and maintenance plans evaluate major industrial sources at their maximum allowable emission levels. Emissions "growth" for the major point source category reflects these maximum allowable emission levels. A comparison of 1998 actual emissions and maximum allowable emissions levels for each facility was presented previously in Figure 26. Detailed emissions information for each facility can be found in the Emissions Inventory Document (Appendix A2).

MOBILE SOURCES (CARS & TRUCKS)

Emission estimates for mobile sources (motor vehicles) are based on vehicle miles traveled (VMT) occurring within the AQMA. VMT estimates for both the 1998 and 2015 road network were developed by the Rogue Valley Council of Governments and the Oregon Department of Transportation (ODOT) using the latest local travel demand model. The travel model analysis boundary covers the greater Medford area and several adjacent communities, but not the entire AQMA. RVCOG hopes to expand the travel modeling area in the near future. For AQMA areas outside the travel model boundary, ODOT used highway performance monitoring and other traffic records to estimate and project VMT. The average growth rate for motor vehicle travel in the AQMA is approximately 2.9% per year. Mobile emission estimates reflect both current and expected motor vehicle travel on each link of the AQMA road network. VMT is allocated to the air quality dispersion modeling grid in order to estimate location specific PM_{10} emissions and ambient impacts from motor vehicles.

Estimating emissions from cars and trucks requires information on local travel patterns and vehicle types comprising the local fleet, as well as the emissions characteristics of each vehicle type. There is limited detailed information available about the motor vehicle fleet in the Medford-Ashland area. The Department's mobile emission estimates have used as much local data as possible to describe the characteristics of the Medford-Ashland motor vehicle fleet, but it has also been necessary to rely on national averages for some information. The following section provides a brief summary of key factors used to estimate mobile emissions in the AQMA.



Travel Modeling

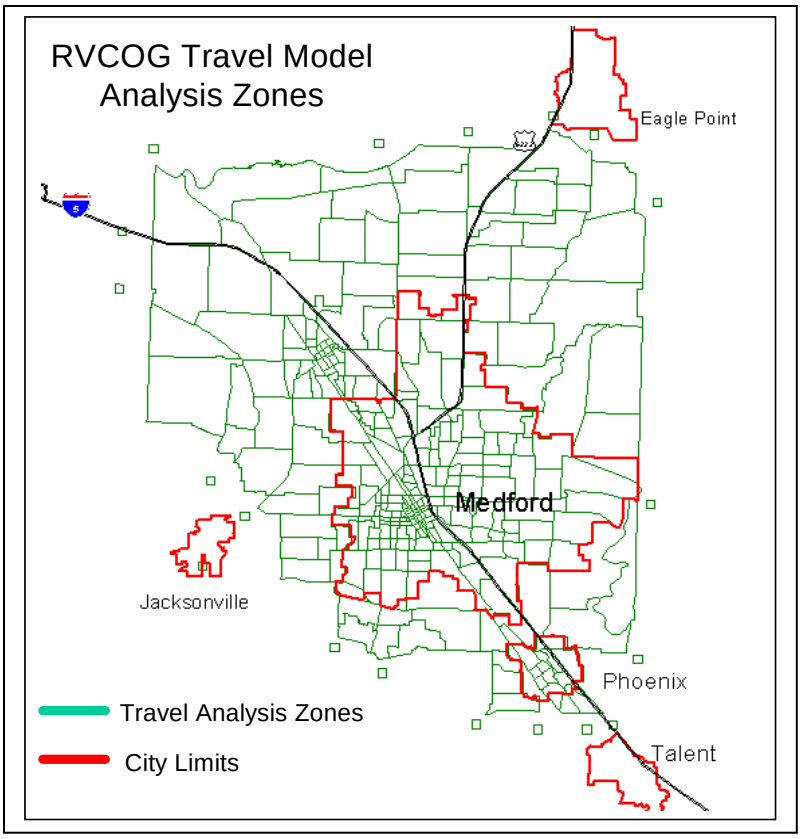
Traditional travel demand models consist of four main steps: *Trip Generation* (i.e. how many person trips and for what reason), *Trip Distribution* (i.e. where do the trips go), *Mode Choice* (i.e. car, bus, bike), and *Trip Assignment* (i.e. which roads

are used). Trip and travel characteristics are developed from household survey and employment information such as income, household size, number of available vehicles, and availability of employment. This trip information is then used to model travel patterns in the community. Travel model results are compared to field measurements (vehicle ground counts) to evaluate whether the model is reasonably reproducing actual travel in the area. Once model performance has been validated, it is used to test future mobility needs reflecting population and employment growth as well as new road or other projects proposed in the Regional Transportation Plan. Ultimately, travel model data is used by DEQ to estimate current and future year motor vehicle emissions.

Travel Demand Model

The Oregon Department of Transportation (ODOT) and the Rogue Valley Council of Governments-RVCOG (the Metropolitan Planning Organization for the Rogue Valley) have developed an improved travel model for use in the greater Medford area. The model has been used to support the Rogue Valley Regional Transportation Plan (RTP). The travel model analysis area encompasses the greater Medford area and several adjacent communities including Central Point and White City. The RVCOG and ODOT have used local Highway Performance Monitoring System (HPMS) data, as well as other local information to estimate motor vehicle travel in the non-MPO area of the AQMA (i.e. areas outside the travel model analysis boundary).

Land use forecasts were prepared for the travel model based on current land use regulations and comprehensive plan updates. Travel forecasts are based on predicted population and employment growth and expected land use changes that influence mobility needs in Rogue Valley communities.



Population, housing and employment densities are allocated to individual transportation analysis zones (TAZs) established within the travel model. TAZ characteristics influence travel demand and motor vehicle use within the zones. DEQ

uses this information to estimate mobile emissions. The same population, housing and employment densities are also used by DEQ to estimate and allocate emissions for the Area and Non-Road Mobile emission source categories.

No travel demand model, no matter how sophisticated, can reproduce motor vehicle travel at all locations and at all times with 100 percent accuracy. Typically, travel demand models will over predict travel in some areas while under predicting travel in others. Validation checks are made at each step in the process of model development. The validation of RVCOG's travel demand model has been reviewed by ODOT's Transportation Planning Analysis Unit (TPAU), the Federal Highway Administration (FHWA), and the Oregon Travel Model Steering Committee. Model performance for each roadway type is within acceptable limits.

Commercial Truck Travel

Currently, it is not possible to develop a specific travel model for local and interstate commercial truck travel in the AQMA. RVCOG and ODOT have made the best effort currently possible to describe commercial vehicle travel in the AQMA. By default, roads with high traffic volumes such as Interstate-5, or major and minor arterial roads will include a proportionally higher share of commercial travel than less traveled roads. The ability to model commercial travel should improve over time as ODOT and RVCOG develop future model upgrades.

Seasonal and Temporal VMT Adjustment

Several adjustments were made to model predicted VMT to estimate annual average and worst-case daily mobile emissions. Annual average emission estimates use VMT information that reflect average daily travel (ADT, Monday-Sunday). Worst-case daily emissions are based on adjusted VMT estimates that reflect somewhat higher traffic volumes during the work week (average weekday travel, Monday-Friday). Average Daily VMT to Weekday VMT adjustments were based on local traffic count information.

There are also seasonal differences in vehicle travel. VMT during peak summer travel months is typically higher than the yearly average, and winter travel is typically lower than average. The travel model produces VMT estimates as an average of yearly travel. This yearly average was used to estimate annual average mobile emissions. For worst-case winter day emission estimates, modeled VMT was adjusted to reflect a slightly lower amount of travel during the winter months (but increased to reflect average weekday commuter travel).

EPA Emission Factor Model

To estimate motor vehicle emissions, VMT data from the travel model must be combined with an estimate of emissions generated by a motor vehicle, typically pounds of emissions per mile driven (i.e. lbs PM_{10}/mile). The Department used EPA's particulate emission factor model (PART5) to develop the emission rates for the Medford-Ashland

motor vehicle fleet. The PART5 model estimates both exhaust (tail pipe) and road dust PM_{10} emissions.

The AQMA Fleet

Both national default and locally derived data was used in the emission model to describe the characteristics of the AQMA vehicle fleet. Local data includes Department of Motor Vehicle (DMV) registrations for passenger and light duty diesel vehicles, which provides the age distribution of the AQMA passenger vehicle fleet (i.e. percent of fleet that are model years from 1 to 25+ years old). EPA's model also requires the average "mix" of vehicle miles traveled by vehicle type (i.e. how much VMT is attributable to passenger cars, heavy-duty trucks, buses, etc.). There is very little local data regarding the actual AQMA fleet "mix", or for other fleet characteristics such as local sales trends of diesel vehicles.

Traffic counts from permanent and temporary traffic recorders were evaluated to estimate the motor vehicle fleet mix in key areas of the AQMA. Traffic recorder data provides a "snap-shot" of motor vehicle travel at a specific location and time. Based on available traffic count data, custom fleet mixes were constructed for three key transportation areas in the AQMA. These include the core Medford area (which is also taken to generally represent travel in the rest of the AQMA); the White City area (including the Highway 62 corridor); and Interstate 5 (I-5). Traffic count data from 1994-2000 (all seasons) was evaluated and taken to generally represent the 1998 vehicle fleet.

Light and Heavy Duty Vehicles

Traffic data was used to evaluate the split between light-duty and heavy-duty vehicles. It is interesting to note that with the exception of Interstate-5, traffic count data shows that heavy-duty vehicles (mostly diesel trucks) represent a relatively low percentage of the total vehicle fleet. Traffic count data suggests that heavy-duty vehicles comprise just over 2% of the total vehicle fleet in the Core Medford area. In the White City Area (OR62 corridor), heavy-duty vehicles are estimated to comprise just over 4% of the total fleet. The fraction of heavy-duty vehicles on Interstate-5 is much higher, with heavy-duty vehicles making up just under 14% of total vehicles on the Interstate.

It should be noted that while heavy-duty trucks may represent a low *percentage* of the total fleet, the actual number of trucks is not necessarily low. For example, one traffic recorder close to the intersection of Highway 62 and Biddle Rd. (October 20-21, 27-28, 1997)[1] recorded a total of 522 heavy-duty trucks. However, during the same period, 17,331 light duty vehicles (mostly passenger cars) were recorded. The number of heavy-duty trucks is significant, but relative to the high number of light duty vehicles, heavy-duty vehicles represent a low percentage of the total fleet (~3% in this example). This supports the local perception that there are a significant number of heavy-duty trucks operating in the AQMA.

[1] 24-hour volumes 6 a.m. to 6 a.m. documented over two separate days. 24-hour counts require several staffing shifts (standard ODOT practice).

There is no reliable data regarding future growth of local diesel vehicles in the AQMA. National default values in EPA's mobile model suggest that heavy-duty vehicles will comprise a greater percentage of the total fleet in the future. Based on EPA defaults, we have increased the fraction of heavy-duty diesel vehicles in the future at a rate of one percent per year. This increases the contribution from heavy-duty vehicles in 2015.

Table 5: Growth in Heavy-Duty Vehicle Fraction of the Fleet

Key Area	1998 Percent Heavy-Duty Vehicles	2015 Percent Heavy-Duty Vehicles
Core Medford/Rest of AQMA	2.2%	2.6%
White City Area	4.3%	5.4%
Interstate-5	13.6%	15.9%

Paved Road Dust

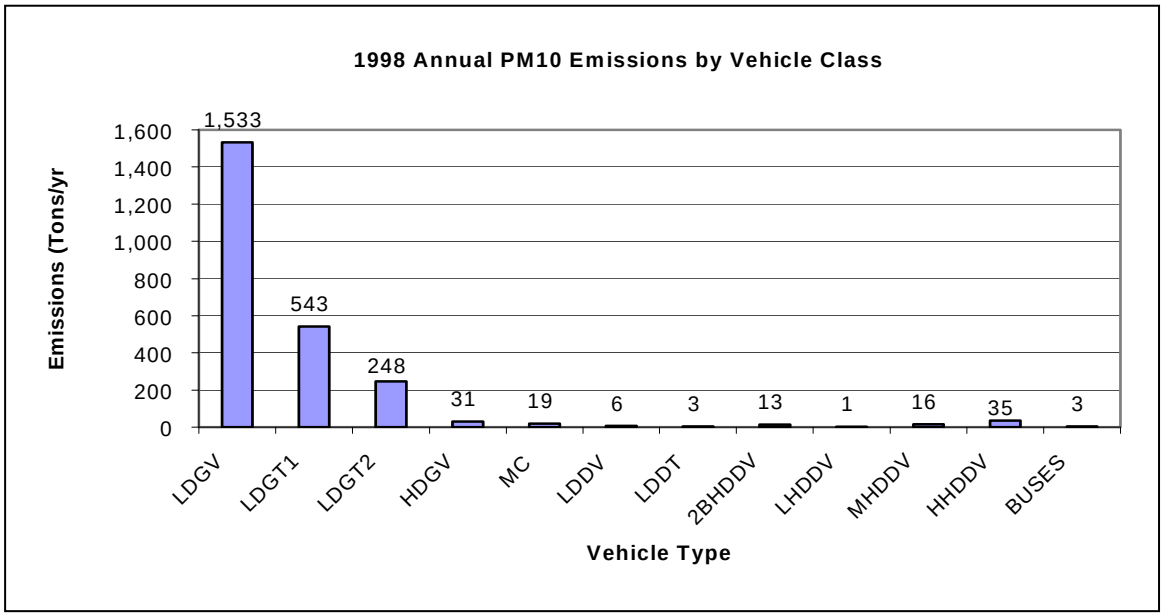
Mobile emissions include both exhaust emissions (tailpipe) and emissions from road dust generated by vehicle travel. Road dust emissions are influenced greatly by the amount of fine silt on the road surface. In May 1997, Midwest Research Institute was contracted to conduct a field study of silt loading on a representative sample of roadways in key areas of the AQMA. Paved road dust emission estimates are based on these local silt-loading factors. It was found that road silt values are generally higher in the White City area than in Medford. Silt loading is generally lower on roadways with high traffic volumes and/or high speeds (for example, Interstate-5 has the lowest silt loading). Using area specific silt loadings, custom paved road dust emission factors were developed for the Medford area (and the rest of the AQMA), the White City area, and I-5. Custom emission factors were also developed for roads with low and high average daily traffic volumes (ADT).

Table 6: Location Specific Road Silt Loadings

Area	Silt Loading (grams/meter^2)
White City	
High ADT Roads	1.4 g/m^2
Low ADT Roads	3.4 g/m^2
Avg. "G" Industrial Area	11.0 g/m^2
Medford/Rest of AQMA	
High ADT Roads	0.19 g/m^2
Low ADT Roads	0.54 g/m^2
Interstate-5	0.015 g/m^2

Using all the factors discussed above, emission estimates are derived for motor vehicle travel within the AQMA. Figure 42 shows an example of the mobile emissions distribution by vehicle type (tailpipe + road dust) in 1998. Additional information on the development of the mobile emissions inventory can be found in the Emissions Inventory Document (Appendix A2).

Figure 42: Distribution of Annual On-road Mobile PM_{10} Emissions by Vehicle Type, 1998



Vehicle Key				FHA Class	GVW (lbs)	Average
LDGV	Light Duty Gasoline Vehicle				<6,000	3,000
LDGT1	Light Duty Gasoline Truck-1			1	<6,000	3,500
LDGT2	Light Duty Gasoline Truck-2			2A	6,001-8,500	7,250
HDGV	Heavy Duty Gasoline Vehicle			2B-8B	> 8,500	8,500
MC	Motorcycle					500
LDDV	Light Duty Diesel Vehicle			1	<6,000	3,000
LDDT	Light Duty Diesel Truck			2A	6,001-8,500	3,500
2BHDDV	Class 2B Heavy duty diesel vehicle			2B	8,501-10,000	9,250
LHDDV	Light, Heavy duty diesel vehicle			3,4,5	10,001-19,500	14,750
MHDDV	Medium, Heavy duty diesel vehicle			6,7,8A	19,501-33,000	26,251
HHDDV	Heavy, Heavy duty diesel vehicle			8B	33,000+	33,000
BUSES	Buses: Estimates = to LHHDV				10,001-19,500	14,750

STATIONARY AREA SOURCES

Area sources include emissions from activities from residential, commercial, or light industrial activity, such commercial space heating, open burning, and woodstove use. The area source categories also includes stationary point sources emitting less than 5 tons per year for PM_{10}.

Area source emissions are developed using reports of commercial activity as well as population, housing and employment information. Emission factors were taken from various EPA reference documents as well as local studies conducted by DEQ or others. Emissions are assigned geographically to the modeling grid based on land use information,

such as housing and employment densities. The emissions forecast for area sources relies on expected growth in population, employment, and other factors.

Wood burning is an important residential space-heating practice in Oregon, and a significant part of the Area Source category. Woodstove and fireplace emissions are significantly greater than other forms of space-heating, such as fuel oil and natural gas. Historically, residential wood burning has been a key contributor to wintertime exceedances of PM_{10} standards. While residential wood smoke has significantly declined over the years, woodstove and fireplace use can still contribute to elevated PM_{10} levels in the winter.

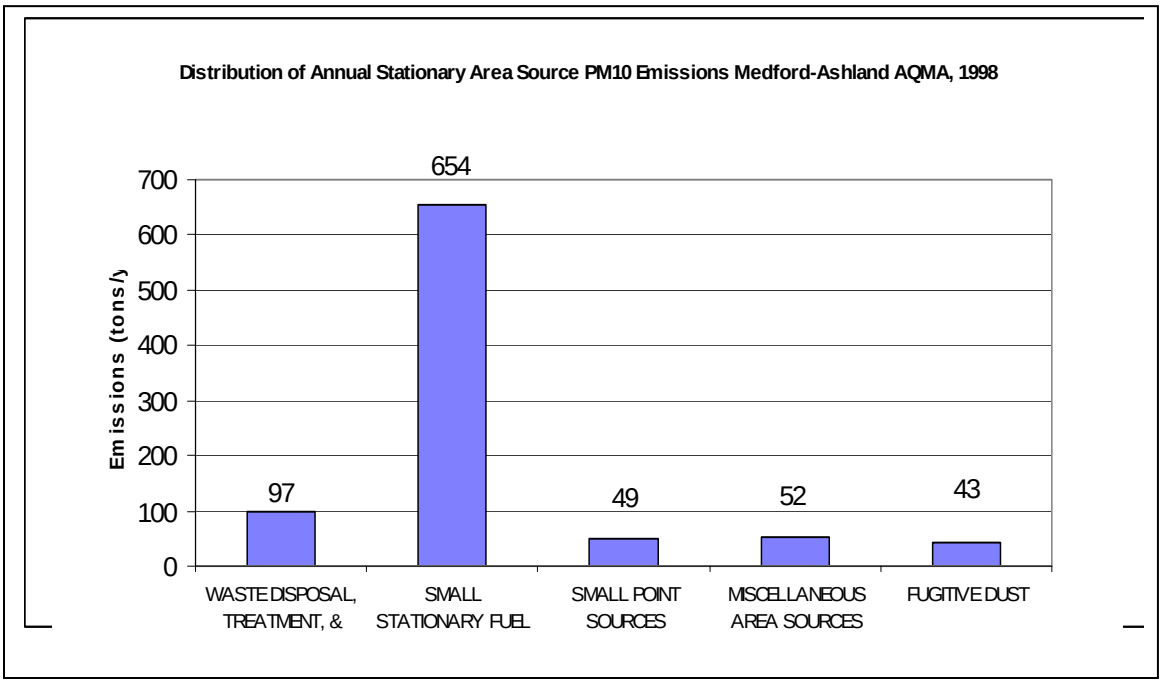
Residential Woodburning: AQMA homes were surveyed just after the 1996/97 woodheating season to develop a residential wood heating profile for the Medford-Ashland area, and to develop trends information for the growth and decline of various woodheating devices. The survey suggests a significant decrease in woodstove use in the AQMA over the past ten years (from an average 60% of AQMA homes burning wood in 1985-86 to an AQMA average of approximately 30% wood burning homes in 1996). Wood use profiles were developed for different areas in the AQMA (the City of Medford for example) using home survey responses by zip code. The survey gathered information on woodheating device type (older noncertified stove, certified catalytic, certified non-catalytic, pellet stove, etc.), as well as important fuel consumption information.

Survey information shows that over time there has been a significant decrease in noncertified woodstoves in favor of certified stoves, pelletstoves and natural gas heating appliances. Heating device trends were evaluated separately for different stove technologies. Woodheating emission trends were estimated from the net affect of growth in cleaner, "certified" woodstoves and a decline in older noncertified stoves. Woodheating trends were estimated separately for older housing stock and new construction. Heating device trends in older homes reflect the ongoing changeover of older stoves to newer woodheating technology or the replacement of wood heat with non-wood alternatives. Survey data suggests a very low rate of woodheating in new construction. Increasing trends in woodheating were estimated using a linear growth approach. Decreasing trends were conservatively estimated using a compound rate of decrease so that the removal of noncertified woodstoves from the AQMA would not be overstated.

Residential space heating emissions were allocated to the modeling grid using household density information provided by RVCOG. As part of the modeling analysis, woodheating emissions were varied by daily temperature and home heat demand. More information on estimating emissions from residential wood combustion can be found in the Emissions Inventory Document (Appendix A2)

Emission estimates (1998) for the major classifications within the Area Source Category are illustrated below in Figure 43.

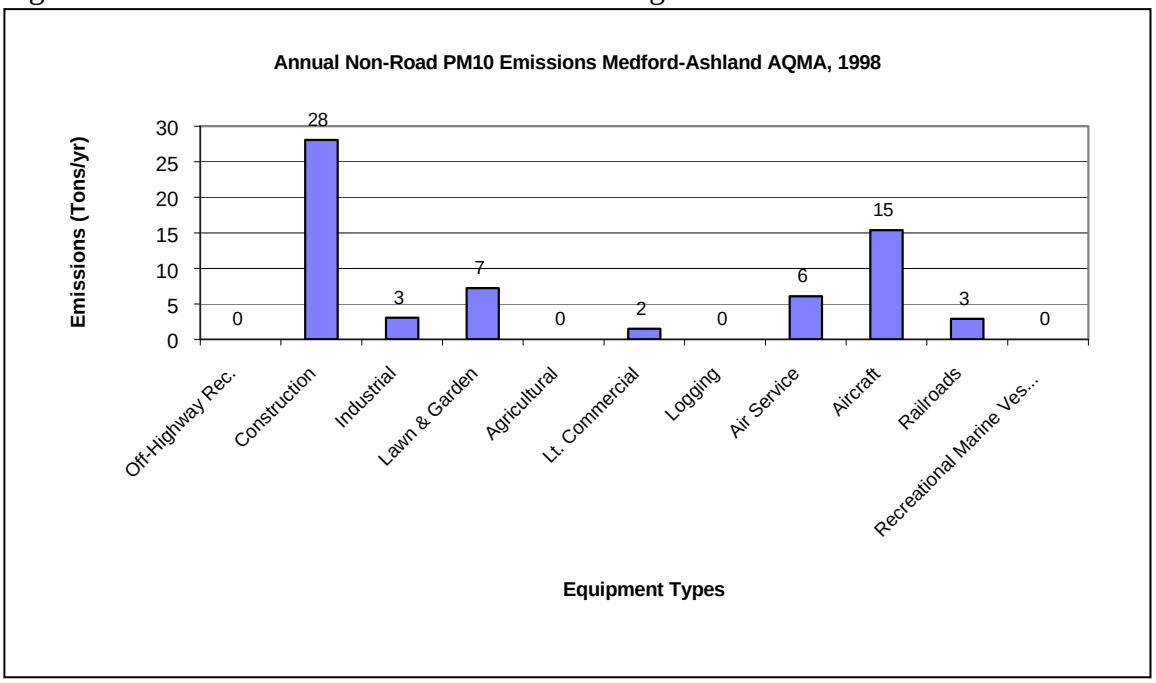
Figure 43: Distribution of Area Sources



NON-ROAD MOBILE SOURCES

The Non-Road Mobile emission source category includes sources such as gasoline and diesel-powered construction vehicles and equipment, aircraft, and railroads. The category is divided into nine sub-categories including: (1) Lawn and Garden Equipment, (2) Airport Services, (3) Recreational Equipment, (4) Light Commercial Equipment, (5) Industrial Equipment, (6) Construction Equipment, (7) Farm Equipment, (8) Agricultural Equipment, and (9) Logging Equipment. Vehicle categories are grouped into three equipment types: two-cycle gasoline engines, four-cycle gasoline engines, and diesel engines. Figure 44 shows emission estimates for the Non-Road category for 1998. More information about Non-Road Mobile emissions can be found in the Emission Inventory Document (Appendix A2).

Figure 44: Distribution of Non-Road Sources Categories



4.14.4.0: Transportation Conformity

Transportation conformity is the regulatory program that links transportation and air quality planning processes together so that emissions from motor vehicles (both now and in the future) do not jeopardize air quality standards. The transportation conformity program will continue to apply to the Medford-Ashland AQMA after it is redesignated to attainment and becomes a state PM_{10} maintenance area. Under conformity, emissions resulting from a transportation plan[2] can not exceed the allowable emissions level established for transportation in the air quality plan. The conformity rules also assure that transportation related air quality strategies are funded and implemented during the transportation planning process.

When an attainment and maintenance plan is developed for an area, conformity rules require that a "budget" be established for motor vehicle emissions. Emissions from future transportation plans, programs, and projects must stay within the allowed budget. A transportation emissions budget is established as part of a technical analysis demonstrating attainment and maintenance with air quality standards. In other words, a budget for motor vehicle emissions growth can not be established without also considering emissions growth from all other sources, and a demonstration that total future emissions growth will not lead to a violation of standards.

[2] Transportation plans describe current and future mobility needs for a community and include projects and programs to meet those needs. Mobile source emissions are directly related to the amount of motor vehicle travel that will result from the road network and programs described in the transportation plan.

Failure to show conformity can seriously delay or jeopardize funding for important transportation projects. The emissions budget established through this PM_{10} attainment and maintenance plan will govern the conformity analysis of each update to the Rogue Valley Regional Transportation Plan for the next eight to ten years.

Until a budget is formally established, conformity determinations must rely on a comparison of the build (or action) scenario in the regional transportation plan to the no-build scenario. The "build" scenario reflects the anticipated future roadway network and project list for which funding has been secured. The "no-build" scenario reflects emissions from the current road network. In order to demonstrate conformity the build scenario must result in fewer emissions than the no-build scenario. The PM_{10} emissions budget for the AQMA will be formally established and take affect when EPA makes an initial finding that the plan submittal is adequate, and publishes that determination in the federal register. All conformity determinations thereafter must meet the emissions budget test. EPA's adequacy determination of the motor vehicle emissions budget would typically occur separately from plan approval.

Establishing the Budget

The transportation emissions budget typically reflects the motor vehicle emissions forecast used in the air quality plan. Since the emissions forecast is derived from estimates of future travel needs, the budget should be adequate to accommodate future conformity determinations. However, unanticipated growth or other factors may increase future mobility needs (and motor vehicle emissions) above levels anticipated in the air quality plan. This could result in a failure to show conformity (i.e. conformity lapse).

In addition to planning for unforeseen emission increases, there is a specific problem know as "planning cycle mismatch" that must be addressed to avoid conformity difficulties in the near future. The timing cycles for updating transportation plans (every 3-5 years) and air quality plans (every 8-10 years) are not in sync. Transportation plans are continually extending their forecasting horizon beyond the last year (and emission budget) established in the air quality plan. Planning cycle mismatch is a common conformity problem nationally.

EPA approval of the PM_{10} attainment and maintenance plan will trigger a conformity analysis for the Rogue Valley Regional Transportation Plan (RTP). The Rogue Valley Council of Governments (RVCOG) has recently updated the RTP, projecting regional mobility needs out to the year 2023. The PM_{10} plan establishes the last year of the emissions budget in 2015. To show conformity, emissions from the 2023 travel network (new RTP horizon year), as well as subsequent horizon year updates, will have to meet the 2015 budget.

There is an additional issue to consider. RVCOG will soon be expanding their metropolitan planning organization (MPO) boundary, adding several new AQMA communities to the local transportation planning area. The area covered by RVCOG's

travel demand model will also be expanded to the new MPO areas. This means that future VMT and mobile emissions estimates for those areas currently outside the MPO boundary could be somewhat different than the estimates currently used in the PM_{10} maintenance plan. This creates uncertainty about the sufficiency the emissions budget for future conformity determinations.

At the request of RVCOG, an emissions buffer of approximately 1,700 lbs/day (~300 tons/year equivalent) has been added to the mobile source emissions budget to help offset the planning cycle mismatch between the 2015 and 2023 planning horizon years, and the uncertainty of adding new areas (Ashland, Jacksonville, Eagle Point) to the travel demand modeling area. Mobile emissions with the additional safety buffer were used in the maintenance modeling analysis. The analysis shows that the conformity buffer can easily be accommodated without jeopardizing compliance with PM_{10} standards.

The emissions inventory includes emission estimates for both annual and daily motor vehicle emissions. The Department estimates that annual emissions are the more constraining (more protective of air quality), and has established the 2015 motor vehicle emissions budget in terms of annual average emissions (tons/year). The Department expects VMT growth to be generally linier from 1998 to 2015 and has therefore not established interim year budgets between 1998 and 2015. Table 7 shows the PM_{10} emission budget established for the AQMA.

Table 7: Motor Vehicle Emissions Budget (PM_{10}) Through 2015

Annual PM_{10} (tons/year)

Year	2015
Motor Vehicle Emissions Budget*	3,754*

* Includes 307 tpy safety buffer

Emission factors, road dust silt loadings, and other relevant information for estimating mobile PM_{10} emissions can be found in the Emission Inventory Document (Appendix A2). Table 8 below lists the emission factors (combined road dust and exhaust) used for the 1998 and 2015 mobile emission estimates.

Table 8: Motor Vehicle Emission Factors (1998 and 2015)

Emission Factor Application	1998 Emission Factors	2015 Emission Factors
Interstate -5	0.29 grams/mile	0.33 grams/mile
Medford Area High ADT Roads	0.83 grams/mile	0.87 grams/mile
Medford Area Low ADT Roads	1.65 grams/mile	1.72 grams/mile
White City High ADT Roads	3.43 grams/mile	3.70 grams/mile
White City Low ADT Roads	6.25 grams/mile	6.74 grams/mile
White City Industrial Roads	13.41 grams/mile	14.46 grams/mile
Unpaved Roads	1.15 lbs/mile	1.15 lbs/mile

Table 9 shows the estimated annual VMT equivalent to the emissions budget.

Table 9: Estimated Annual Motor Vehicle Travel in 2015 (Miles/Year)

Year	2015
Annual Motor Vehicle Miles Traveled	1,599,355,788†

† Includes additional VMT to account for 1,799 lbs/day safety buffer.

Transportation Control Measures (TCM's)

PM_{10} emission reduction strategies for the AQMA include the street cleaning programs for the City of Medford, White City, and the connecting transportation corridor (Highway 62). Jackson County recently used funding from the Congestion Mitigation & Air Quality (CMAQ) program to purchase a high efficiency street cleaner for use in the Medford-White City area. This street cleaning program is considered by the Department to be a Transportation Control Measure (TCM) for reducing particulate pollution. At a minimum, the cleaning program must continue to use a high efficiency, vacuum street sweeper(s) (or equivalent), provide geographic coverage that includes the cities of Medford, White City, and significant intervening travel corridors, and provide cleaning frequency no less than twice per month.

EPA criteria for Motor Vehicle Emission Budget Adequacy

The motor vehicle emissions budget contained in this plan satisfies EPA adequacy criteria established under 40 CFR 93.118(e)(4). Specifically:

EPA Criteria	Response
40 CFR 93.118 (e)(4)(i)	The plan will be submitted to EPA by DEQ Director Stephanie Hallock as the Governor's designee. Public hearings were held on December 16, 2003 and January 21, 2004.
40 CFR 93.118(e)(4)(ii)	The Medford-Ashland Air Quality Advisory Committee, which included representation from local, state, and federal transportation officials, advised the Department on transportation issues in the plan including the motor vehicle emissions budget. The draft PM_{10} plan was reviewed by the Federal Highways Administration and Environmental Protection Agency. Both FHWA and EPA provided comments, which have been responded to by the Department.
40 CFR 93.118(e)(4)(iii)	The motor vehicle emissions budget is summarized in the maintenance plan document and plan appendix.
40 CFR 93.118(e)(4)(iv)	The motor vehicle emissions budget was included in the emission estimates used to demonstrate continued compliance with standards.
40 CFR 93.118(e)(4)(v)	The emissions budget is directly related to the emissions inventory and reflects strategies relied on in the plan.
40 CFR 93.118(e)(4)(vi)	The initial 1991 PM_{10} attainment plan for the AQMA was not formally approved by EPA. This 2004 PM_{10} attainment and maintenance plan establishes the first formal PM_{10} emissions budget for the AQMA.