State of Oregon
Department of Environmental Quality
Air Quality Division

State Implementation Plan for Particulate Matter (PM_{10}) in the Medford-Ashland Air Quality Maintenance Area

A Plan for Meeting and Maintaining The National Ambient Air Quality Standards For PM_{10}

December 10, 2004

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Acknowledgments

"When I first came here in the 1970's the furnace was shooting fire 100 feet in the air".

- Gary Grimes, former Medford DEQ Air Quality Manager

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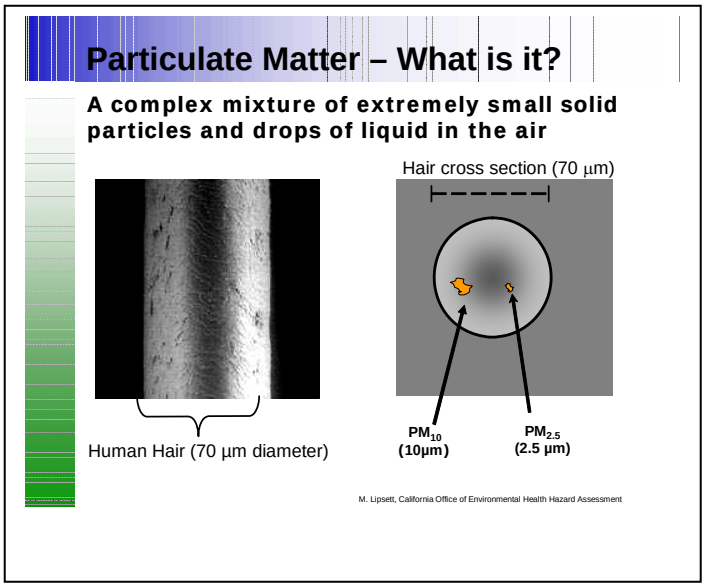
Executive Summary

The U.S. Environmental Protection Agency (EPA) adopted National Ambient Air Quality Standards (NAAQS) for PM_{10} on July 1, 1987. The acronym "PM_{10}" stands for particulate matter of a size less than or equal to 10 micrometers (µm) in diameter, or about 1/7th the diameter of a human hair. Exposure to high levels of PM_{10} is considered a risk to human health due to the body's inability to effectively filter out particles of this size. These particles can become lodged in the lungs aggravating chronic respiratory diseases such as asthma, bronchitis, and heart disease. Populations especially at risk include children, the elderly, and those with existing health problems. There is both a daily standard for PM_{10} (based on a 24-hour average), and an annual average standard. The daily PM_{10} standard is 150 micrograms per cubic meter (ug/m^3), and the annual average standard is 50 ug/m^3.

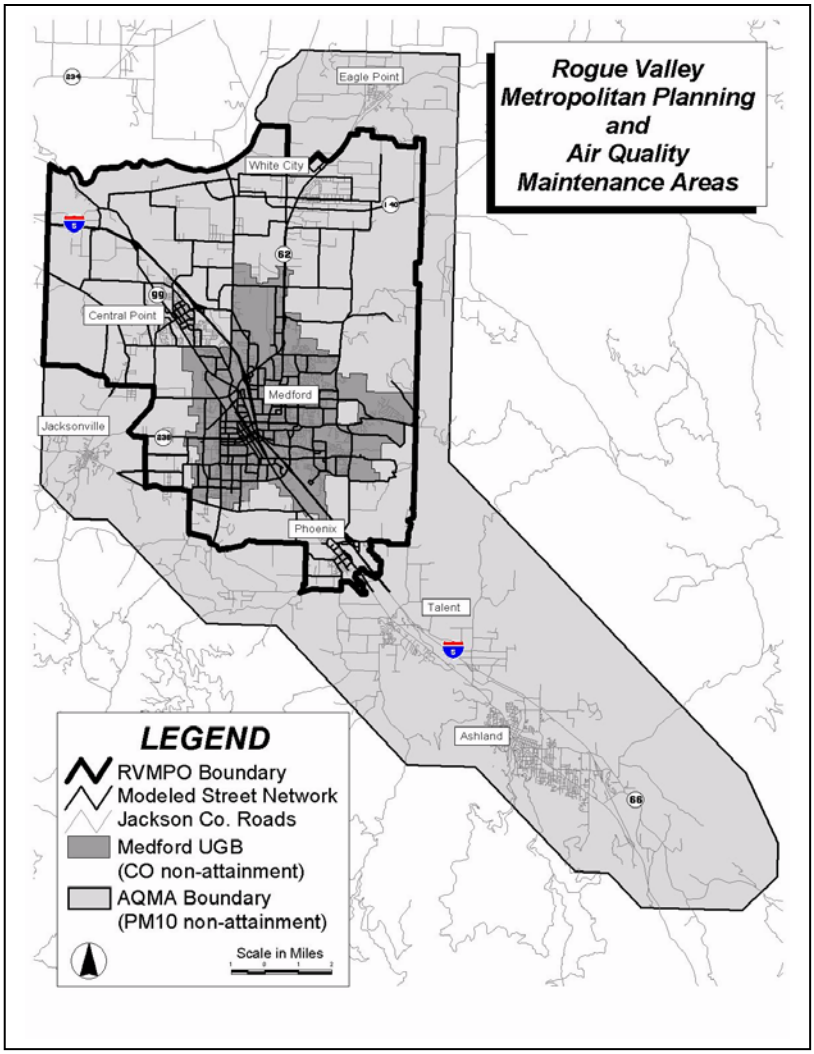


Compliance with the daily standard is evaluated by looking at the number of times the standard is exceeded in any three year-period (at the same location). If the average number of exceedances in any three-year period is 1.0 or less, the area is in compliance. If the average number of exceedances is 1.1 or more, the area is in violation of standards[1]. The annual PM_{10} standard is violated if the three-year average of annual average values exceeds 50 ug/m^3. In Oregon, the daily PM_{10} standard has been the more difficult to meet. Under the Clean Air Act, an area that violates standards is designated as "nonattainment", and must adopt emission reduction measures to bring the area back into compliance.

The Medford-Ashland Air Quality Maintenance Area (AQMA) is the designated PM_{10} nonattainment boundary for the greater Medford area. The AQMA encompasses much of the Rogue Valley of Southwest Oregon, and includes the communities of Ashland, Talent, Phoenix, Medford, Central Point, Jacksonville, White City, Eagle Point, and the intervening lands of Jackson County. The AQMA was established in the 1970's as the planning boundary that best describes the common airshed shared by Rouge Valley citizens. The Figure below shows the planning boundary for the Medford-Ashland AQMA, as well as the boundary for the local metropolitan planning organization.

[1] For example, if 3 exceedances occurred in a three-year period, then the average number of exceedances will be 1.0 (i.e. 3 exceedances divided by 3 years = 1.0). If 4 exceedances occurred in the three-year period, the average number of exceedances would be 1.3 (violation).

PM_{10} measurements taken in the AQMA in the mid to late 1980's showed that the 24-hour PM_{10} health standard was exceeded an average of 20-25 days per year during the winter months. During this time, the maximum 24-hour PM_{10} concentration measured in Medford was over 300 $\mu g/m^3$ as compared to the 24-hr average PM_{10} standard of 150 ug/m^3. Annual average PM_{10} concentrations in Medford during the 1980's ranged from about 58 to 68 $\mu g/m^3$ compared to the average annual PM_{10} standard of 50 $\mu g/m^3$.



Because of these measured violations, the Medford-Ashland AQMA was initially listed by EPA as a Group 1 PM_{10} planning area[2], leading to a nonattainment area designation under the 1990 Clean Air Act Amendments. The Clean Air Act requires states to develop and adopt State Implementation Plan (SIP) revisions to assure that areas exceeding standards are brought into compliance within the time frames prescribed by the Clean Air Act. Once the area has returned to compliance, states must prepare an additional plan ensuring continued compliance with standards for at least ten years.

There have been several PM_{10} plans developed for the Medford-Ashland AQMA. The initial ***Attainment Plan*** adopted in 1991 contained a suite of emission reduction strategies that brought the area into compliance with PM_{10} standards by the required Clean Air Act deadline of December 31, 1994. The Attainment Plan was updated in 1998, and is updated again here in this 2004 Attainment Plan. This document also includes a PM_{10} ***Maintenance Plan*** for the AQMA. The maintenance plan continues the successful PM_{10} strategies for the AQMA, and provides an air quality analysis to ensure continued compliance with PM_{10} standards through at least the year 2015.

[2] "Group 1" areas were those areas known to violate PM_{10} standards, and were identified for designation to nonattainment status when the Clean Air Act was amended in 1990.

The attainment and maintenance plan *(the plan)* will be submitted for approval to the Environmental Protection Agency (EPA) along with a request that the legal status of the Medford-Ashland AQMA be revised from nonattainment to attainment for PM_{10}.

Air Quality Trends

Emission reduction strategies adopted in the AQMA have been very successful in reducing daily and annual PM_{10} values to levels that are well below federal standards. Figures 1 and 2 show the trend in daily and annual average PM_{10} values measured at the key monitoring sites of Welch & Jackson Streets (Medford) and the White City Post Office.

Figure 1: Daily and Annual Average PM_{10} Trend Medford (Welch & Jackson Site)

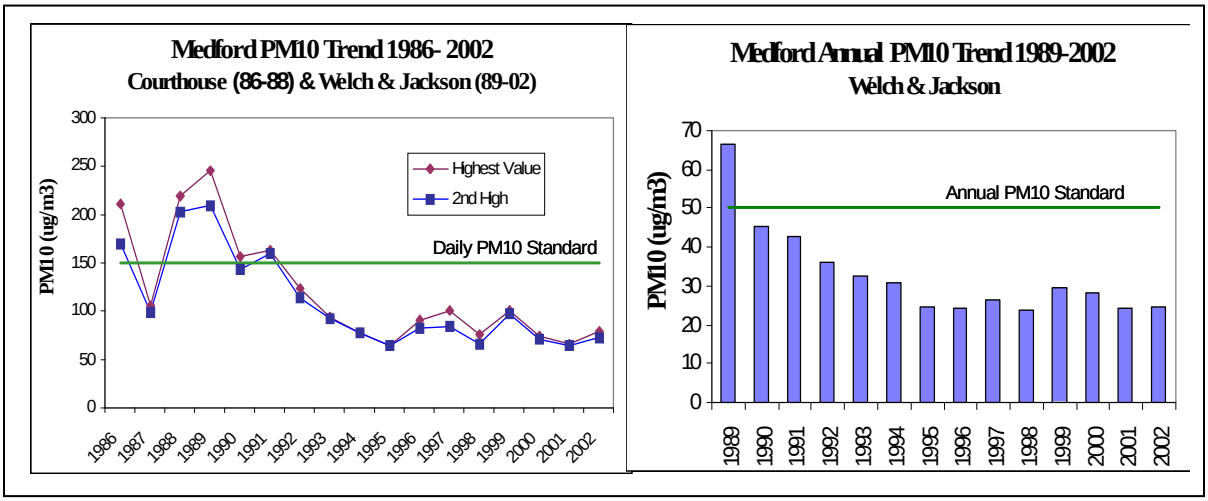
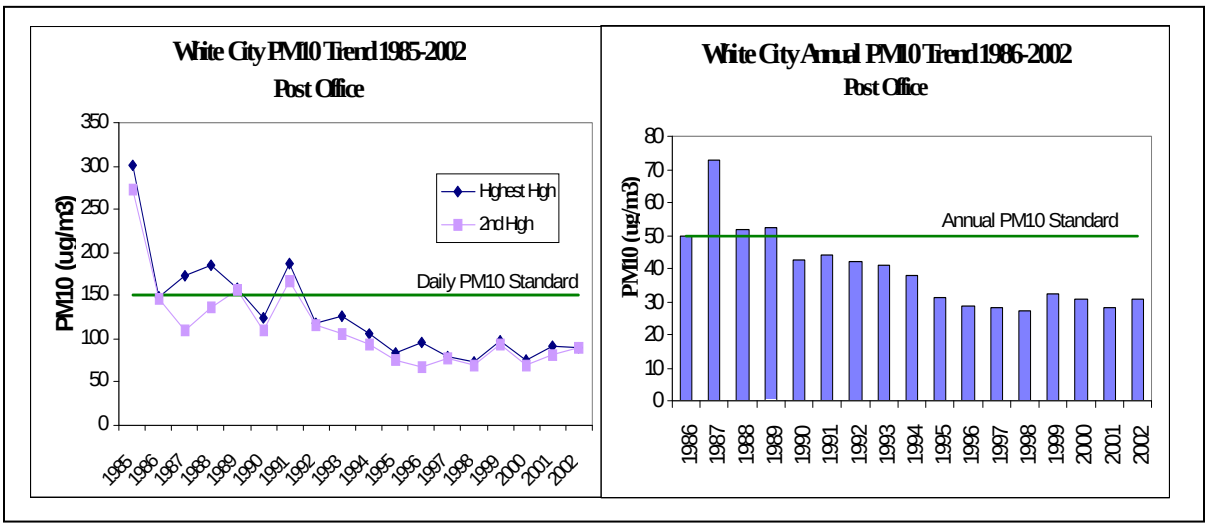


Figure 2: Daily and Annual Avg. PM_{10} Trends for White City (Post Office Site)



Summary of Attainment and Maintenance Analysis Approach

The Clean Air Act required that the Medford-Ashland AQMA demonstrate compliance with PM_{10} standards by no later than December 31, 1994. The initial PM_{10} attainment plan submitted in 1991 adopted the emission reduction measures necessary to bring the area into compliance by the Clean Air Act deadline. Ambient monitoring at both the Welch & Jackson and White City monitoring sites show that PM_{10} levels have been well below standards since 1992.

In order for EPA to redesignate the AQMA to attainment, the Department must demonstrate that: a) PM_{10} standards are currently being met in the AQMA; b) standards would continue to be met even under worst-case conditions (i.e. worse-case emissions and meteorology); and c) that the AQMA will continue in compliance with standards for at least the next 10 years. This demonstration involves three analysis approaches:

1. Current Compliance (Actual Conditions): Monitoring data reflects actual maximum PM_{10} levels measured in the AQMA, and shows that the AQMA has been in compliance with standards since approximately 1992. Monitoring data demonstrates that the AQMA met the 1994 Clean Air Act attainment deadline, and has continued in compliance with PM_{10} standards ever since.

2. Attainment Demonstration (Modeling Analysis of Current Potential PM_{10} Levels): The attainment analysis must evaluate the current potential for PM_{10} levels to increase under worst-case conditions. Emissions used in the attainment analysis reflect actual 1998 emissions from all source categories, except major industry. For the worst-case analysis approach, EPA requires that major industrial emissions be considered at legally allowable (maximum permitted) levels, not their actual 1998 emission levels. The Department selected 1998 for the attainment analysis because the emissions inventory for that year provides the most accurate estimate of PM_{10} emissions currently available in the AQMA. The analysis also includes the air stagnation meteorology routinely experienced in the AQMA. The worst-case analysis approach provides an estimate of PM_{10} concentrations that could potentially occur in the AQMA.

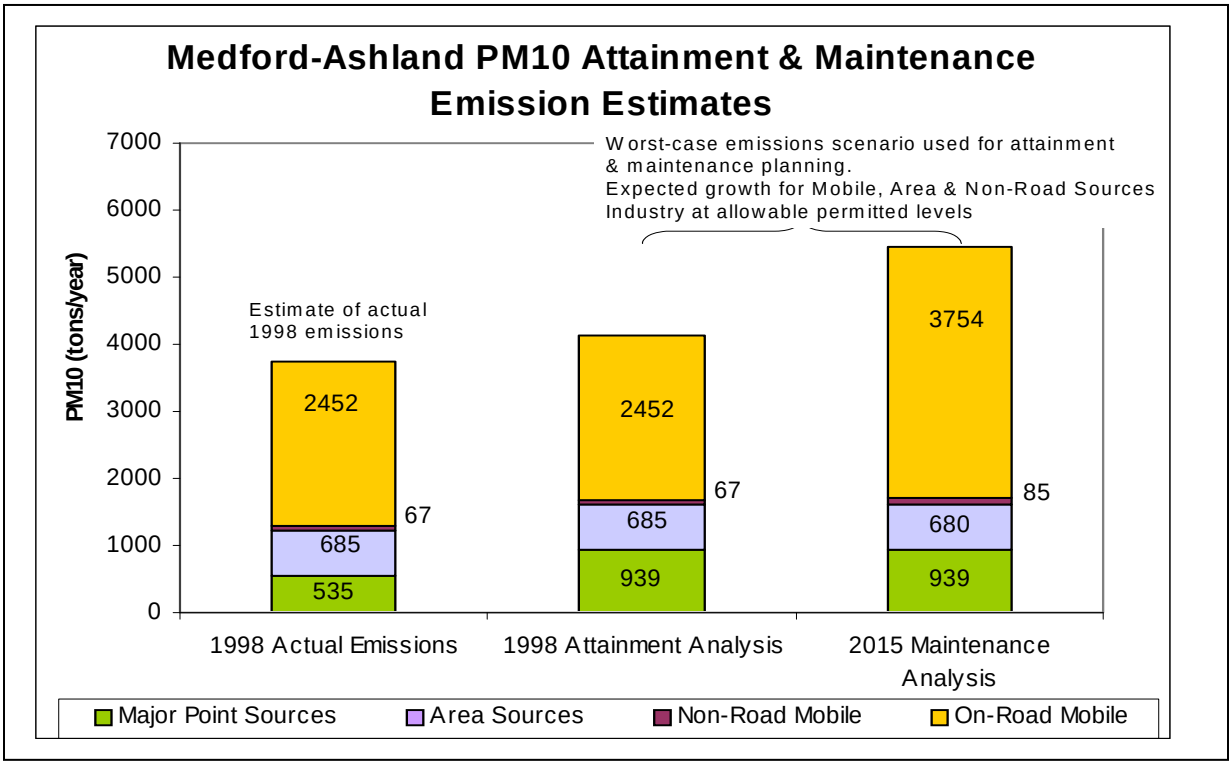
3. Maintenance Demonstration (Modeling Analysis of Future Potential PM_{10} Levels): The maintenance analysis is based on an emissions projection to the year 2015. The emissions forecast reflects anticipated emissions growth since 1998 resulting from changes in population, housing, employment, motor vehicle travel, and other factors. Again, major industrial sources in the maintenance analysis are evaluated at their maximum allowable levels. The 2015 analysis also uses stagnation meteorology.

AQMA Emission Estimates and Emissions Forecast

The emissions inventory (EI) and emissions forecast groups emission sources into four main categories: **Area Sources** (such as woodstoves and open burning), **Mobile Sources** (cars & trucks), **Non-Road Mobile** (construction equipment, small engines, etc.), and **Major Point Sources** (Major Industry). The 1998 attainment EI and 2015 emissions forecast are shown in Figure 3. The largest emissions growth is expected in the mobile

source category. Modest growth is expected for Non-Road sources; Area Sources are expected to decrease somewhat due to the continued replacement of older, high polluting woodstoves. Growth in the major industry category reflects the difference between actual 1998 reported emissions and maximum allowable permitted emissions.

Figure 3: AQMA PM_{10} Emissions Inventory (1998) and Emissions Forecast (2015)



Compliance Analysis (Summary of Attainment and Maintenance Air Quality Modeling)

The attainment and maintenance demonstrations rely on an air quality dispersion modeling analysis that estimates potential PM_{10} concentrations throughout the AQMA. Both the attainment analysis and maintenance analysis demonstrate compliance with PM_{10} standards, and show that no additional PM_{10} emission reduction strategies are currently needed in the AQMA.

Figures 4 through 7 show the model predicted PM_{10} levels (ranked highest to lowest) for the attainment and maintenance analysis (annual avg. and daily PM_{10}). Again, there are no predicted violations of either the annual average or daily (24-hr avg.) PM_{10} standards. The highest predicted (worst-case) annual average PM_{10} levels are 49.2 ug/m^3 in 1998 and 49.3 ug/m^3 in 2015. The highest predicted (worst-case) daily compliance levels (4th highest) are 149.4 ug/m^3 in 1998 and 147.8 ug/m^3 in 2015. The highest predicted PM_{10} levels occur within the core of the White City industrial area. Peak PM_{10} levels in this area are very similar in both the attainment and maintenance analysis because maximum allowable industrial emissions were used in both cases. PM_{10} concentrations decrease

very quickly with distance from the core industrial center, and are substantially below standards in adjoining commercial and residential areas.

The attainment and maintenance modeling analysis is described further in sections 4.14.6.0 and 4.14.6.2

Figure 4: Attainment Analysis: Worst-Case Annual Avg. PM_{10} Levels (1998)

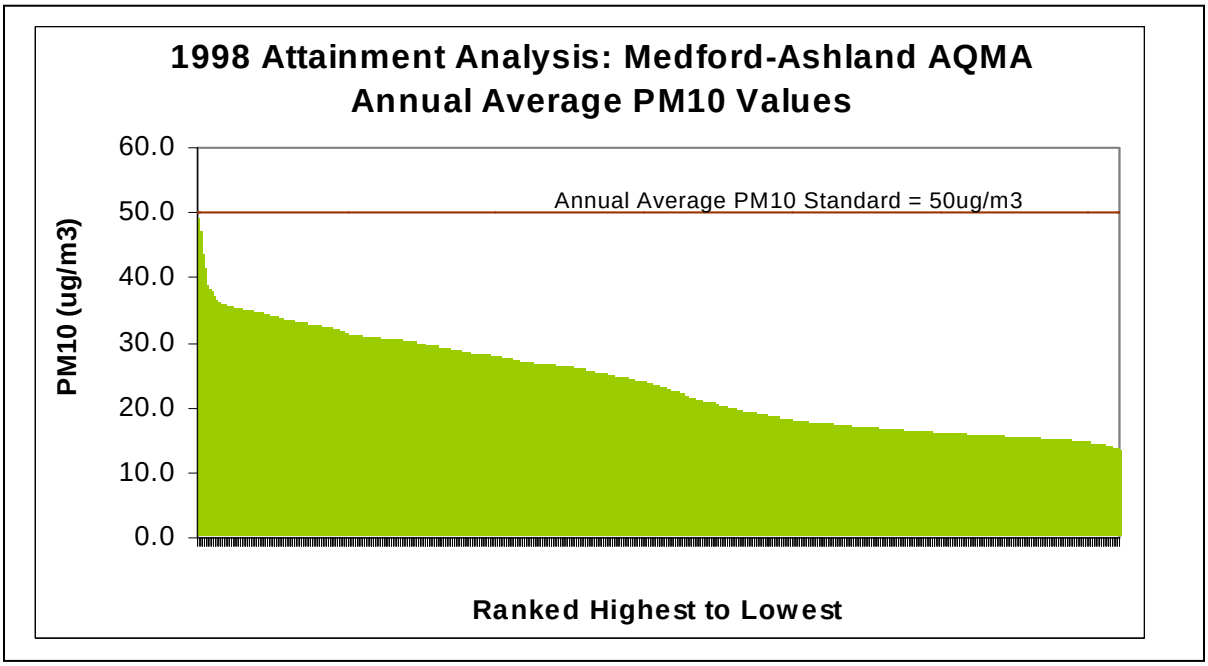


Figure 5: Attainment Analysis: Worst-Case Daily PM_{10} Levels (1998)

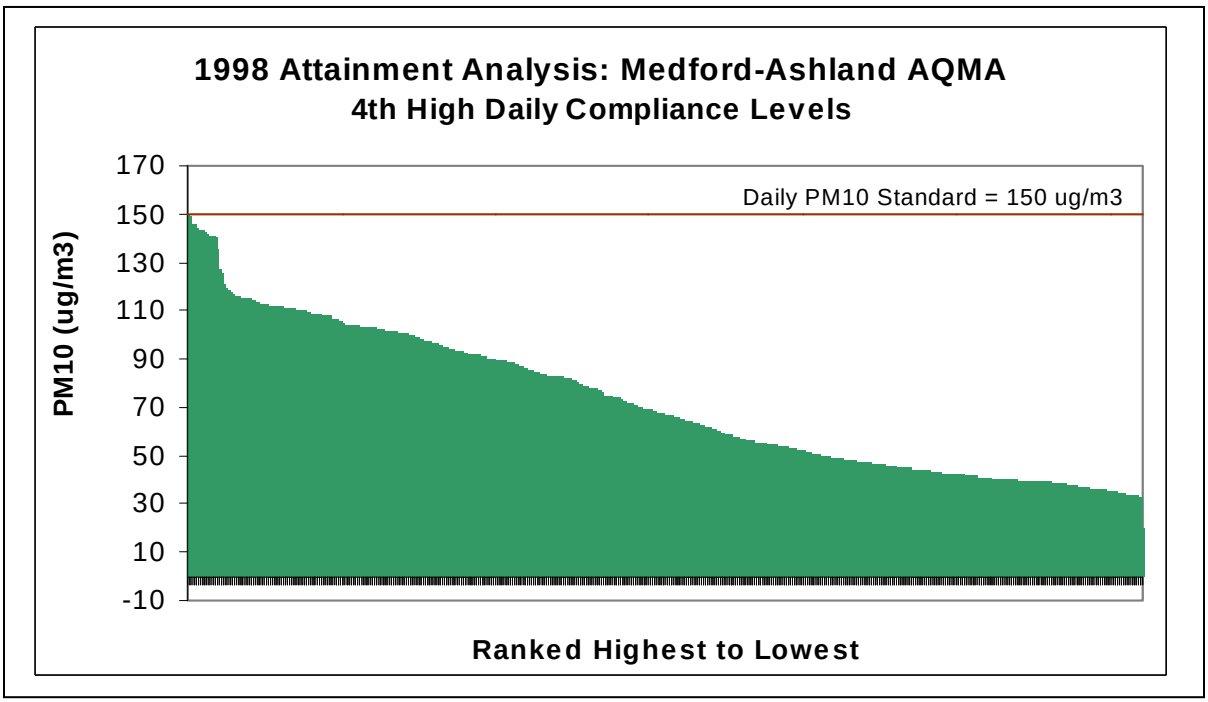


Figure 6: Maintenance Analysis: Worst-Case Annual PM_{10} Levels (2015)

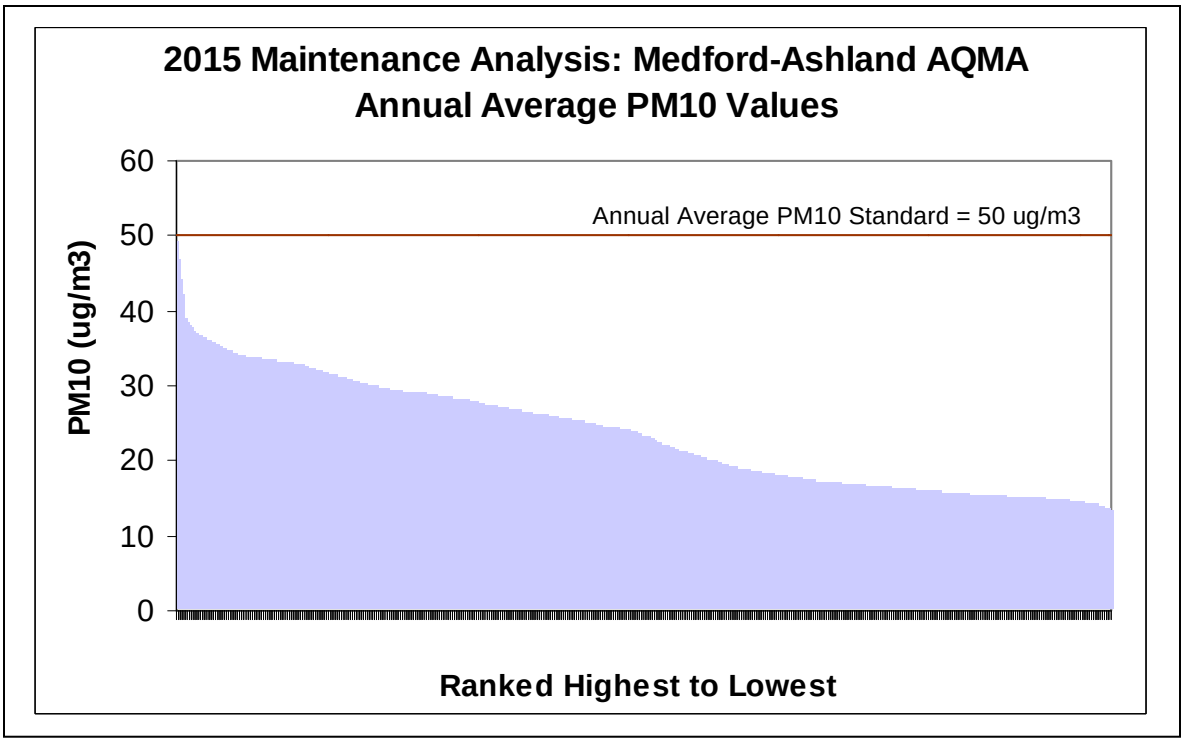
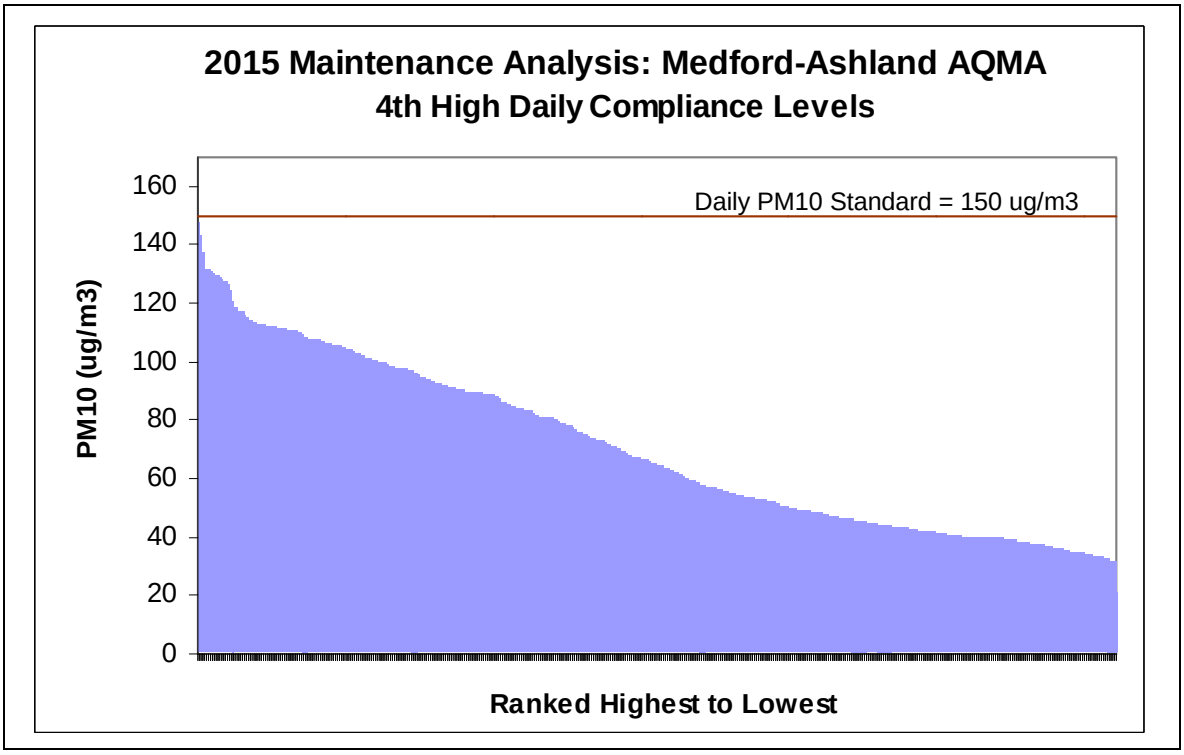


Figure 7: Maintenance Analysis: Worst-Case Daily PM_{10} Levels (2015)



Air Quality Strategies for PM_{10}

The plan continues all of the PM_{10} strategies that have been so successful in reducing emissions in the Valley. These include:

- A mandatory woodstove curtailment program.
- Emission limit standards for existing industrial processes.
- Local open burning ordinances.
- Enhanced road cleaning program in Medford and White City.
- Management of prescribed forestry burning year round, and special protection for the Rogue Valley during the winter months.

The plan also continues the strictest requirements for managing emissions growth from future new and expanding major industry under the New Source Review (NSR) program. These include:

- a very low emission threshold level (5 tons/year) for triggering NSR,
- the requirement to install state-of-the-art emission control technology, and
- the requirement to obtain emission offsets and demonstrate an air quality benefit (20% improvement in air quality).

The New Source Review requirements are discussed further is Section 4.14.8.0.

The attainment and maintenance plan also provides an air quality analysis demonstrating current and continued compliance with PM_{10} standards in all locations in the AQMA though at least the year 2015.

Transportation Conformity

The maintenance plan establishes a cap on future motor vehicle PM_{10} emissions, called the "emissions budget". The budget is used as part of the Transportation Conformity program which ensures that emissions from motor vehicles (both now and in the future) do not jeopardize air quality standards. The conformity program and emissions budget is described in more detail in Section 4.14.4.0

PM_{10} Contingency Plan

The maintenance plan establishes a process to prevent or correct any measured violation of PM_{10} standards. This process of investigation and (if needed) corrective action is called the "contingency plan". The contingency plan establishes early warning action levels for both daily and annual average PM_{10} levels (120 ug/m^3 (24-hr avg.) and 40 ug/m^3 (annual average). PM_{10} levels measured above these early warning thresholds will trigger a process to investigate the cause of the event and assess the risk to PM_{10} standards. The Air Quality Advisory Committee could also be convened to assist the Department in its investigation. The contingency plan is described further in Section 4.14.9.0

Conclusion

Monitoring data shows that the Medford-Ashland AQMA successfully met the Clean Air Act attainment deadline of December 31, 1994, and has remained in compliance with standards as of late 2004. The attainment modeling analysis shows that even under worst-case meteorology and maximum allowable emissions for major industry, the AQMA would be in compliance with PM_{10} standards. The maintenance analysis shows that the AQMA will continue to be in compliance through at least 2015 (even under worst-case conditions). The analysis demonstrates that no new emission reduction strategies are needed to maintain compliance. However, relatively high predicted PM_{10} levels support the need to continue the existing PM_{10} strategies. These strategies will also help avoid violations of the new federal fine particulate standards (known as $PM_{2.5}$).

On-Going Prevention-Future Air Quality Work

The Department will continue to work with Rogue Valley communities to address important air pollution issues, particularly in the areas of air toxics, growth in motor vehicle travel, prescribed forestry burning, and emissions from heavy-duty diesel vehicles.