A Plan for Maintaining The National Ambient Air Quality Standards For Particulate Matter (PM_{10}) In Klamath Falls Urban Growth Boundary

Appendix D6-1
Technical Analysis Protocol

Adopted by the Environmental Quality Commission October 2002

State of Oregon
Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390

Oregon
John A. Kitzhaber M.D., Governor

Department of Environmental Quality
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May 11, 2001

Steve Body
Environmental Protection Agency
Region 10
Office of Air Quality
1200 Sixth Avenue
Seattle, WA 98101

RE: Technical Analysis Protocol for
Klamath Falls PM10 Maintenance Plan

Dear Mr Body:

Enclosed is the Technical Analysis Protocol (TAP) for the Klamath Falls PM10 Maintenance Plan for signature. We plan to conduct the emission inventory this summer. Then, we anticipate preparing a maintenance plan for Klamath Falls using a Klamath Falls Air Quality Advisory Committee this fall. The TAP outlines the steps we plan to use to write the maintenance plan

Please review the TAP and if appropriate, obtain the necessary signatures and return the signed document to our Air Quality Planning Section at headquarters. Please return the signed Technical Analysis Protocol for the Klamath Falls PM10 Maintenance Plan to:

Annette Liebe
Manager, Air Quality Planning Section
Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204

I appreciate your help. If you have any questions, please feel free to contact me at 541-388-6146 extension 245.

Sincerely,

Patti Seaston

for Larry Calkins
Air Quality Specialist

Enc: Technical Analysis Protocol

RECEIVED
MAY 17 2001

Technical Analysis Protocol
Klamath Falls PM_{10} Maintenance Plan
May 2001

I. Background Information

The Klamath Falls PM_{10} nonattainment area is defined as the urban growth boundary (UGB). The Klamath Falls UGB is classified as nonattainment for the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) and the annual PM_{10} NAAQS. A map delineating the urban growth boundary is provided at the end of this document as Figure 4.

A. Design Values

A medium-volume PM_{10} monitor has been at the same location at 4866 Clinton Street at Peterson Elementary School in a residential area within an area known as south suburban and within the Klamath Falls UGB. It has been at this location from 1987 through the present. From 1969 to 1987, a total suspended particulate (TSP) monitor was located at the Fire Station on Broad and Wall Streets. The Peterson School PM_{10} monitor is currently co-located with the new $PM_{2.5}$ monitor and a meteorological station. All PM_{10} monitors are Federal Reference Method monitors Two other PM_{10} monitors are background samplers and are located at 1211 Miller Island and at 10500 Highway 140. They were established in 1991 and have operated at that location to the present. Design values will be calculated for Peterson School and any of the other appropriate monitoring sites

The selected base year for the maintenance plan is 1996. The validated, maximum 24-hour PM_{10} ambient concentration for the three-year period 1995-97 is 107 $\mu g/m^3$ at the Peterson School site At all other times the concentrations of emissions were substantially less than the standard at both background sites. For the three-year period 1996-1998, the maximum 24-hour concentration at the Peterson School monitor was 107 $\mu g/m^3$. The daily PM_{10} standard is 150 $\mu g/m^3$. The annual average PM_{10} standard is 50 $\mu g/m^3$. Design values for each of the three monitors will be statistically derived from historical monitoring data.

B. Attainment Year and Concentrations

The Klamath Falls area attained the standard for PM_{10} in 1994. The area has remained in compliance with the standard since 1994. The last exceedance of the 24-hour PM_{10} standard in the Klamath Falls UGB occurred in 1991[1], as did the last violation of the

[1] One of the background sites exceeded the standard on January 31, 1992 at 221 $\mu g/m^3$ The exceedance is a one-time event believed to be caused by short term dredging activity in the Klamath River

PM_{10} 24-hour standard The Klamath Falls area exceeded the PM_{10} annual standard in 1989 and since then there have been no annual exceedances and hence no violations

C. Control Strategies

The Klamath Falls UGB attained the standard for PM_{10} by primarily using control strategies identified in the 1991 attainment plan. These strategies targeted residential wood burning and open burning Industrial controls, transportation strategies, slash burning restrictions, fugitive dust controls, and a ban on the sale of uncertified wood stoves were also significant strategies with the 1991 plan and the 1995 addendum to the plan. The 1995 addendum to the plan added a budget for transportation conformity and other housekeeping items.

II. Potential Risk for Renewed Nonattainment

It would be unlikely for the Klamath Falls area to exceed the standard for PM10 in the future if effective strategies continue to be implemented. The last exceedance of the daily standard was 196 µg/m3 on January 22, 1991. Figure 1 shows the highest twenty-two monitored ambient concentrations for PM_{10} since the last daily exceedance in 1991. Each of the concentrations shown in Figure 1 was in 1991, 1992 or 1993, except for one in 1996. The standard is 150 ug/m3, rounded to the nearest 10 ug/m3. Since 1996, there have been no daily concentrations greater than 107 µg/m3.

Figure 1
Highest PM_{10} 24-Hour Concentrations Since Last Exceedance

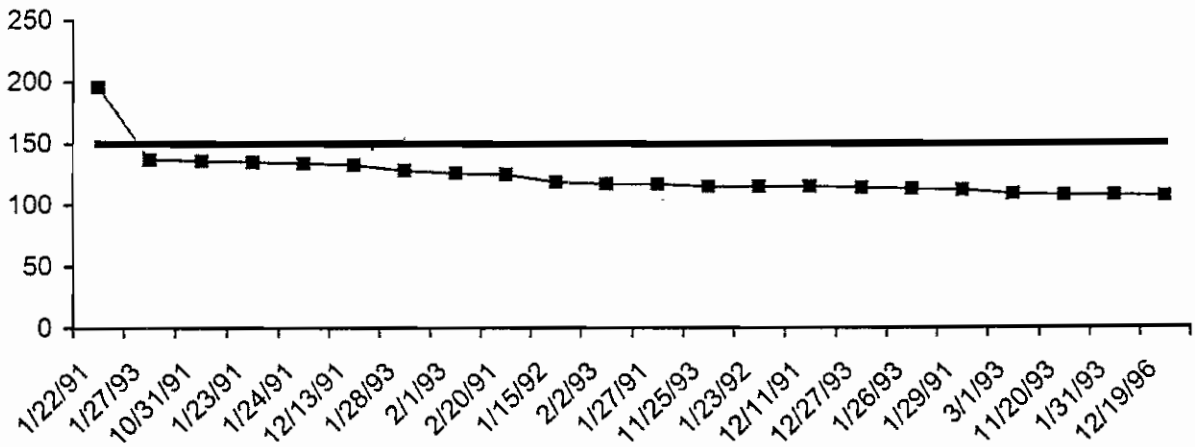


Figure 2
Klamath Falls (Peterson School) PM_{10} Trend
24-Hour Highest Concentrations

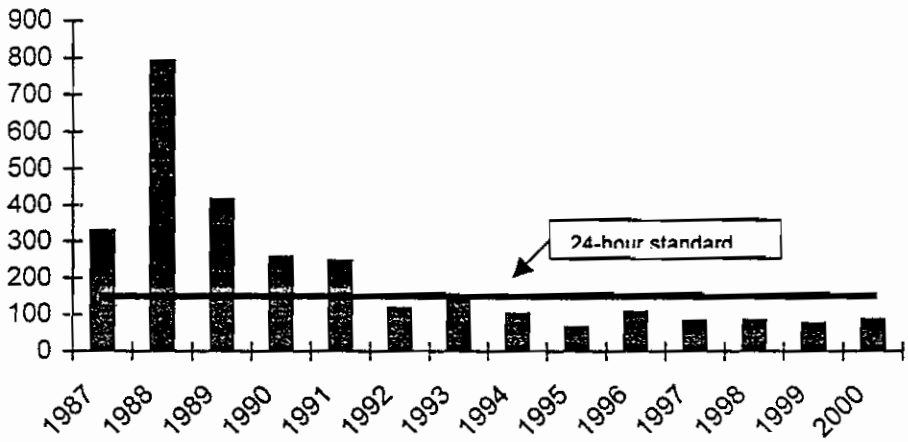
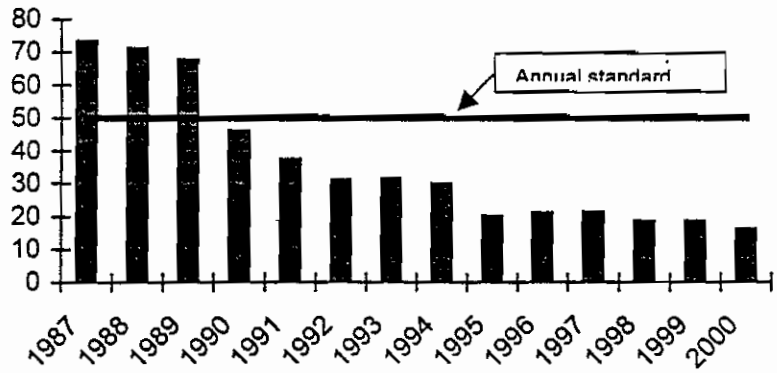


Figure 2 shows that the maximum daily concentration trend since 1988 is significantly downward. Meteorological trends through the same time period will be addressed in the maintenance plan to demonstrate that attainment of the standard was not due to favorable meteorological conditions.

Figure 3 [1]
Klamath Falls (Peterson School) PM_{10} Trend
Annual Average Concentrations



[1] Figure 3 - The 1998 DEQ Annual Report used a 99th percentile and DEQ has not published annual reports for 1999 or 2000. For the purpose of this figure, the annual average concentrations are from the DEQ Annual Reports through 1997. Annual average concentrations for 1998 through 2000 are a weighted average from current data.

There is clearly a downward trend for the annual average emissions as shown in Figure 3 The last exceedance of the annual standard was in 1989 where the annual average was 67 8 µg/m3 for the year. The annual average currently is less than half the standard in recent years since 1995 and is continuing on a downward trend The annual average for 1996 was 21.0 µg/m^3

Strategy Impacts

On January 25, 1988, Klamath Falls experienced the worst wood smoke-related particulate pollution in the nation. Other days during that same winter were nearly as significant. Citizens in Klamath Falls recall those days vividly Townspeople provide anecdotal evidence of the pollution. They recall turning on headlights at noon just to drive through town and public-works employees stopping at midday because they couldn't breathe well enough to continue working.

Since then, pollution levels have not been as memorable. In 1991, there was a significant drop in peak PM_{10} concentrations when the 1991 attainment plan and the mandatory Klamath County wood burning curtailment ordinance was enacted. At the same time there was a significant removal of uncertified wood stoves from homes and an increase in natural gas service to homes in outlying areas. The PURE Project was a wood stove removal and home weatherization program for low-income families, which was completed in 1994. Open burning was eliminated on "yellow" and "red" days, which are poor ventilation days where there is significant pollution in the air.

Saturation Survey

A saturation study was conducted in 1996-97 winter heating season by DEQ to re-evaluate the existing monitoring site selection All PM_{10} levels measured during the study were well below the NAAQS. The Peterson School site was determined to represent the highest particulate levels in Klamath Falls and is appropriately located for ongoing PM_{10} sampling.

Of ten sites sampled in the Klamath Falls area study, two other sites, Hope Street and Avalon Street, also had high particulate levels. Both sites are in close proximity to Peterson School and share the same neighborhood layout, topography and terrain, meteorology and share suspected impacts from residential wood heating and traffic. The Hope street site had the highest concentrations but is not a practical location for a full time sampler because of its proximity to the State Highway (South 6th Street) which is regularly sanded during the PM_{10} season and is located in a more commercial setting. The Avalon Street site is comparable to the Peterson School site but does not have the history of data collection that the Peterson School site has. The Peterson School site is located next to neighborhood streets and residential areas where residential wood combustion occurs and represents potential impacts to schoolchildren

Sampling days were selected based on forecasts for poor ventilation conditions and when high ambient particulate concentrations were likely. Each survey sampler

consisted of a Thomas model 107A pump, which drew air through a filter at 2 meters above the ground. All survey samplers ran from approximately 12:00 PM of the day of the sample to 12:00 PM of the following day. The ten sites were selected based on neighborhood layout, topography and terrain, meteorology and suspected impacts from wood heating, traffic, proximity to commercial businesses and sites selected in the 1985/86 survey.

Emission and Growth projections

The attainment year emissions level and 2015 projection of motor vehicle emissions will be based on EPA's MOBILE Part 5 model. The final maintenance plan document will include a complete attainment year emission inventory and a 2015 emission inventory projection, with the overall source mix for the maintenance period.

Growth projections for the Klamath Falls urban growth boundary are shown in Table 1. The growth rates were discussed with the Klamath Falls Air Quality Advisory Committee for the carbon monoxide maintenance plan approved by Environmental Quality Commission (EQC) in September 2000. This committee will also continue to advise the Department on the development of the PM_{10} maintenance plan. The committee includes representatives from the local jurisdictions, industry, environmental representatives, and local business. The growth rates are consistent with the most recent local comprehensive plan and Portland State University's Center for Population Research and Census projections.

Table 1
Klamath Falls UGB Projected Average Annual Growth

Population growth	**1.2%**
Household growth	1.1%
Avg. Non-Industrial Employment	0.7%
Industrial Employment	1.3%
Vehicle Miles Traveled	1.8%

III. Demonstration of Attainment of National Ambient Air Quality Standard for PM_{10}

A. Monitored Data

Monitored data from 1995 through 1997 will be used to show that the area is in attainment. Data through 2000 will demonstrate that the area continues to show attainment with the PM_{10} daily and annual standard.

B. Other Attainment Documentation

The saturation study referenced above provides further evidence that the area is in attainment. The findings of this study will be submitted as an appendix to the maintenance plan.

A meteorological analysis will be performed to demonstrate that the PM_{10} levels of recent years are not attributable to favorable meteorological conditions This analysis will be summarized in the maintenance plan

IV. Summary of Approved SIP Revision

A. Summary of Air Quality Attainment Plan/Dates of Approval

- EPA designated Klamath Falls as a moderate PM_{10} nonattainment area on November 15, 1990

- A PM_{10} attainment plan for Klamath Falls was adopted by the EQC on January 31, 1991, revised and adopted on November 8, 1991, and was revised again on August 18, 1995 and submitted to EPA on September 22, 1995. EPA approved both the attainment plan and the addendum on April 14, 1997.

B. Description of Permanent and Enforceable Emission Reductions

The plan will document the existing permanent and enforceable strategies that will carry over to the maintenance plan. The basis for any new strategies included in the maintenance plan will be documented through an emission inventory

C. Clean Air Act Sections 110 and Part D Requirements

The main portions of Clean Air Act as last amended in 1990 that apply to the Klamath Falls nonattainment area include Title I Part A Section 110 and Title I Part D Sections 172(c), 176(c)(4), and 187(a).

1977 Clean Air Act Amendments -- New Source Review and Plant Site Emission Limit rules were submitted to EPA on September 9, 1981 and approved on August 13, 1982. The Environmental Quality Commission addressed maintenance areas on September 23, 1998 by further amending these rules

Conformity rules were adopted in 1995 and approved by EPA on May 16, 1996.

The 1993, 1996 and the 1999 periodic emission inventory requirement will be addressed concurrently through the maintenance plan emission inventory

V. Air Quality Maintenance Plan

A. Attainment Year Emissions Inventory

An attainment period emission inventory will be developed for 1996. Annual and worst case daily PM_{10} emissions will be calculated. Point, area and non-road mobile emissions will be estimated using standard EPA emission inventory methodology. EPA's MOBILE Part 5 model will be used to estimate mobile source emissions. The Oregon Department of Transportation (ODOT) travel demand model will supply VMT. ODOT estimated 1996 vehicle miles traveled for the Klamath Falls carbon monoxide maintenance plan. The Klamath Falls travel model provides a localized tool for estimating the area's travel, potential travel changes under various policy options and land use, and demographic changes. The travel model output will be used with MOBILE Part 5 emission factors to estimate mobile source emissions. A summary of the travel model validation was submitted to EPA with the 1999 Klamath Falls Carbon Monoxide maintenance plan.

B. Maintenance Demonstration

The maintenance demonstration will rely on a proportional roll-forward approach, relying on the attainment period ambient concentration, background concentration, the 2015 daily emissions projection, and the 1996 daily emission inventory. The annual emission projection will be done in a similar manner using annual emissions. The following formulas will be used to calculate the 2015 projected ambient concentrations:

2015 projected 24-hour ambient concentration formula

2015 PM_{10} daily ambient concentration =

[(1995-1997 PM_{10} daily ambient concentration – background) *

(2015 daily EI/1996 daily EI)] + background

2015 projected annual average ambient concentration formula

2015 PM_{10} annual ambient concentration =

[(1995-1997 PM_{10} annual ambient concentration – background) *

(2015 annual EI/1996 annual EI)] + background

To meet this demonstration, we expect the resulting 2015 ambient concentration to be below the PM_{10} 24-hour NAAQS and Annual PM_{10} NAAQS.

It is anticipated that additional control measures will not be required to keep the area in attainment throughout the maintenance period. An emissions budget that will govern future transportation conformity determinations for PM_{10} will be established.

C. Monitoring Network and Commitments

DEQ will conduct a PM_{10} saturation survey roughly every five to ten years, pending EPA review Based on monitoring data, relevant traffic data and other considerations such as special project funding availability, DEQ air monitoring, modeling and planning staff, in consultation with EPA air monitoring, modeling and planning staff may reach agreement that the periodic survey is unnecessary, or should be delayed

D. Verification of Continued Attainment

DEQ will continue to operate the PM_{10} monitors in the nonattainment area. A tracking method, such as periodic emission inventories, will be evaluated and addressed in the final redesignation document.

E. Contingency Measures

Contingency measures and triggering events will be discussed with the local advisory committee and addressed in the final plan.

VI. Schedule for Completion

• Technical Analysis Protocol to EPA	May 2000
• Technical Work Completed (draft emission inventory and projection)	October 2001
• Advisory Committee Review	December 2001
• Hearing Authorization	January 2002
• Authorization for public hearing	February 2002
• Submit Legal Notice for Bulletin	March 2002
• Conduct Public Hearing (maintenance plan with proposed emission inventory)	April 2002
• Adoption by Klamath Board of County Commissioners	May 2002
• Topic Review	June 2002
• EQC Adoption (maintenance plan with final emission inventory)	July 2002
• Submit redesignation request and adopted maintenance plan to EPA	August 2002
• EPA Approval (18 months)	February 2004

Department of Environmental Quality

Annette Liebe, Manager, Airshed Planning Section — Date 5/4/01

Region 10 Environmental Protection Agency

Bonnie Thie, Manager, State & Tribal Programs Unit — Date: 4/17/02

Figure 4 Klamath Falls PM_{10} Nonattainment Area