



# Oregon

Theodore R. Kulongoski, Governor

## Department of Environmental Quality

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October 20, 2008

Elin D. Miller  
Regional Administrator  
U.S. Environmental Protection Agency, Region 10  
1200 Sixth Avenue, Suite 900  
Seattle, WA 98101-3140

RE: Oregon's PM<sub>2.5</sub> Nonattainment Boundary Determinations - Additional Supplemental Information

Dear Ms. Miller:

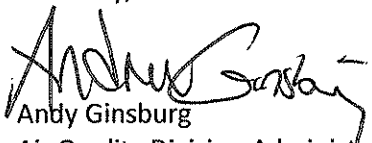
The Oregon Department of Environmental Quality (ODEQ) is submitting additional information to supplement its October 2, 2008 comments on the U.S. Environmental Protection Agency's proposed designations for the 2006 24-hour PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS).

In our October 2<sup>nd</sup> submission, ODEQ recommended the PM<sub>10</sub> SIP-approved Air Quality Zone as the nonattainment boundary for the Klamath Falls area. This recommendation was based on an analysis of the available scientific data to include all sources that contribute to PM<sub>2.5</sub> exceedances. Based on air quality monitoring and speciation data, DEQ identified woodsmoke as the primary cause of PM<sub>2.5</sub> pollution in the area. Meteorological data showed Klamath Falls was frequently affected by nighttime inversions and low wind speeds on violating days, causing woodstove smoke to stay suspended in the area. The information enclosed with this letter (Attachment B) provides further supporting evidence that that PM<sub>2.5</sub> pollution is caused by woodsmoke and is a localized effect.

Additionally, the Lane Regional Air Protection Agency (LRAPA) submitted comments to the EPA Docket on the recommended PM<sub>2.5</sub> nonattainment boundary for Oakridge. ODEQ fully supports LRAPA's recommendation and analysis that the Oakridge Urban Growth Boundary (UGB), as recommended by Governor Kulongoski in December 2007, is the most appropriate nonattainment boundary. ODEQ requests that LRAPA's comments and technical analysis be considered in the same manner as a State comment. ODEQ has worked closely with LRAPA to address PM<sub>2.5</sub> pollution in Oakridge, and we value this partnership to maintain clean air in Oregon.

We appreciate any efforts you can make in considering this information as you finalize your decision on the Klamath Falls and Oakridge nonattainment boundaries. If you have any questions please feel free to contact either Rachel Sakata (503-229-5659) or Larry Calkins (541-567-8297, Ext. 25).

Sincerely,

  
Andy Ginsburg  
Air Quality Division Administrator

Enclosure



cc: Lane Regional Air Protection Agency  
Klamath County Public Health Department



# Oregon

Theodore R. Kulongoski, Governor

## Department of Environmental Quality

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October 2, 2008

### Air Docket

Docket ID #: EPA-HQ-OAR-2007-0562  
U.S. Environmental Protection Agency  
Mail Code 6102T  
1200 Pennsylvania Ave, NW  
Washington, DC 20460

**Subject:** Comments on the Area Designations for the 2006 24-Hour PM 2.5 National Ambient Air Quality Standards (Docket #: EPA-HQ-OAR-2007-0562, FRN page #: 51259-51260)

The Oregon Department of Environmental Quality (ODEQ) appreciates this opportunity to comment on the U.S. Environmental Protection Agency's (EPA) proposed designations for the 2006 24-hour PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) published in the Federal Register on September 2, 2008. ODEQ is concerned with EPA's proposed PM<sub>2.5</sub> designations that greatly expands ODEQ's proposed boundary for Klamath Falls.

ODEQ does not believe EPA based the proposed nonattainment boundary for Klamath Falls on a full understanding of the available data; therefore, ODEQ submits supplemental analysis in this letter and Attachment A for consideration. ODEQ does not believe the proposed boundary is appropriate and recommends the PM<sub>10</sub> SIP-approved Air Quality Zone (AQZ) as a viable and scientifically defensible PM<sub>2.5</sub> nonattainment area boundary for Klamath Falls.

ODEQ's recommendation of the PM<sub>10</sub> SIP-approved Air Quality Zone (AQZ) is larger than the state's initial recommendation of an urban growth boundary (UGB). Attachment A provides a detailed analysis. Like ODEQ's initial UGB boundary recommendation, this recommendation includes the urban area of Klamath Falls, all major industrial sources *both inside and outside* the UGB, and all other sources that have the potential to contribute to PM<sub>2.5</sub> exceedances at this time. The recommendation also provides an additional buffer area to capture near-by sources that may occasionally contribute to general PM<sub>2.5</sub> levels in Klamath Falls. Emission sources located outside the AQZ would not be included in the official nonattainment area but would be evaluated for their effect,

if any, on the nonattainment area when ODEQ develops the Klamath Falls PM<sub>2.5</sub> attainment plan in 2009-10.

ODEQ's technical analysis uses the best available information to fully assess all contributing sources to the Klamath Falls area. If EPA has further questions or needs additional data collection and technical analysis, ODEQ asks EPA to delay making the nonattainment decision. This would allow ODEQ time to provide supplemental information for EPA to make a science-based determination in Klamath Falls.

#### History of PM Pollution in Klamath Falls

ODEQ has taken many steps over the years to address particulate matter (PM) pollution. In 1987, Klamath Falls was in violation of the federal PM<sub>10</sub> standards and had some of the worst particulate pollution in the county. ODEQ submitted a PM<sub>10</sub> attainment plan to EPA in 1991 for the Klamath Falls area, using the urban growth boundary as the nonattainment area boundary. The attainment plan resulted in NAAQS compliance in 1994. The efforts of the Klamath Falls community and ODEQ were so successful that when EPA promulgated the 1997 standards for PM<sub>2.5</sub>, there were no violations of the standard in Klamath Falls, or anywhere in Oregon. When EPA lowered the PM<sub>2.5</sub> standard in 2006, Klamath Falls was once again at the crossroads of a nonattainment designation.

The emission sources contributing to current PM<sub>2.5</sub> NAAQS exceedances are likely the very same sources that contributed to PM<sub>10</sub> exceedances in the 1980's. As with PM<sub>10</sub>, these sources can be successfully addressed through ODEQ's proposed nonattainment area boundary of the Air Quality Zone (AQZ).

EPA's larger proposed nonattainment boundary is based on assumptions that reflect generic conditions across the country, but do not reflect the factors that underlie NAAQS violations in Klamath Falls. For example, in the eastern U.S., PM pollution is typically caused by regional sources and transport from secondary particulate formation. In Oregon, PM problems are typically caused by localized residential wood smoke during wintertime air stagnation periods. ODEQ's monitoring data shows that woodsmoke pollution comprises 75-80 percent of the known pollution at the monitor, indicating woodsmoke is the primary contributor of PM pollution in Klamath Falls.

Sources Affecting the Klamath Falls Nonattainment Boundary

EPA's determination of a nonattainment boundary for Klamath Falls is not based on sound technical information. Many of the assumptions used by EPA as the basis for their boundary determination do not uphold the Clean Air Act's mandate (Section 107(d)(1)(A)(i)) to only include those areas that contribute to not meeting EPA's ambient air quality standard. For example:

*Woodstoves*

Local meteorology data strongly suggests woodstove use is creating the pollution concentrations at the violating monitor and is localized to the air quality zone. ODEQ's meteorological analysis suggests severe shallow ground level inversions occur at night during wintertime air stagnation periods. The high elevation and topographic features of the Klamath Falls urban area cause PM pollution to be trapped in low lying areas by a layer of warmer air above. Exceedance days are characterized by low wind speeds allowing PM pollution from woodstoves to concentrate in the urban area. The nighttime inversions coupled with low wind speeds strongly suggest pollution is a localized effect.

*Agricultural & Federal Lands*

EPA's recommendation for the Klamath Falls nonattainment boundary encompasses large tracts of agricultural land and over 23,000 acres of federally managed lands that are not densely populated. These areas do not contribute PM<sub>2.5</sub> emissions except during field burning activities; however, there is no correlation between any exceedances of the standard during these field burning events. The monitored exceedance days happen in the wintertime, when burning does not occur on these lands.

*Other Outside Sources*

EPA included the communities of Keno and Merrill in the proposed Klamath Falls nonattainment boundary. There is no evidence that the cities of Keno and Merrill impact the Klamath Falls nonattainment area. The Keno and Merrill areas are separate airsheds that would require significant wind transport to bring emissions into the Klamath Falls area. Meteorological data in Klamath Falls indicates low wind speeds dominate during violating days, further indicating pollution is localized to the Klamath Falls urban area.

In closing, the ODEQ has worked hard to ensure emissions from sources affecting NAAQS compliance are quickly addressed. A federal nonattainment designation has serious legal and economic consequences for small communities such as Klamath Falls, and can cause great economic hardship. Klamath Falls has worked consistently over the

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past twenty years to meet federal air quality standards and reverse the stigma of "nonattainment". It is critical that the nonattainment area boundary be established based on a thorough analysis of the emission sources that pose a risk to NAAQS violations in this community.

As in the past, we will continue to work with local communities to implement strategies necessary to bring air quality back into compliance with health standards as quickly as possible. In setting the PM<sub>2.5</sub> nonattainment area boundary for Klamath Falls we ask EPA's full consideration of the science and analysis when determining the nonattainment boundary and to ensure that the determination meets the requirements of the Clean Air Act.

Sincerely,



Dick Pedersen  
Director

Enclosure

cc: Mahbubul Islam, U.S. EPA, Region X  
Steve Body, U.S. EPA, Region X  
John Elliott, Klamath County Commissioner  
Marilyn Sutherland, Klamath County Public Health Department

**Attachment A**  
**Supplemental Information for the**  
**Nonattainment Area Boundary Analysis – Klamath Falls**

**Introduction**

On August 18, 2008, the U.S. Environmental Protection Agency (EPA) informed the Oregon Department of Environmental Quality (DEQ) of its intention to modify the state's recommendations for the fine particulate matter (PM<sub>2.5</sub>) nonattainment areas in Oregon. Based on the description and rationale for EPA's modification to Oregon's recommended nonattainment boundaries, the DEQ disagrees with the conclusions of the analysis and would like to submit additional information to assist in the final determination decision for the Klamath Falls nonattainment boundary area.

In December 2007, DEQ submitted an extensive analysis of the factors influencing PM<sub>2.5</sub> NAAQS violations in Klamath Falls and recommended the Urban Growth Boundary (UGB) as the nonattainment area boundary for Klamath Falls. EPA reviewed DEQ's analysis and conducted its own nine factor analysis. EPA's recommendation includes a portion of Klamath County be designated nonattainment for the 24-hour PM<sub>2.5</sub> air quality standard. EPA greatly expanded Oregon's proposed boundary on the basis that other major sources and populations could contribute to violations in the area.

DEQ believes EPA's specific determination of a nonattainment boundary for Klamath Falls is inaccurate and therefore inappropriate. Many of the assumptions used as the basis for the boundary determination do not uphold the Clean Air Act's mandate to only include those areas that contribute to not meeting EPA's ambient air quality standard. In particular, this nonattainment boundary must consist of those sources that are directly responsible for violations of the standard, and rely on concrete data from sources that could be contributing.

DEQ proposes an alternative boundary in this memo, known as the Air Quality Zone (AQZ). In this supplemental analysis, DEQ shows that EPA's boundary does not accurately represent the sources that contribute to violations of the standard and analyzes each proposed boundary by additional criteria not included in the original December 2007 submission. Local woodstove use, meteorological conditions indicating pollution is contained within the Klamath Falls urban area, Oregon's unique land-use laws restricting population growth, and population density all indicate PM<sub>2.5</sub> pollution is localized and occurs within the AQZ.

This memo will address several elements, including;

1. Proposed geographic boundaries
2. Emissions data
3. Air quality monitoring and meteorology data
4. Land use, population density and growth estimates

5. Traffic and commuting patterns
6. Geography and topography

## **1. Proposed Geographic Boundaries**

### EPA's Analysis and Proposed Boundary

EPA conducted a nine factor analysis and reviewed DEQ's analysis to determine the boundary for the Klamath Falls PM<sub>2.5</sub> nonattainment area (NAA). EPA concluded that DEQ's recommended area of the UGB did not include all the sources in the area that could potentially contribute to violations of the standard.

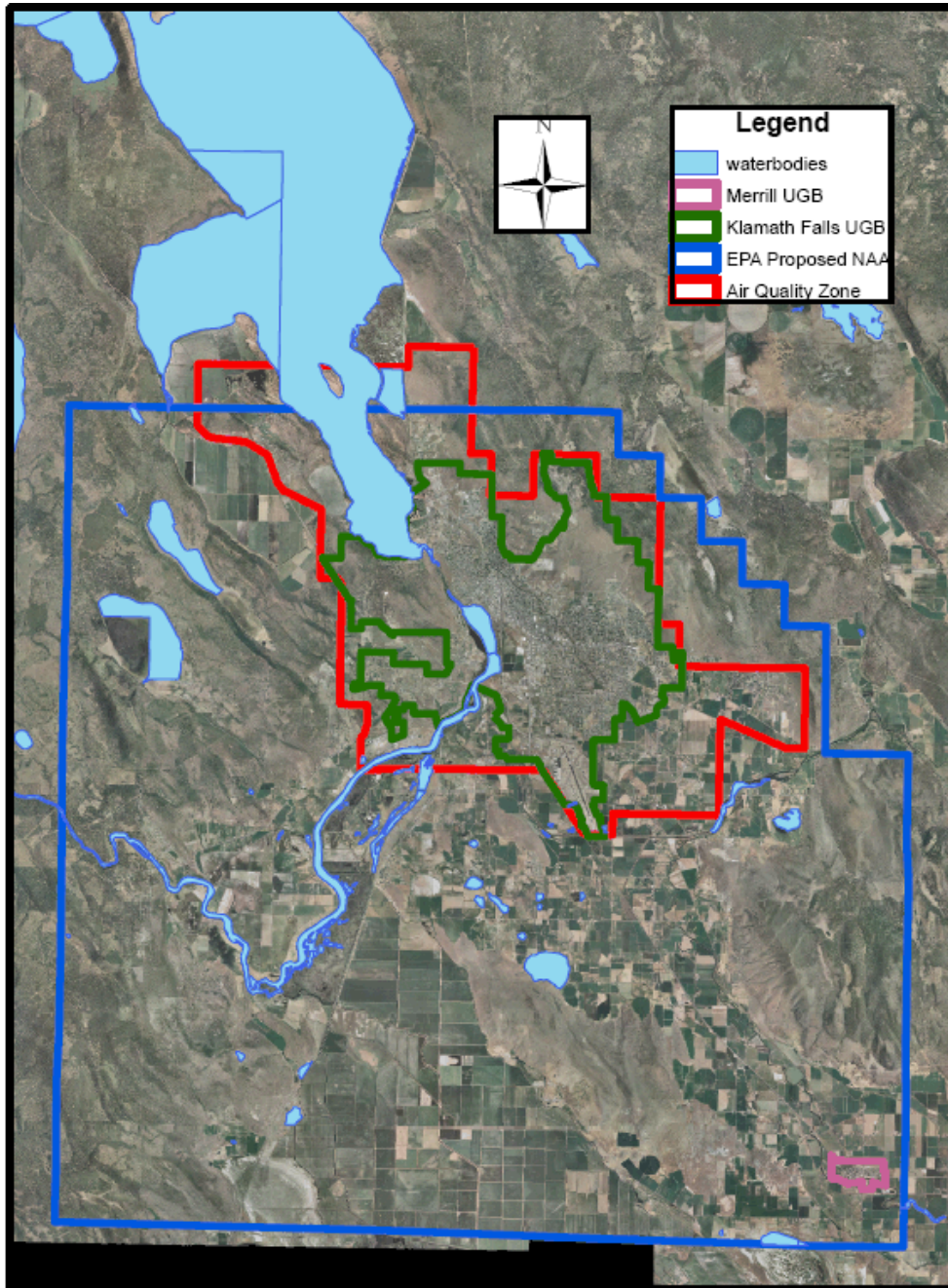
In EPA's proposed determination, the NAA boundary is expanded beyond the UGB. EPA's analysis determined at least two major industrial sources located just outside the UGB, and two small communities, Keno and Merrill, located 20 miles to the southeast and southwest of the UGB, could contribute to violations in the area. EPA's expanded boundary extends all the way south to the Oregon-California jurisdictional state line and includes areas EPA believes encompass potential sources and nearby populations in the same airshed, that is, areas not physically separated from Klamath Falls by mountains or other topographic features. However, DEQ does not believe the broad areas to the south of Klamath Falls, and specifically the communities of Keno and Merrill, contribute significantly to PM<sub>2.5</sub> impacts in the Klamath Falls area, based on population density and meteorology.

EPA's proposed NAA encompasses large tracts of productive agricultural land (roughly 120,000 acres) and over 30,000 acres of state and federally managed lands that are sparsely populated. Additionally, over 28,000 acres of private timberlands are in the proposed area. These areas do not have significant PM<sub>2.5</sub> emissions except during field and slash burning activities; however there is no correlation between exceedances of the standard that occur in the winter months, and field burning events that occur in the summer and slash burning is regulated by a smoke management program.

The map in Figure 1 shows the proposed EPA boundary. It also shows the UGB and the alternative Air Quality Zone (AQZ) boundary, proposed in this response by DEQ as a new recommended nonattainment boundary for Klamath Falls. The AQZ boundary encompasses an area greater than the UGB and includes all industrial sources and surrounding subdivisions that may provide contributing source impacts to the urban area near the monitor. See Appendix A for additional maps.



**Figure 1 Proposed Nonattainment Area Boundaries – Klamath Falls**



State of Oregon’s Proposed Boundary for Klamath Falls

DEQ has reviewed EPA’s recommendation for the proposed Klamath Falls NAA boundary and believes it is not based on a full understanding of the available data. DEQ’s speciation data, local meteorology, population density, and degree of urbanization indicates that sources of pollution are localized to the Klamath Falls urban area.

The AQZ was originally established and designated by Klamath County in 1991 to address PM<sub>10</sub> pollution. Known as the “Air Quality Protection Area”, (surrounding the UGB), it was incorporated into Oregon’s State Implementation Plan<sup>1</sup>, to address older subdivisions outside of the Urban Growth Boundary that may contribute to emissions inside the UGB.

Klamath County revised the boundary in 2002 and added protections for PM<sub>2.5</sub>. The new boundary was expanded and renamed to the “Air Quality Zone”. The AQZ was expanded to include existing residential areas and industrial sources originally excluded from the UGB. It goes beyond the UGB to the east to include existing residential subdivisions. The boundary continues south to include the airport (Kingsley Field). Continuing southeast, the AQZ includes three major industrial sources (Collins Forest Products, the Peaker Facility and the Klamath Co-Generation facility). The delineation of the AQZ also considered potential future impacts to the Klamath Falls area, and extends north and east of the UGB to include a destination resort along Klamath Lake and proposed residential subdivisions and to account for future recreational and residential growth.

Within the revised 2002-Air Quality Zone, stricter air quality requirements were established that include restrictions on open burning and woodstove use. Speciation data (2007-2008) suggest woodstoves are the primary source creating the pollution concentrations seen at the Peterson School monitor. To address the potential woodsmoke issues, woodstove use was restricted on days when the anticipated PM<sub>2.5</sub> concentration was expected to exceed 65 µg/m<sup>3</sup>. Open burning was prohibited, except for a 30 day window, twice per year. In 2002, when DEQ submitted a PM<sub>10</sub> maintenance plan for Klamath Falls, it included the revised AQZ as part of the State Implementation Plan (SIP)<sup>2</sup>

In November of 2007, Klamath County Commission revised the restrictions within the AQZ to reflect the 2006 federal PM<sub>2.5</sub> National Ambient Air Quality Standard (NAAQS). It reduced the allowed open burn window to a maximum of 15 days twice per year and curtailed woodstove use when emissions were expected to exceed 30 µg/m<sup>3</sup>. The AQZ boundary was also slightly changed at that time. See map in Figure 1.

DEQ’s recommendation of the AQZ for the Klamath Falls nonattainment boundary incorporates potential sources that could contribute to violations at the monitor. Exceedances occur on winter days when strong nocturnal inversions occur and wind speeds fall below three miles per hour at night. There is little or no transport of wood combustion-related smoke into or out of the area. Other potential outside sources, such as the small, southern communities of Keno and Merrill are located about 12 miles and 20 miles from Peterson School monitor respectively. They are separated by hills, topography or distance to prevent the buildup and transport of emissions. For this reason,

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<sup>1</sup> Klamath Falls PM<sub>10</sub> Attainment Plan, incorporated into the SIP, June 1995.

<sup>2</sup> Approved by EPA, 2005

DEQ is proposing that these small communities not be included within the nonattainment area boundary and the AQZ be used instead.

## 2. Emissions Data

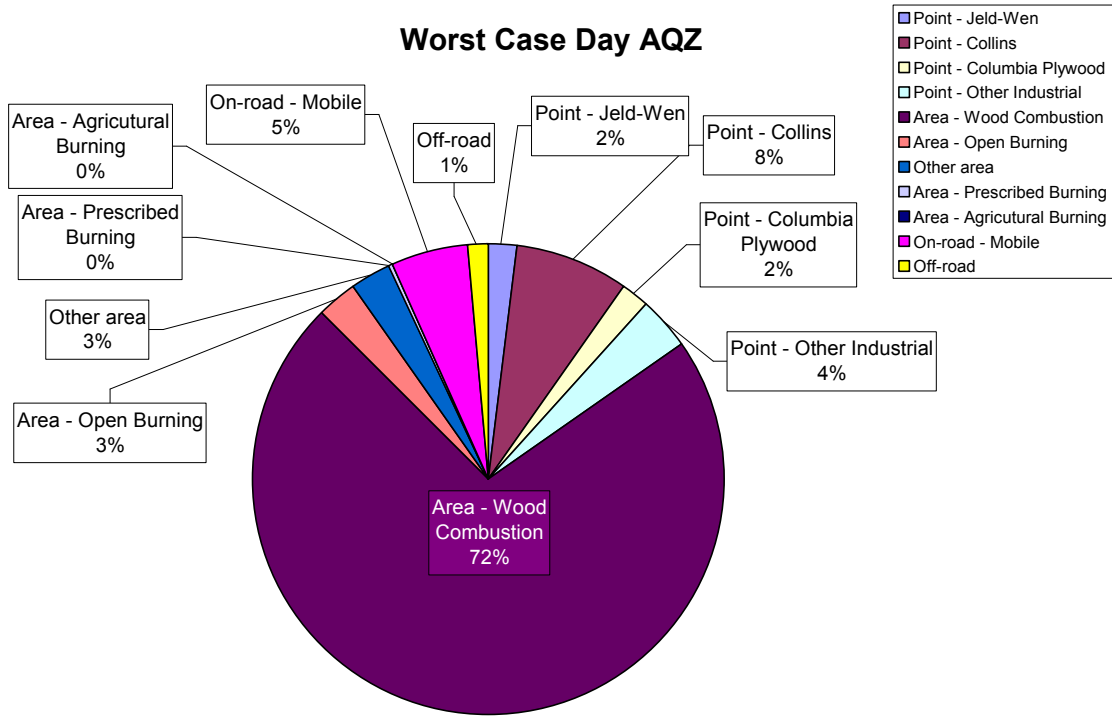
DEQ analyzed Klamath County emissions data that was subsequently submitted as part of the 2005 National Emissions Inventory (NEI). DEQ scaled the inventory, based on population to the UGB, the alternative AQZ, and EPA’s proposed NAA boundary. Table 1 provides a worst case daily analysis (lbs/day) for the UGB, the AQZ, and the proposed EPA NAA. Table 1 shows that there is not a substantial difference in emissions between the AQZ and the EPA NAA for area and point sources, which are the major contributors to the emission inventory.

**Table 1 – Worst Case Day Rough Estimate PM2.5 Emission Inventory**

	Area sources (lbs/day)	Point sources (lbs/day)	Nonroad sources (lbs/day)	On road sources (lbs/day)
UGB	8588	914	137	512
AQZ	9168	1808	166	626
EPA proposed NAA	10254	1808	249	695

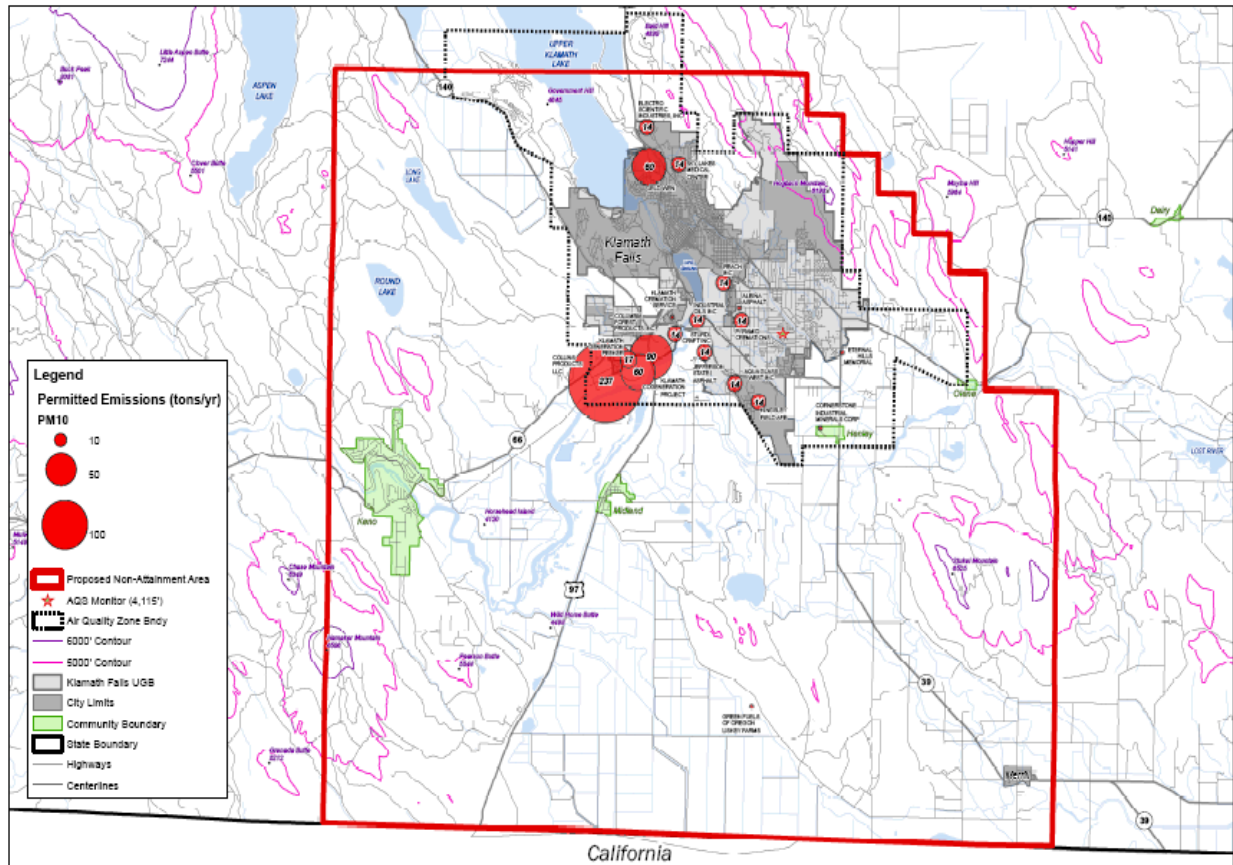
Area sources are a significant source of emissions in the Klamath Falls area, the largest portion of which is residential wood combustion for heating. Figure 2 shows that the contribution from wood combustion in the AQZ comprises 72% of the total emission inventory.

Figure 2 - Emission inventory pie chart showing the Air Quality Zone worst case day



EPA’s analysis acknowledged that residential wood combustion (RWC) is an important contributor to PM<sub>2.5</sub> emissions in the Klamath Falls area. However, EPA was also concerned about other potential sources including industrial point sources not included in DEQ’s original UGB nonattainment boundary. DEQ’s new proposed nonattainment boundary area, the AQZ, now includes all the identified point source emissions that could contribute to the Klamath Falls area and almost all area source emissions. Figure 3, identifies the potential industrial source contribution and their permitted emissions, all located within the AQZ.

Figure 3: Map of Industrial Point Sources and their relative PM2.5 contribution



Appendix B contains additional data for permitted industrial sources in Klamath County, including current and future emission controls. Further PM emissions reductions are expected at these facilities, once EPA’s Maximum Achievable Control Technology (MACT) standards go into effect.

The emission inventory shows that wood stove emissions are the most significant source of emissions, and these emission sources are located in the urban population center of Klamath Falls. The EPA proposed NAA does not add emission sources that significantly contribute to, or are projected to contribute to, particulate levels on exceedance days in Klamath Falls. Consequently, we recommend the AQZ as the nonattainment area boundary.

### 3. Air Quality Monitoring and Meteorological Data

Air quality monitoring data provide supporting evidence that residential wood combustion emissions are the primary cause of exceedance days and not other burning, such as agricultural or prescribed burning. Data shows exceedances occur during winter months, at a time when only woodstoves are contributing to smoke in the area. Agricultural lands and forest lands are either flood irrigated or covered in ice and snow

during these months. For this reason, DEQ is proposing that the nonattainment area not be extended to the California border which encompasses primarily agricultural and range-forest lands. Rather we are proposing the AQZ.

In the 2005-2007 monitoring period, exceedances of the 24-hour standard did not occur at any time except during the winter months, specifically from the end of October through January. Table 2 shows the exceedance days and values during this 2005-2007 monitoring period.

Table 2: 2005 – 2007 PM<sub>2.5</sub> Exceedance Days & Values

2005		2006		2007	
Date	Value (ug/m3)	Date	Value (ug/m3)	Date	Value (ug/m3)
1/13/05	49.9	1/23/06	47.5	1/15/07	39.7
1/16/05	46.4	12/4/06	51.2	1/18/07	55.6
1/19/05	50.5	12/31/06	52.6	1/24/07	35.3
1/22/05	49.2			11/23/07	39.6
10/31/05	43.3				
11/18/05	38.7				
11/21/05	37.3				
11/24/05	35.2				
12/6/05	44.2				
12/12/05	46.8				

The October through January period corresponds directly with the winter wood heating season (cool season) and indicates the exceedances are a seasonal occurrence.

Speciation Data

In DEQ’s nine factor analysis for the Klamath Falls area (March 20, 2008), the state evaluated speciation data from summer (June 2000) and winter samples (December 2000). Comparison of these PM<sub>2.5</sub> samples indicated that the percentage contributions from organic and elemental carbon were roughly the same. Elemental and organic carbon are typical indicators of combustion activities, including wood burning. Further, EPA conducted its own speciation analysis and similar results were found. As a result of this analysis, DEQ concluded that burning is a major contributor to PM levels in Klamath Falls, irrespective of season.

EPA’s own nine factor analysis acknowledged wood smoke is an important source impacting the Peterson School monitor, but also indicated other sources could be contributing. More recent analysis by DEQ of samples from the fourth quarter of 2007 from Klamath Falls, shows carbon is still a significant contributor to PM<sub>2.5</sub> emissions. On November 8, 2007 and December 14, 2007, two recorded exceedance days, organic carbon is the most significant (74%-79%) PM<sub>2.5</sub> sample component. (Figures 4 and 5)

Figure 4 – PM<sub>2.5</sub> Speciation Data from November 8, 2007 (36 ug/m<sup>3</sup>) measured at the Peterson School monitor

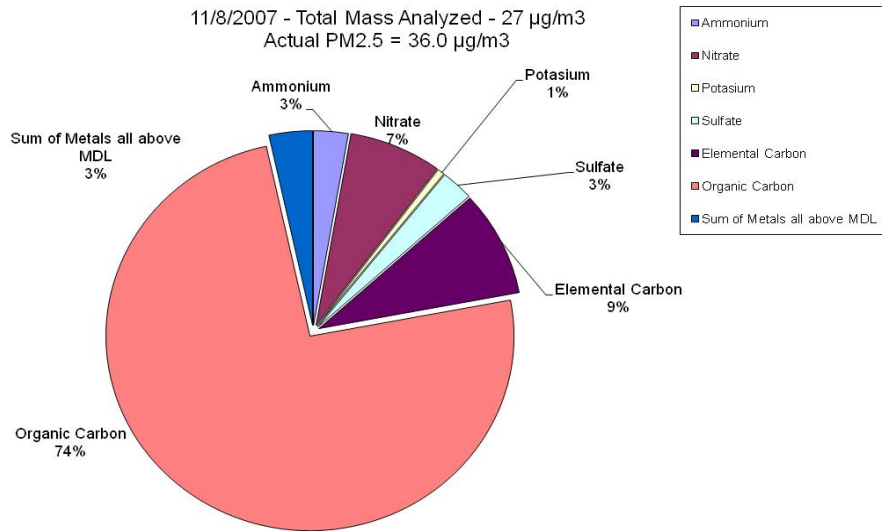
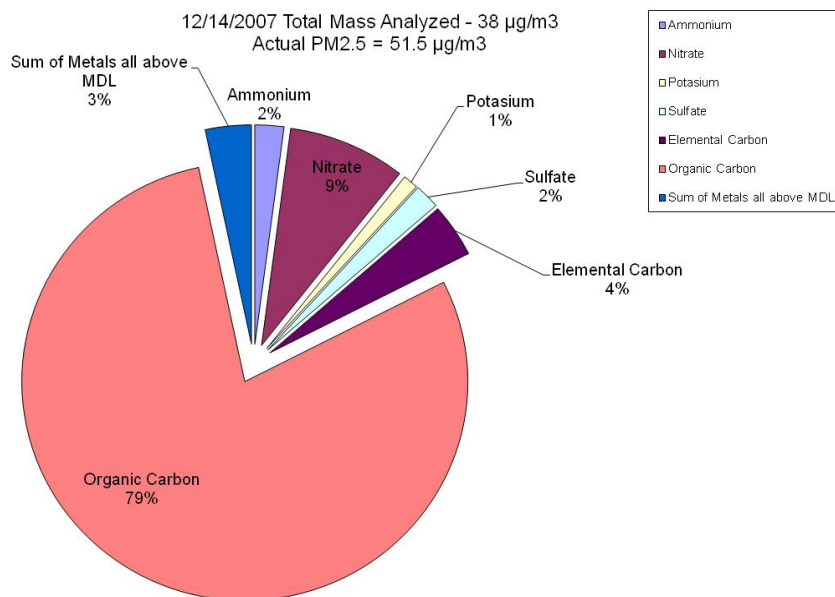


Figure 5: PM<sub>2.5</sub> Speciation Data from December 14, 2007 (51.5 ug/m<sup>3</sup>), measured at the Peterson School monitor



As noted above, carbon sources are associated with products of combustion. Elemental carbon sources include fossil fuel combustion including motor vehicles, whereas organic carbon is typically associated with wood burning from woodstoves, open burning, or biomass burning. The contribution of elemental carbon relative to organic carbon in the Klamath Falls speciation data is small (4% vs. 79%), indicating most of the PM<sub>2.5</sub> is coming from wood burning activities not from fossil fuel combustion, including on-road and non-road emissions.

DEQ also analyzed the speciation data for potassium. Potassium is a trace element found in high concentrations in wood smoke, and has often been used as a wood smoke tracer.<sup>3</sup> Studies by Schauer, et al. (2001) have associated ratios of potassium to organic carbon based on wood type. As shown in the speciation data (Appendix C), potassium is approximately 0.6% by weight of the sample and organic carbon is approximately 76.9% by weight, giving a potassium to organic carbon ratio of 0.008:1.0. This correlates well with the potassium to organic carbon ratio of 0.005:1.0 for pine wood<sup>4</sup>, and indicates a high probability that the PM<sub>2.5</sub> sample came from a wood smoke emission source.

DEQ also reviewed the speciation data on nitrate and sulfate to determine how much of the PM contribution could be coming from industrial sources and secondary particle formation. Only 10% of total PM<sub>2.5</sub> mass is from nitrate and sulfate, indicating that the formation and transport of secondary inorganic particulate from industrial sources is not a significant contributor to PM<sub>2.5</sub> exceedances. Appendix C contains more detailed information and other speciation data.

On September 18, 2008, EPA published new speciation data analyzed by Desert Research Institute (DRI) for ten areas EPA planned to designate nonattainment where there was a lack of speciation data.<sup>5</sup> Klamath Falls was one of those areas. EPA's analysis confirms DEQ's conclusions regarding the large contribution of carbon contributing to PM levels in Klamath Falls.

DEQ provided EPA with twelve samples representing the top exceedance days for January 2004 through December 2006. All twelve data samples occurred in the wintertime. The average FRM mass was 42.1 µg/m<sup>3</sup> of which 36.8 µg/m<sup>3</sup> (87%) was a total carbon mass. Figure 6 indicates the percentage of nitrate, sulfate, total carbon mass (TCM) and crustal components of the PM speciation. Nitrate and sulfate were adjusted for particle bound water in accordance with EPA methodology.

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<sup>3</sup> Larson & Koenig, (1994)

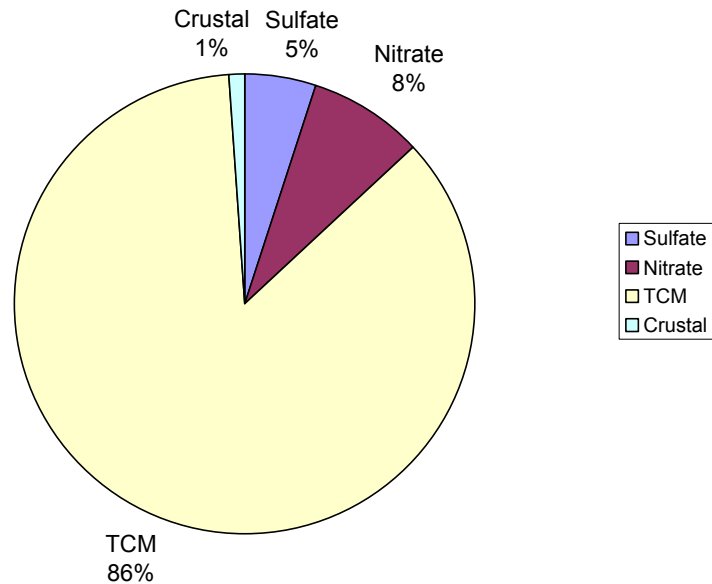
<sup>4</sup> Schauer et al. (2001)

<sup>5</sup> [http://www.epa.gov/ttn/naags/pm/docs/available\\_new\\_speciation\\_data\\_pm2.5\\_naa.pdf](http://www.epa.gov/ttn/naags/pm/docs/available_new_speciation_data_pm2.5_naa.pdf)



Figure 6

**EPA Speciation Analysis of 12 filter samples in Klamath Falls**



Consistent with DEQ’s analysis, Figure 6 shows nitrate and sulfate are not significant contributors. EPA’s speciation data also had similar amounts of potassium in the samples, indicating a tracer for wood combustion similar to the samples analyzed by DEQ. This provides further evidence that wood burning activities, a primary source of carbon emissions, represents the majority of PM pollution.

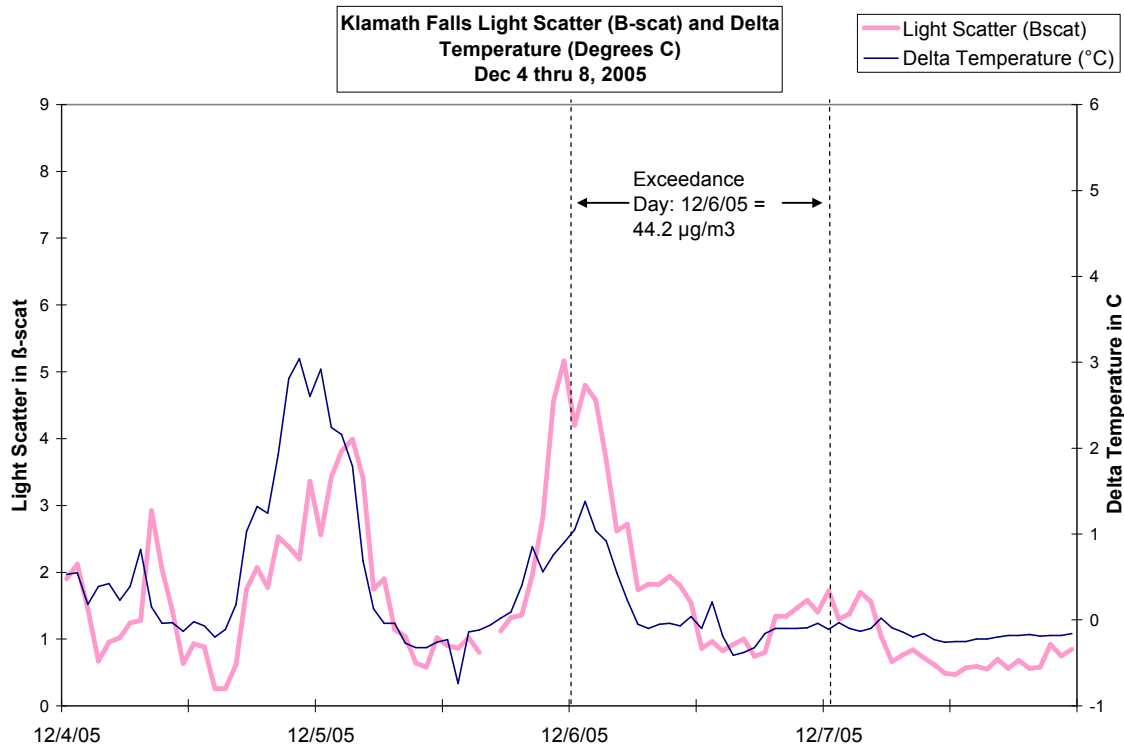
Meteorology and Diurnal Effects:

Additional evidence that woodstove smoke is the main contributor to violations at the Peterson School monitor can be seen in an examination of local meteorology and its diurnal pattern. EPA is concerned about transport from regional sources, particularly from potential sources to the south, west, and east of the monitor. Meteorological data from Klamath Falls indicates that low wind speeds dominate during violating days, and the Klamath Falls area experiences frequent winter-time nocturnal inversions, when PM pollution can build up over time. These night-time inversions coupled with low wind speeds strongly suggest that pollution in the Klamath Falls area is a localized effect caused by woodstoves, with little wind movement to bring pollution from outside the urban area.

Figures 7, 8, and 9 below show a typical night time effect during the winter. Figure 7 shows the comparison of light scattering and temperature. Temperature was measured at two meters (~six feet) and ten meters (~33 feet). A change in temperature from the two

and ten meters is considered a delta temperature; a positive change in temperature indicates a strong inversion near the surface of the ground. Beta scatter ( $\beta$ -scat) is a light scatter measurement that correlates to  $PM_{2.5}$  ( $3.5 \beta$ -scat roughly equals  $35 \mu\text{g}/\text{m}^3$ ). Light scatter has a good correlation to  $PM_{2.5}$  in Klamath Falls ( $R^2 = 0.93$ ). On December 6, 2005, an exceedance day ( $44.2 \mu\text{g}/\text{m}^3$ ), the B-scat measurements and delta temperature patterns closely correspond. This shows a relationship between the strong inversion and stagnant weather conditions contributing to the  $PM_{2.5}$  pollution.

**Figure 7 – Night-time inversions as displayed in Delta C with particulate pollution as displayed in  $\beta$ -scat.**



Figures 8 and 9 below show a typical night time condition for an episode during December 1 - 5, 2006 and December 28, 2006 - January 3, 2007. Hourly nephelometer data are compared to wind speed. There were two monitored exceedances during this time period - December 4, 2006 ( $51.2 \mu\text{g}/\text{m}^3$ ) and December 31, 2006 ( $52.6 \mu\text{g}/\text{m}^3$ ). The "0:00" hour is midnight. During the exceedance days wind speeds often decrease to less than three miles per hour until midnight and stay low until the surface warms and air movement changes. This causes woodsmoke pollution to remain close to the ground and localized within the urban area.

Figure 8 – Diurnal Effects on December 4, 2006 as displayed in beta scatter (B-scat).

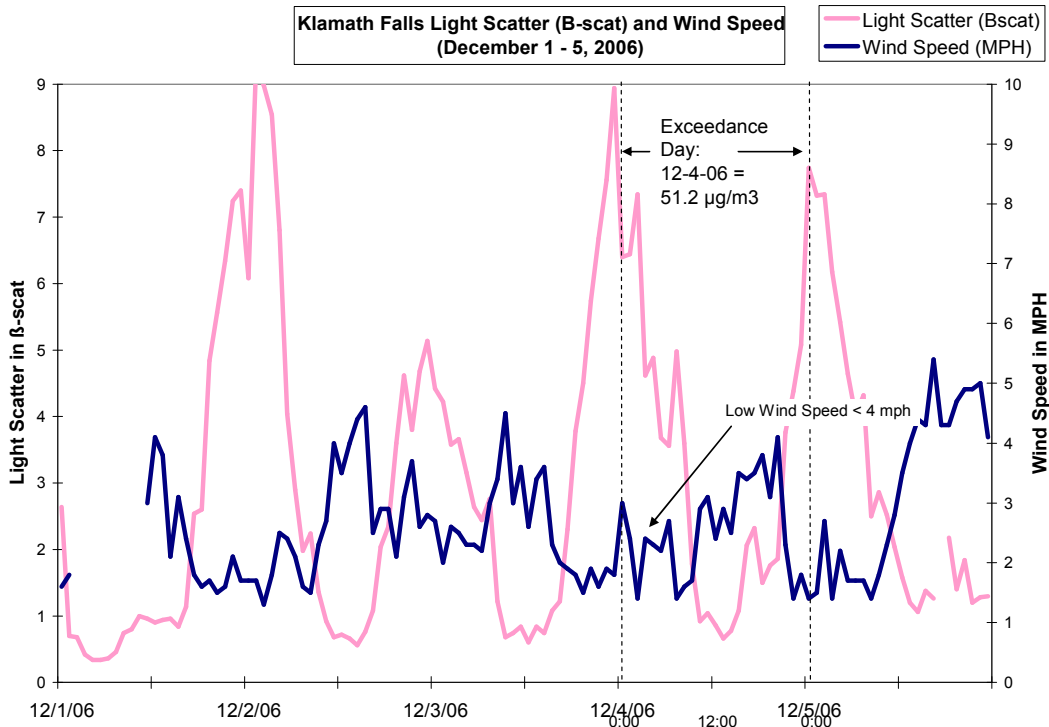
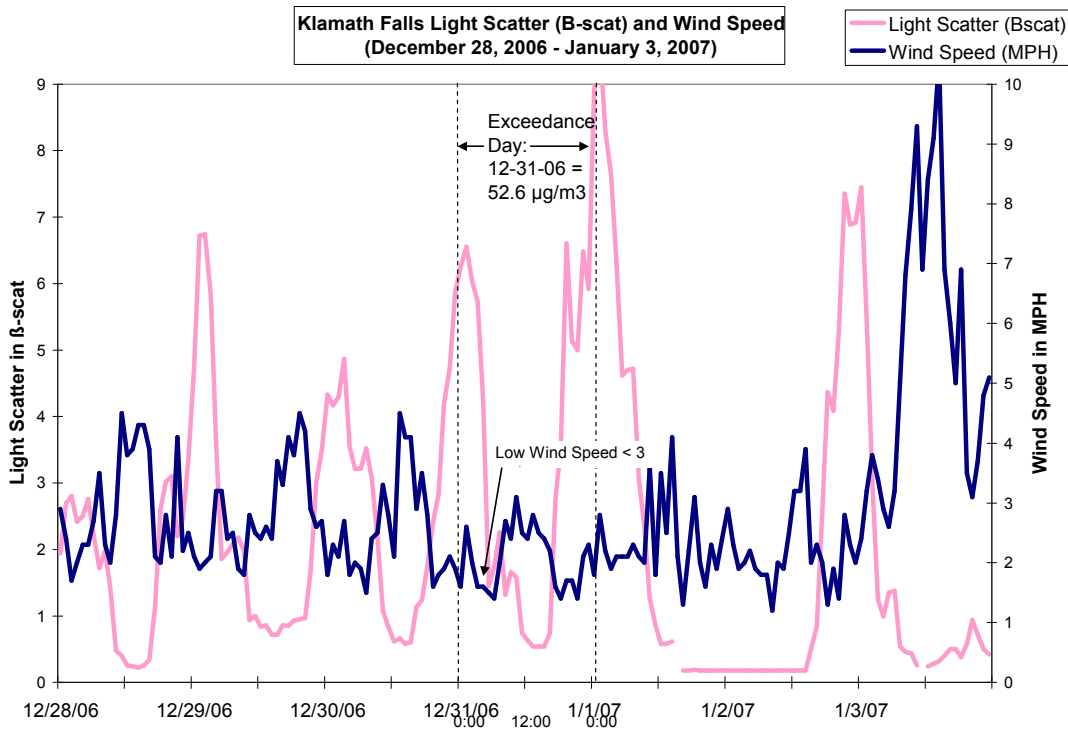


Figure 9 – Diurnal Effects on December 31, 2006 as displayed in beta scatter (B-scat).



The graphs in Figures 7, 8, and 9 show high concentrations from 5 p.m. - 6 p.m. on the exceedance days until midnight or 1 a.m. and then decrease until 5 a.m., sometimes increasing slightly at 7 a.m. and then decreasing to very low concentrations by 11 a.m. or noon. This is typical of woodstove use, when residents fire up their woodstoves in the evening hours and again in the early morning hours. If regional transport or industrial emissions were the main contributors to PM pollution, emissions tend to be more constant throughout the entire day. Figures 7, 8, and 9 provide further evidence that PM pollution is a diurnal effect of woodstove heating. Additional charts showing the diurnal effects on exceedance days are displayed in Appendix D.

EPA concluded in its analysis that the HYSPLIT back trajectories indicated a more expansive boundary would be appropriate to capture all sources that might contribute to the violations. Back trajectories are typically used when a specific source of emissions is suspected of influencing a receptor. In this case there are no suspected sources of emissions from the southeast influencing the exceedance days as EPA may suggest. EPA based part of its decision on the analysis of only a few HYSPLIT trajectories but did not take into account the range of trajectories during other exceedance days. Although many of the trajectories on violating days come from the southeast, nearly all potential sources such as industry and human-caused emissions sources occur in or near the UGB. DEQ has addressed this issue by recommending the expanded boundary of the AQZ, which includes all potential industrial sources that could contribute to an exceedance (Figure 3). Additionally, the expanded AQZ also includes many subdivisions to the east and west that are not in the UGB.

Based on speciation of the air quality monitoring data and meteorological events associated with exceedance days, DEQ believes the AQZ is sufficient to address all sources of emissions impacting the Peterson School Monitor.

#### **4. Land-Use, Population Density, and Growth Rates**

Klamath County encompasses 6,135 square miles and is Oregon's fourth largest county in land mass. The greater Klamath Falls area is zoned into residential, commercial and industrial categories. The industrial sites are on the outskirts of the main part of the community, while the residential areas are separated by commercial areas. Peterson School, where the monitor is located, is in a residential area. Residential population densities are predominately in the AQZ.

Oregon's land-use laws are unique in that they specifically restrict growth to urban areas. In 1973, the Oregon Legislature established nineteen goals and developed regulations to provide clear direction to local land-use planners. The land-use laws provide for an urban growth boundary (UGB), whereby cities and counties collaborate on planning requirements for the land between the corporate city limits and the UGB. Once sufficient infill occurs through normal growth within the corporate city limits the city may expand their limits within the Urban Growth Boundary. If the city wishes to expand beyond the UGB however, the State has strict limits on enlarging the boundary. The city must demonstrate on a 20-year planning horizon the need for expected urban population,

provide a plan for housing needs, employment opportunities, parks and other urban amenities. The city must demonstrate that the current UGB cannot reasonably accommodate the needs of the anticipated population growth.

Population Density and Growth

Table 3 shows the population for the Klamath Falls area. Population data gives an indication of whether population-based emissions from nearby areas might contribute to violations of the standard. A population of 20,400 live within the corporate city limits of Klamath Falls another 24,498 people live outside the city limits in an area known as South Suburban for a total population of 44,898 within the UGB. The population of the AQZ is somewhat larger, at approximately 47,361. The EPA proposed NAA includes most of the AQZ with the addition of the towns of Keno and Merrill, and rural agricultural lands with scattered housing, for a total of about 53,965 people (estimated for 2005).

Table 3: Klamath Falls Population (2005 U.S. Census Bureau Data<sup>6</sup>)

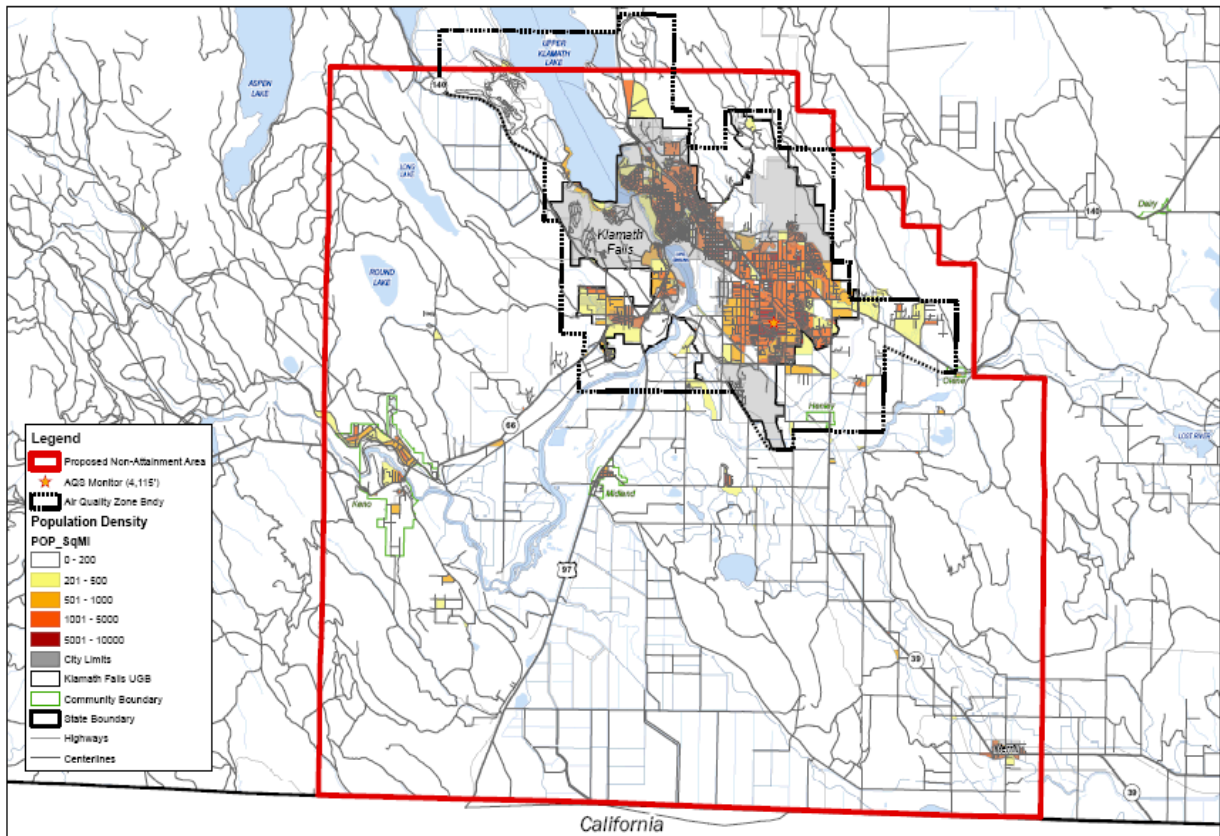
City Limits	Urban Growth Boundary	Air Quality Zone	EPA Proposed NAA Boundary	Klamath County
20,400	44,898	47,361	53,965	65,055

Figure 10 shows the population density of people living in the Klamath Falls area. The AQZ encompasses the highest population densities in the area. Outside the AQZ almost all of the census block groups show a population density of less than 200 persons per square mile.

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<sup>6</sup> City Limits, UGB and Proposed Nonattainment area estimated based upon 2000 census blocks (measured by Klamath County GIS personnel) and Portland State University (PSU) growth rates for Klamath Falls and Klamath County to 2005.

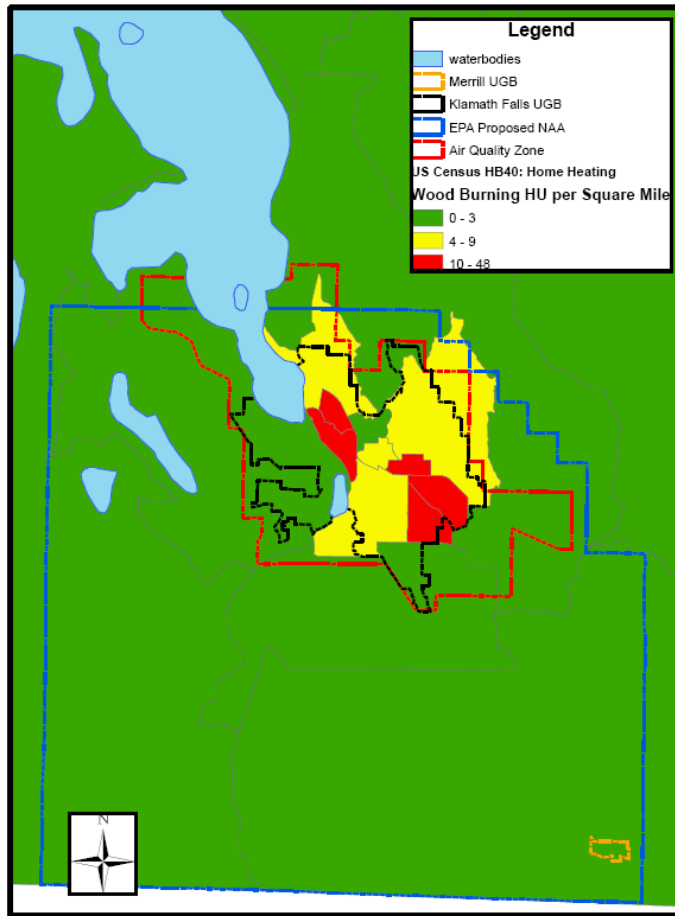
**Figure 10 – Population per square mile US Census Bureau 2000 Census Block**



In the area surrounding Klamath Falls are the two communities of Merrill and Keno, as noted above. These small farming towns lie between Klamath Falls and the Oregon-California border. EPA based part of its reasoning on expanding the nonattainment boundary because of the potential contribution these communities could have on the Klamath Falls area. However, EPA did justify why these communities should be included other than they are located within 12 and 20 miles of Klamath Falls. These communities have populations of approximately 1,000 people, no sources of industrial emissions and are miles from the Klamath Falls AQZ. Additionally, meteorological evidence shows that on violating days wind speeds are very low (less than 3 mph) indicating emissions from these towns do not affect the Klamath Falls area.

Klamath Falls has the highest population density in Klamath County, and also contains a major concentration of woodstove usage. Figure 11 shows U.S. Census data (2000) for households using wood as the primary source of heat equal or greater than four heating units per square mile.

**Figure 11 – 2000 Census tract data showing households using wood as a heating source per square mile**



Keno and Merrill have low concentration usage of home wood heating in their areas. Figure 11 identifies the potential woodstove source contribution and emissions, all located within the AQZ. Keno and Merrill’s emissions are small to negligible, indicating its influence on the Klamath Falls area is unlikely.

#### Population Growth

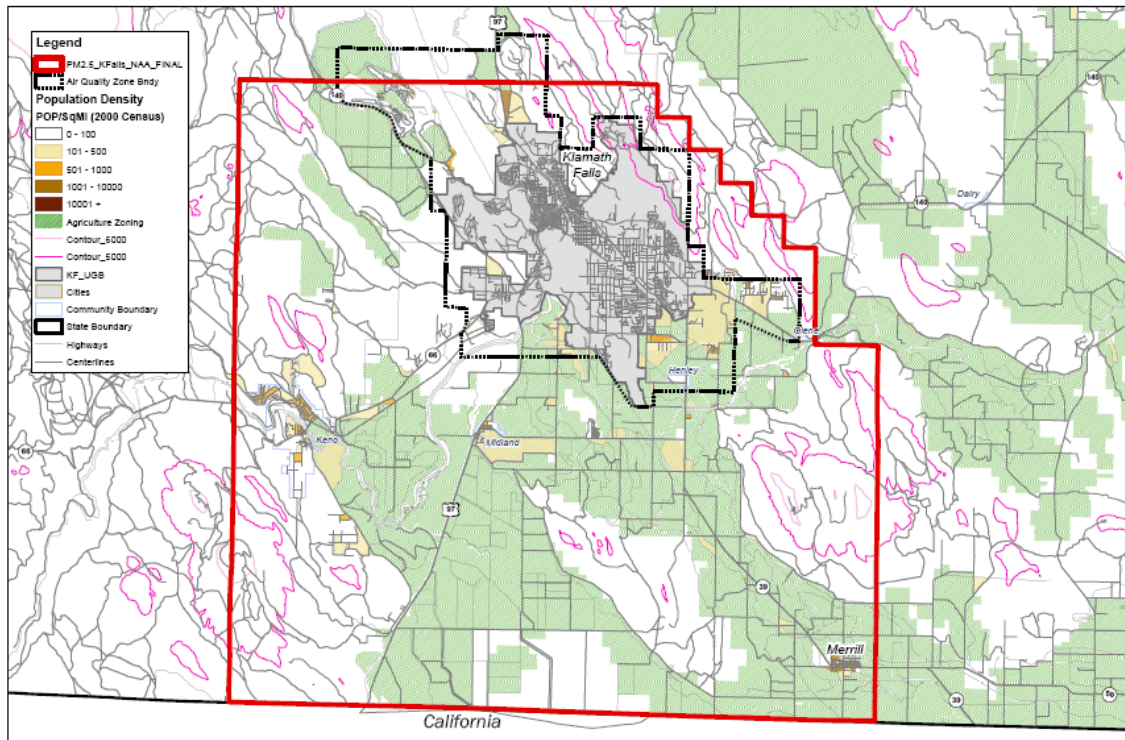
The Klamath Falls area is growing but largely within the urban area. Klamath County is predicted to have an overall grow rate of 0.5% per year for the next five years. In the city of Klamath Falls, the anticipated growth is slightly less than 1.0%. However, as a result of Oregon’s land-use laws much of that growth will occur in the major metropolitan area of Klamath Falls, specifically within the UGB.

#### Agricultural Lands

EPA’s proposed NAA contains a large area that is zoned for agricultural use (Figure 12). Population density and housing in this area is very low and exists primarily to support agricultural activities. This area should not be included within a Klamath Falls NAA boundary, as proposed by EPA, as these lands do not produce significant PM2.5 emissions during the time of year when exceedances are measured.

There are roughly 16,000 acres of cereal grain, 100,000 acres of forage and 4,000 acres of vegetables grown in the Klamath irrigation project, a major project south of Klamath Falls. Agricultural harvest activity occurs between August and October and field burning is completed by mid-October at the completion of the harvest. Grain fields are flood irrigated beginning in November and remain flooded until March when planting activity begins for the next years crops, preventing any burning from occurring. While some field burning may occur in April to prepare the seed bed for planting, this does not occur during the time when Klamath Falls is experiencing PM2.5 exceedances.

**Figure 10 – Agricultural land-use zones outside of Urban Growth Boundary**



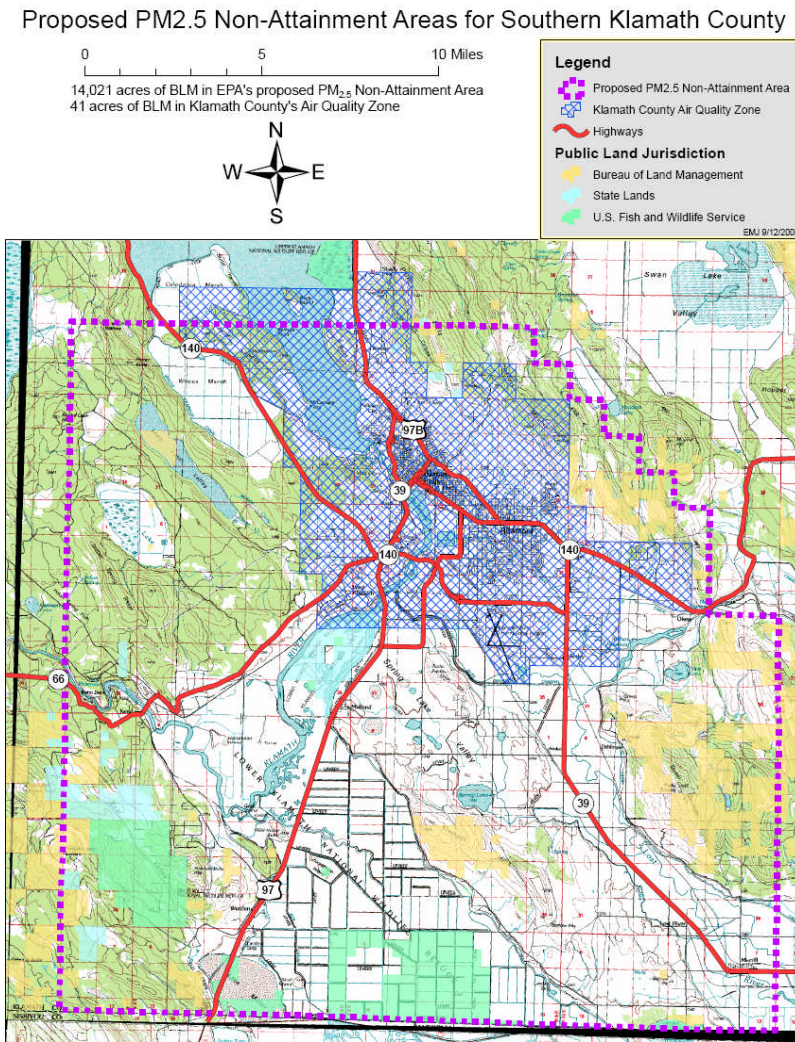
Agricultural lands that lie within the AQZ boundary proposed by DEQ are prohibited from burning. Klamath County ordinances strictly regulate agricultural burning and it is not allowed without a variance. In Figure 10, lands not green and outside the air quality zone are either federal or state lands, or private forest lands. There are also a few small residential and commercial zones in the Keno, Midland and Merrill areas.

### Federal Lands

In the southern portion of the EPA proposed nonattainment area there are over 30,000 acres of federally and state managed lands (Figure 11). There are U.S. Fish and Wildlife refuge properties that comprise a total of 11,126 acres. The Bureau of Land Management (BLM) also manages 14,021 acres of land within the boundaries of the EPA proposed NAA. The BLM also manages 41 acres of land within the Air Quality Zone. In addition, the Oregon Department of Forestry manages 2,435 acres. (See Attachment F for maps depicting areas discussed).



**Figure 11 – Map of federal Lands and other jurisdictions in relationship to EPA proposed Nonattainment area.**



The U.S. Fish and Wildlife service manage its lands which includes farming and burning of the lands. The BLM activities include managing range resources and a small amount of timberlands. Any burning of these lands does not occur during stagnant periods and is conducted outside of the winter exceedance season. The EPA NAA boundary includes much of these BLM and USFS federal lands, creating a concern that these federal lands would need to address general conformity requirements every time an action was taken and categorical exclusions could not be taken.

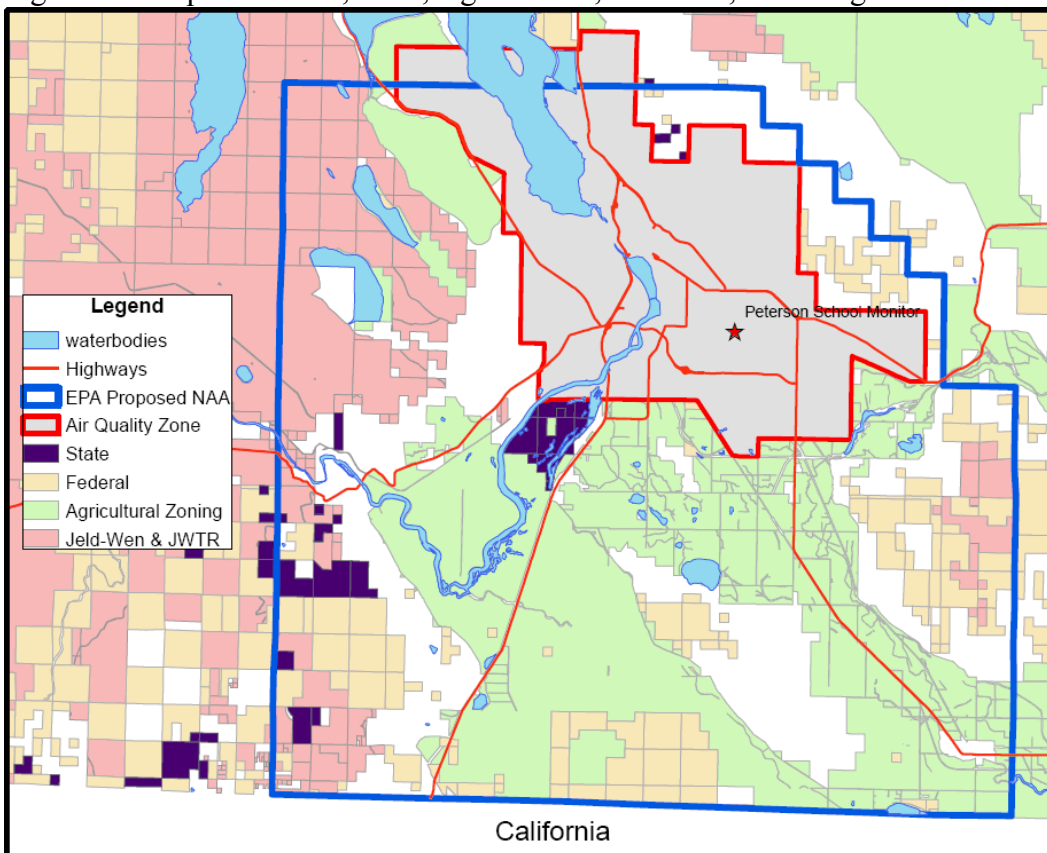
Forested and Range-Lands

Jeld-Wen and Jeld-Wen Timber Resources, a private company, own 28,137 acres of

forested and range lands to the west, southwest and southeast of Klamath Falls inside the proposed Nonattainment Area. They manage the lands primarily for timber production. Typical forest management activities occur on these lands. Smoke management for prescribed and pile burning utilize the Oregon Smoke Management program and Jeld-Wen is a signature to a smoke management agreement by the state. Pile burning may occur in October, November or December or in April, or May as permitted by the Smoke Management Program. The purpose of the Oregon Smoke Management Program is to avoid intrusions (no matter how long into protected cities like Klamath Falls. There have been no known burns on Jeld-Wen lands in the proposed nonattainment area during exceedance days identified in 2004-2007.

EPA’s proposed NAA boundary encompasses large tracts of federal, state, agricultural, and forested and range lands (Figure 12). Agricultural and federally managed lands in the southern portion of EPA’s proposed NAA do not produce PM2.5 emissions during the time of year where exceedances were measured. With the exception of one day at the end of October 2005, all 2005-2007 monitored exceedance days were in the months of November through February. Normally there is snow on the ground on these agricultural and federally managed lands or the fields were flood irrigated at this time. Field burning occurs in September and early October and in March, April and May depending upon the objectives. Field burning and rangeland burning also does not contribute emissions because heat cannot be generated to meet the objectives of the burn.

Figure 12: Map of Federal, State, Agricultural, Forested, and Range Lands

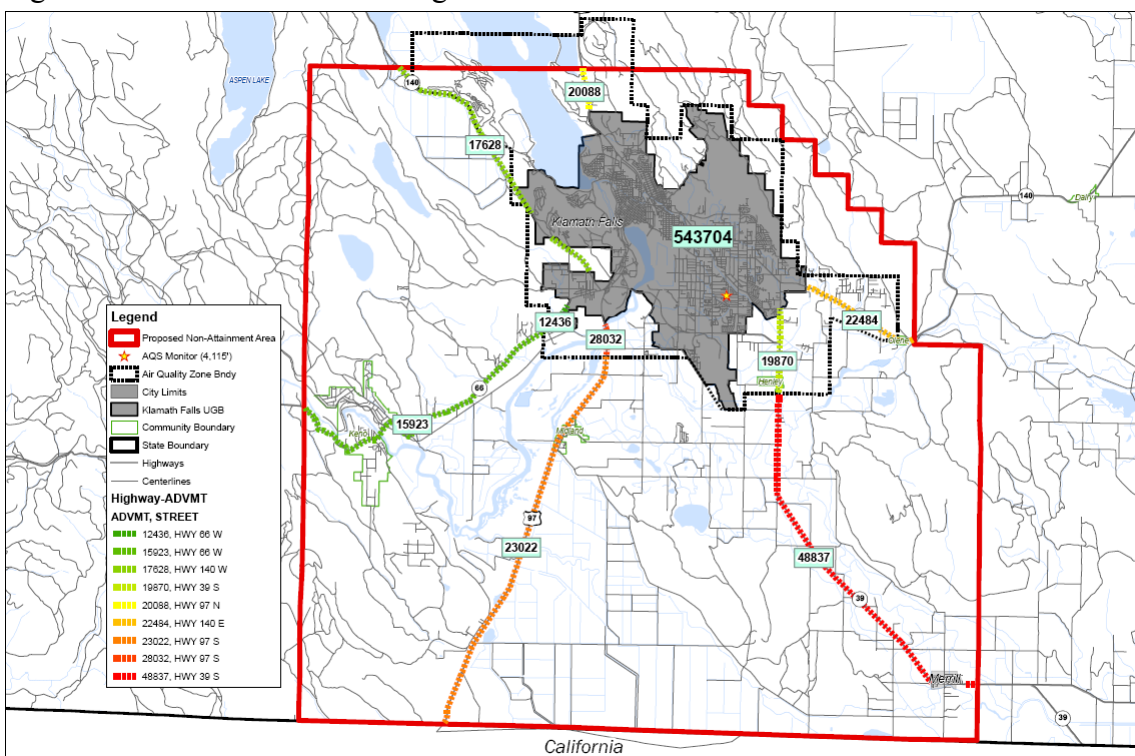


Because the southern portion of the EPA proposed nonattainment area is predominately federal and agricultural lands, and that activity on these lands are not happening during exceedance months, DEQ recommends not including these lands in the nonattainment area boundary. The AQZ seems to be the most appropriate nonattainment area boundary.

## 5. Traffic and Commuting Patterns

EPA uses standard methodologies to assess commuting between counties and concluded there is a low rate of commuting and a low degree of urbanization between the rugged features that separate Klamath Falls from the surrounding counties and areas. Klamath Falls is an urban center in southern Klamath County. There is a major north and south two lane road that connects traffic from northern California through Klamath Falls to points north in Oregon. There is also an east-west arterial through Klamath Falls, known as Highway 140. (Figure 13)

Figure 13: Traffic and Commuting Patterns in Klamath Falls Area



DEQ refined their analysis on average daily VMT inside the UGB from the 2002 PM10 Maintenance Plan and transportation sources entering the UGB in 2004 (Table 4)

**Table 4 – Vehicle Miles Traveled outside the UGB**

	Estimated lbs/day based on ADVMT <sup>1</sup> inside UGB	Estimated lbs/day based on ADVMT <sup>1</sup> inside AQZ to be added to the UGB lb/day (VMT)	Estimated lbs/day based on ADVMT <sup>1</sup> inside NAA to be added to the UGB lb/day (VMT)
UGB VMT (maint. Plan analysis 2004)	543,704		
S. Highway 97		28,032	51,054
N. Highway 97		20,088	6,200
W. Highway 140		17,628	17,628
E. Highway 140		22,484	22,484
W. Highway 66		12,436	28,359
S. Highway 39		19,870	68,707
Total ADVMT <sup>1</sup>	543,704	664,242	738,136

<sup>1</sup> ADVMT = Average Daily Vehicle Miles Traveled

The average daily vehicle miles traveled outside the Air Quality Zone but inside the EPA proposed NAA is 73,894 VMT (738,136 – 664,242). Most traffic is during the day-time. The small increase in EPA’s proposed NAA compared to the AQZ coupled with the nocturnal nature of the air quality problem shows vehicles have not contributed to the exceedance days. The difference in emissions between the Air Quality Zone and the proposed nonattainment area is 70 lbs/day<sup>7</sup> or about 0.5% increase in PM<sub>2.5</sub> emissions in the proposed nonattainment area. This emission increase is negligible. Winter VMT traffic pattern volumes are less and more predictable than summer patterns, as there is less travel on the interstate and less off-pavement driving. Additionally, NO<sub>x</sub> and SO<sub>2</sub> emissions are only 10% of the speciation pie, suggesting that vehicle traffic in EPA’s proposed NAA and secondary particulate formation is an insignificant contribution to the nonattainment area problem in comparison to the AQZ.

Because emissions from traffic occur primarily in the AQZ and there are insignificant emissions generated from traffic outside the AQZ, DEQ recommends the AQZ as the nonattainment area boundary.

## 6. Geography and Topography

Klamath Falls is located within the Klamath Basin, a high plateau with a foothill directly to the north of town. Klamath Falls is surrounded to the east, north, and west, by mountains, forming a bowl that causes locally generated pollution to become trapped during strong wintertime inversions.

DEQ commends EPA for using a partial county boundary and considering an attribute

<sup>7</sup> Calculation: Mobile source UGB EI data / UGB VMT = Conversion factor (9.42 x 10<sup>-4</sup> lbs/day). (9.42 x 10<sup>-4</sup> lbs/day \* AQZVMT) = 626 lbs/day, (9.42 x 10<sup>-4</sup> lbs/day \* EPA NAA VMT) = 695 lbs/day. 695 lbs/day – 626 lbs/day = 70 lbs/day (emissions from VMT in the EPA NAA)

such as topography as a method to determine what part of the county should be included in the nonattainment area. However, topography needs to be analyzed in conjunction with other criteria and cannot be the sole basis for the partial county designation. EPA considered the 5000-6000 ft contour level to define the expanded boundary to the north, east, and west but not to the south. Instead, it draws the nonattainment boundary at the California state line, instead of extending into Northern California where the 5,000 ft contour level would exist. Using the California jurisdictional boundary is arbitrary and inconsistent with its justification for basing the boundary determination on the topographic features. EPA must base its decision on sound science and not arbitrary determinations to set the nonattainment boundary.

Based on an analysis by DEQ, 5000 feet is an arbitrary elevation and there is no evidence that during exceedance periods PM pollution rises to 5000 feet or that air movement throughout the basin occurs. On the contrary, there is evidence that during strong inversions, there are low wind speeds and locally generated pollution from woodstoves. Therefore, DEQ recommends that the AQZ is the best boundary for a nonattainment area surrounding Klamath Falls.

### Conclusion

DEQ understands EPA's perspective on determining potential sources of emissions impacting Klamath Falls and drawing a boundary around those potential sources of pollution identifying a nonattainment area. However, EPA's proposed boundary uses topography and potential sources just outside the UGB as the primary basis to determine its large boundary to the California border. Although these factors are important, there are many other considerations EPA needs to consider based on the available information and science.

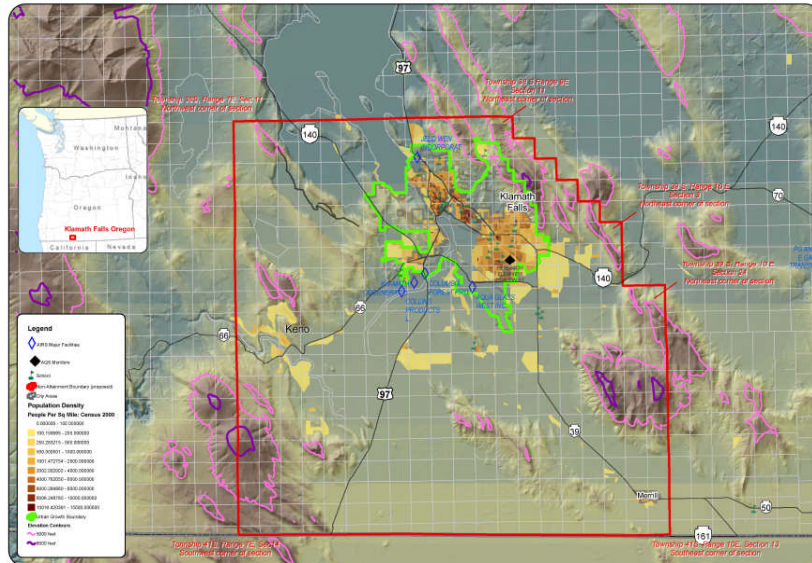
Instead, DEQ recommends the AQZ as a viable and scientifically defensible boundary for the Klamath Falls nonattainment area. Based on air quality monitoring and speciation data, DEQ and EPA identifies woodsmoke as the primary cause of PM pollution in the area. Meteorological data shows Klamath Falls is frequently affected by nighttime inversions and low wind speeds on violating days, causing woodstove smoke to stay suspended in the area. Woodstove use is further characterized by the diurnal pattern observed from the nephelometer data, providing further evidence the exceedances are caused by woodsmoke use.

Further, EPA believes the boundary should be expanded south to the Oregon – California jurisdictional state line to encompass potential sources and nearby populations, such as rural agricultural and federal lands and small communities such as Keno and Merrill. Based on population density and meteorology, and the fact that no agricultural or slash burning occurs during violating days, DEQ does not believe the broad areas to the south of Klamath Falls, and specifically the communities of Keno and Merrill, contribute to PM<sub>2.5</sub> impacts in the Klamath Falls area.

EPA must recommend a final nonattainment boundary for Klamath Falls based on the

best available science, identifying those sources that contribute to PM pollution. DEQ's analysis looks at all potential sources impacting Klamath Falls and recommends the Air Quality Zone as the nonattainment boundary for Klamath Falls.

APPENDIX A – Klamath Partial County – EPA proposed Nonattainment Area Boundary and Urban Growth Boundary. Air Quality Zone depicted below.



**PM 2.5 Non-Attainment Area (proposed)**  
**Klamath Falls Oregon Area**  
 shown with Topography & Population Density



APPENDIX B – Emissions Data

Table 1: Detailed PM2.5 estimates for worst case day emissions by area:

	UGB	AQZ	Proposed NAA	Klamath County
Jeld-Wen	235	235	235	249
Collins	0	1,860	1,860	1,860
Columbia Plywood	233	233	233	233
Other Industrial	446	446	446	719
Wood Combustion	8,435	8,475	9,260	11,627
Boilers	178	179	196	258
On-road gas	46	46	51	64
On-road diesel	102	103	112	141
Off-road	143	153	235	423
Mobile fugitive	390	399	580	2,685
Food Production	143	143	156	196
Construction - Diesel	15	15	19	70
Backyard Burning	225	236	446	3,106
Agricultural Production	4	6	16	239
Wildfire	9	10	11	860
Prescribed Fire/ Structure	16	17	49	1,543
<b>Total</b>	<b>10,620</b>	<b>12,556</b>	<b>13,905</b>	<b>24,273</b>



Table 2 - Plant Site Emission Data – Inside Proposed NAA

Source Name	PSEL PM (1)	PSEL PM10 (2)	PSEL CO (3)	PSEL NOx (4)	PSEL SOx (5)	PSEL VOC (6)	PSEL Single HAP (7)	PSEL Combo HAP (7)	Permit Number & type
Klamath Energy LLC Klamath Cogeneration Proj		60	558	271	39	123			18-0003-TV-01
JELD-WEN, Inc. dba JELD-WEN	80	60	104	73	39	427			18-0006-TV-01
Collins Products LLC Weyerhaeuser	382	237	99	54	50	12730			18-0013-TV-01
Columbia Forest Products, Inc.	130	90	99	88	39	143	9	24	18-0014-TV-01
Pyramid Cremations	24	14	99	39	39	39			18-0018-G1-12
Industrial Oils, Inc.	24	14	99	39	39	39			18-0020-SI-01
Electro Scientific Industries, Inc.	24	14	99	39	39	39			18-0022-SI-01
Klamath Generation, LLC	64	64	66	113	16	67			18-0026-ST-01
Reach, Inc.	24	14	99	39	39	39	9	24	18-0031-G3-10
Klamath Energy, LLC Klamath Generation Peeker	17	17	80	40	23	11			18-0032-TV-01
Sky Lakes Medical Center, Inc.	24	14	99	39	39	39			18-0056-G2-11
Jefferson State Redi Mix, Inc.	24	14	99	39	39	39			18-0070-G1-09
Down River LLC	24	14	99	39	39	39	9	24	18-0086-G3-10
Eternal Hills Memorial Gardens & Funeral									18-0087-BS-01
O'Hair & Riggs Funeral Chapel Klamath Cremation									18-0088-BS-01
Aqua Glass Corporation		14	99	39	39	197			18-0093-TV-01
Kingsley Field Air National Guard Baseu	24	14	99	39	39	39	9	24	18-0097-SI-01

- (1) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 24 tons/yr. In most cases the actual emissions are much less
- (2) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 14 tons/yr. In most cases the actual emissions are much less
- (3) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 99 tons/yr. In most cases the actual emissions are much less
- (4) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 39 tons/yr. In most cases the actual emissions are much less
- (5) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 39 tons/yr. In most cases the actual emissions are much less
- (6) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 39 tons/yr. In most cases the actual emissions are much less
- (7) For permit streamlining, a minimum PSEL is assigned at 1 ton less than the SER, or 9 tons/yr for any single HAP or 24 tons/yr for any combined set of HAPs. In most cases the actual emissions are much less

### **Level of Emission Control from Sources in and near Klamath Falls UGB.**

Four major industrial sources that produce PM<sub>2.5</sub> are on the western portion of Klamath Falls. All but one source are permitted as Title V sources. All the facilities have reduced emissions over the years.

Jeld-Wen is a growing business that may have future expansion capabilities. They have controlled most of their sources with BACT or better control equipment. Within the next couple of years they should have good controls on all of their facilities. They have installed an ESP on their hogged fuel boiler and will have baghouses on their whole fiber line including hardboard production. These controls and all controls at Jeld-Wen are or will be federally enforceable. By adding baghouses, Jeld-Wen plan to reduce their emissions by 22 tons per year PM<sub>10</sub> or a 90% reduction in emission and a similar reduction in PM<sub>2.5</sub>. There will likely be little to no reduction in NO<sub>x</sub> or SO<sub>2</sub> from this facility.

Collins Products has reduced their emissions by closing parts of their facility. MACT determinations are yet to be made for the hardboard portion of their facility. Within the next couple of years they will have installed biofilters with particulate controls on the press vents and hardboard defibulators. Their steam comes from the co-generation energy facility next door. These controls and all controls at Collins are or will be federally enforceable. Their wet scrubbing system prior to the biofilters will likely reduce PM<sub>10</sub> by 80%-90% and likely a similar reduction for PM<sub>2.5</sub> in the scrubbers and biofilters. Our office believes Collins will realize a 51 ton/year reduction on the Hardboard facility and a 36 ton per year reduction on the Particleboard facility. There will likely be no reduction for NO<sub>x</sub> or SO<sub>2</sub> at this facility.

Klamath Energy operates a co-generation facility producing power and steam from natural gas. Although a source of particulate matter, they are not considered a significant source because they fire on natural gas. Klamath Energy has a Title V permit that is federally enforceable

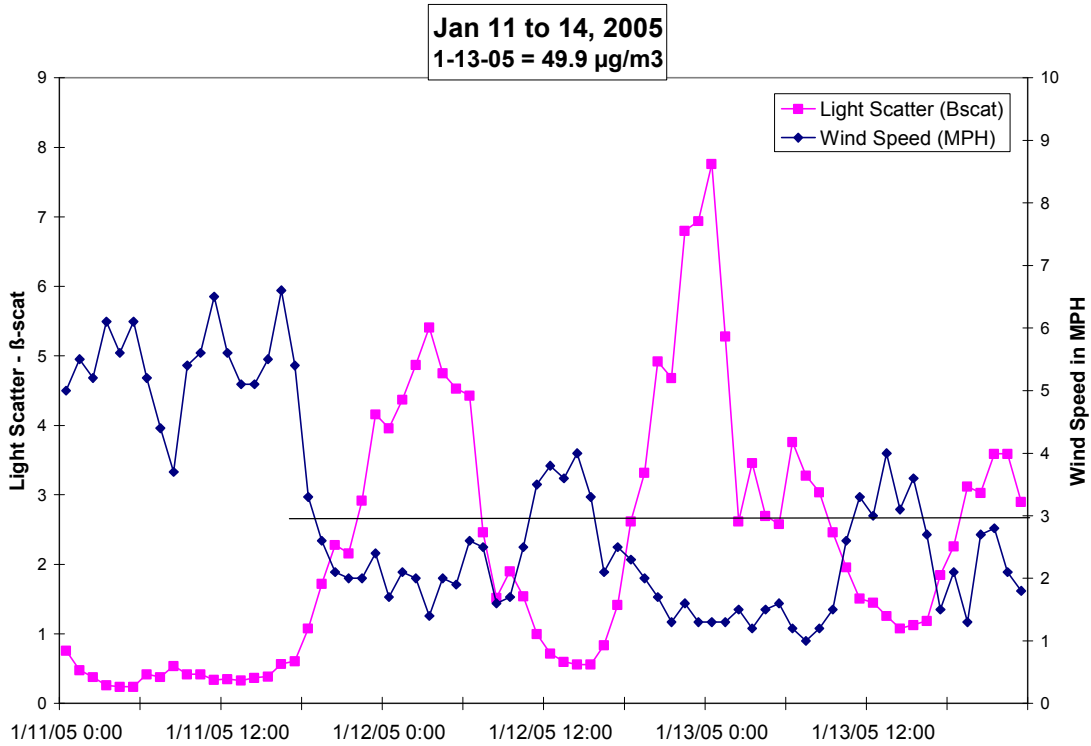
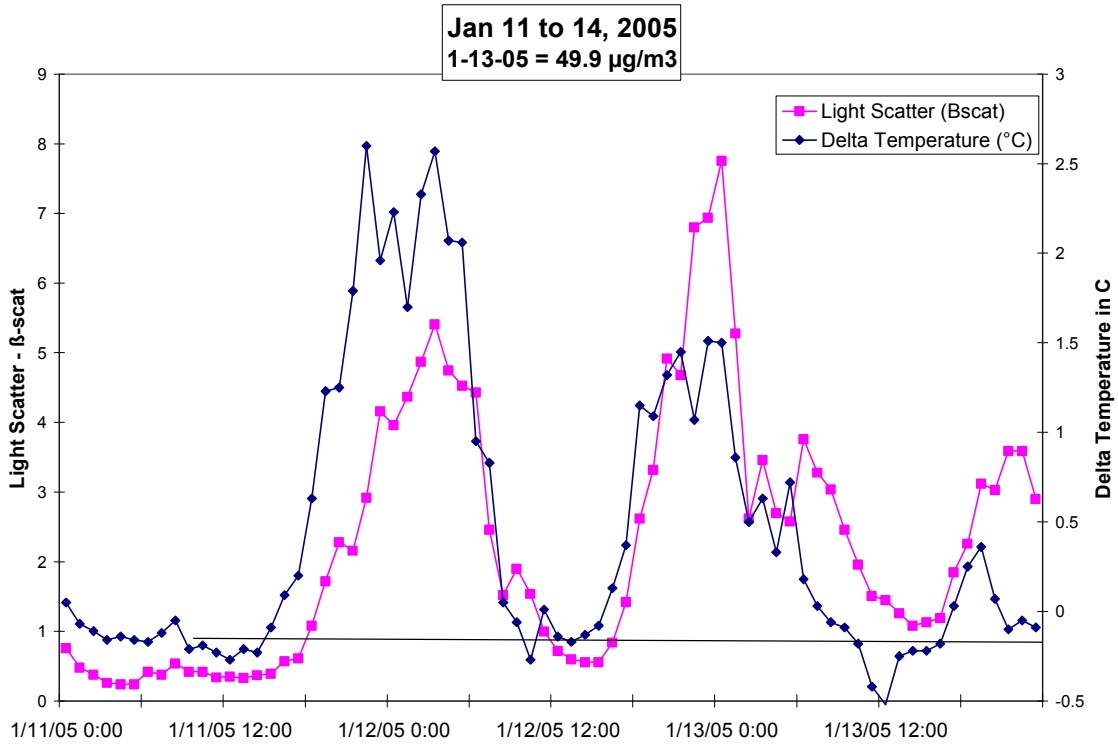
Columbia Plywood has also made substantial emission reductions over the years. They are a synthetic minor source and are not required to control their emissions to the extent of Collins or Jeld-Wen. They have two hogged fuel boilers, one with a multiclone. There are no controls on two veneer dryers or three press vents. The level of control on Columbia Plywood is less than other sources in the Klamath Falls area. These controls and all controls at Columbia Plywood are federally enforceable.

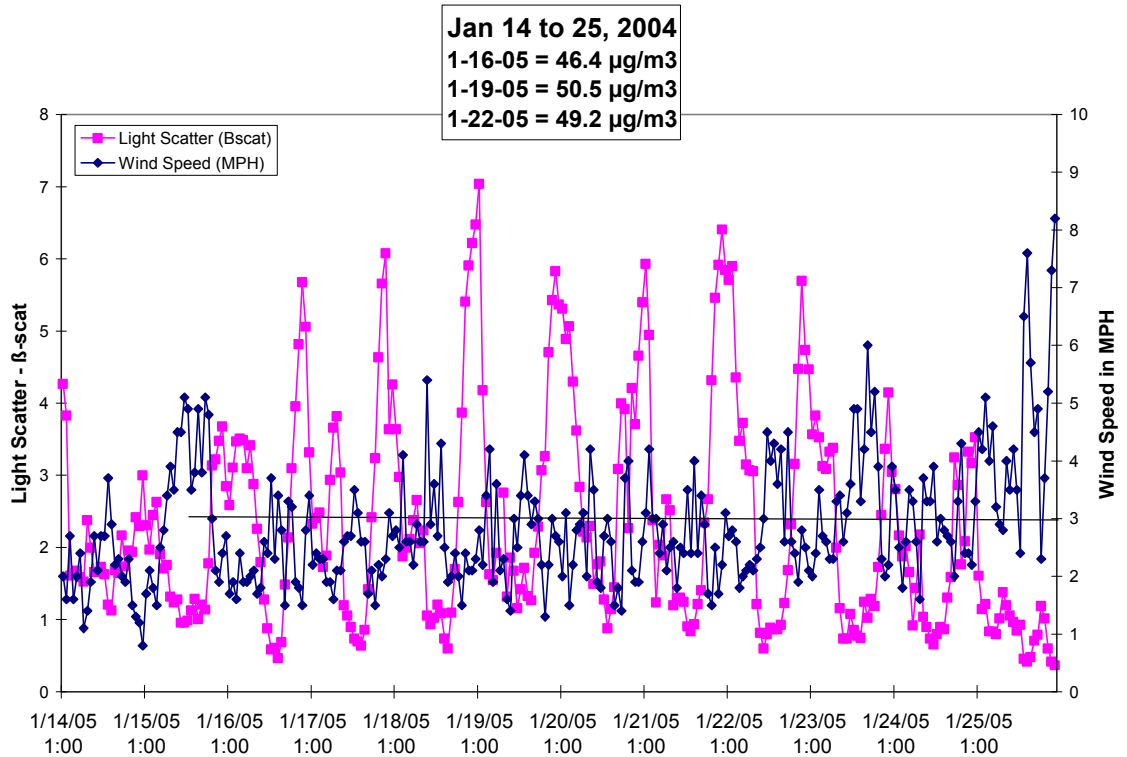
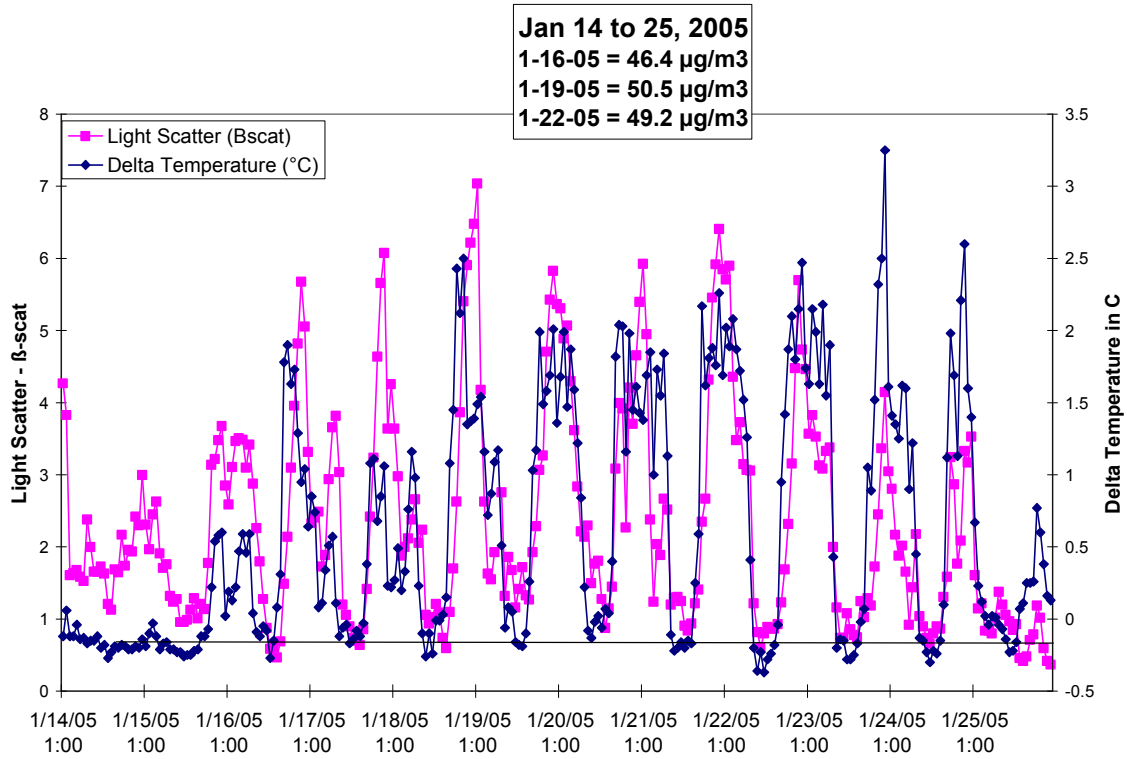
APPENDIX C – Speciation Data

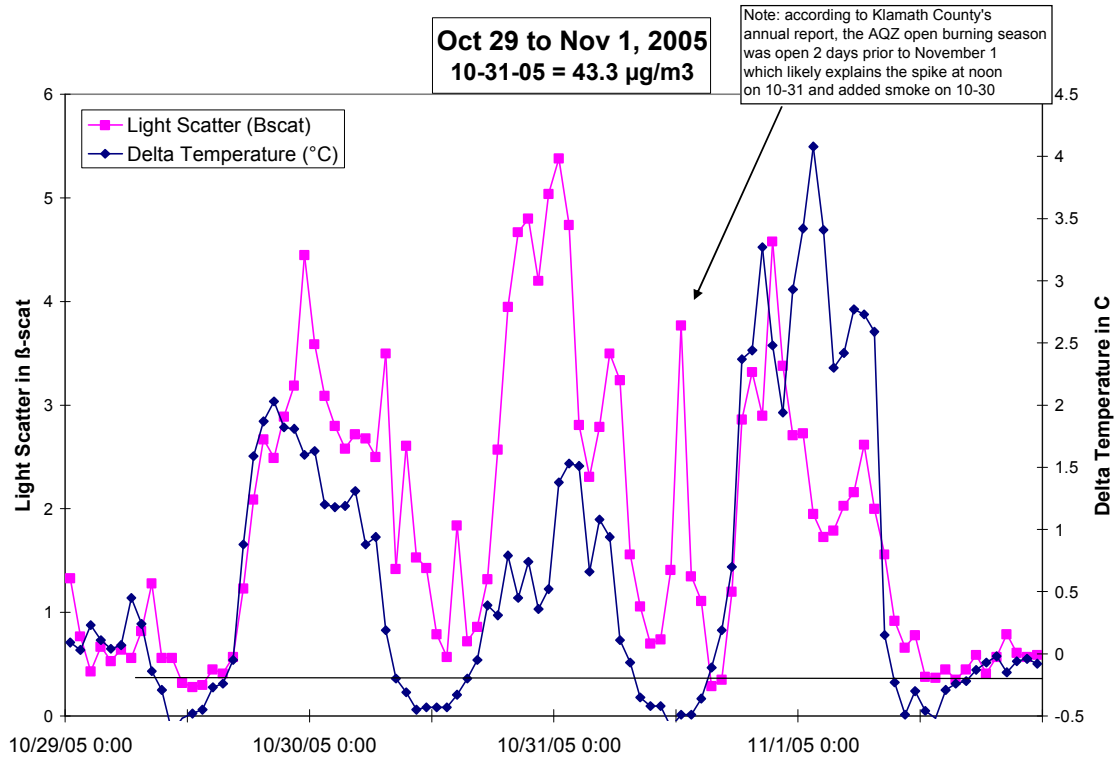
Table 3 – Fourth Quarter 2007 Speciation data

Klamath Falls PM2.5 Speciation fourth qtr 2007 (Metals above MDL only)									
Micrograms per Cubic Meter (µg/m3)									
Date	Ammonium	Nitrate	Potassium	Sulfate	Elemental Carbon	Organic Carbon	Sum of Metals all above MDL	Total Mass accounted	Actual PM2.5
11/8/2007	0.74	1.99	0.15	0.7	2.36	20.1	0.927	27	36
11/14/2007	0.7	2.36	0.16	0.4	2.09	20.4	0.733	27	37.3
12/14/2007	0.8	3.27	0.42	0.7	1.51	30.3	1.275	38	51.5
Average	0.7	2.5	0.2	0.6	2.0	23.6	1.0	30.7	
SD	0.1	0.7	0.2	0.2	0.4	5.8	0.3		
max	0.8	3.3	0.4	0.7	2.4	30.3	1.3		
Average % of total PM <sub>2.5</sub> mass	2.2%	8.1%	0.6%	1.9%	6.5%	76.9%	3.2%		

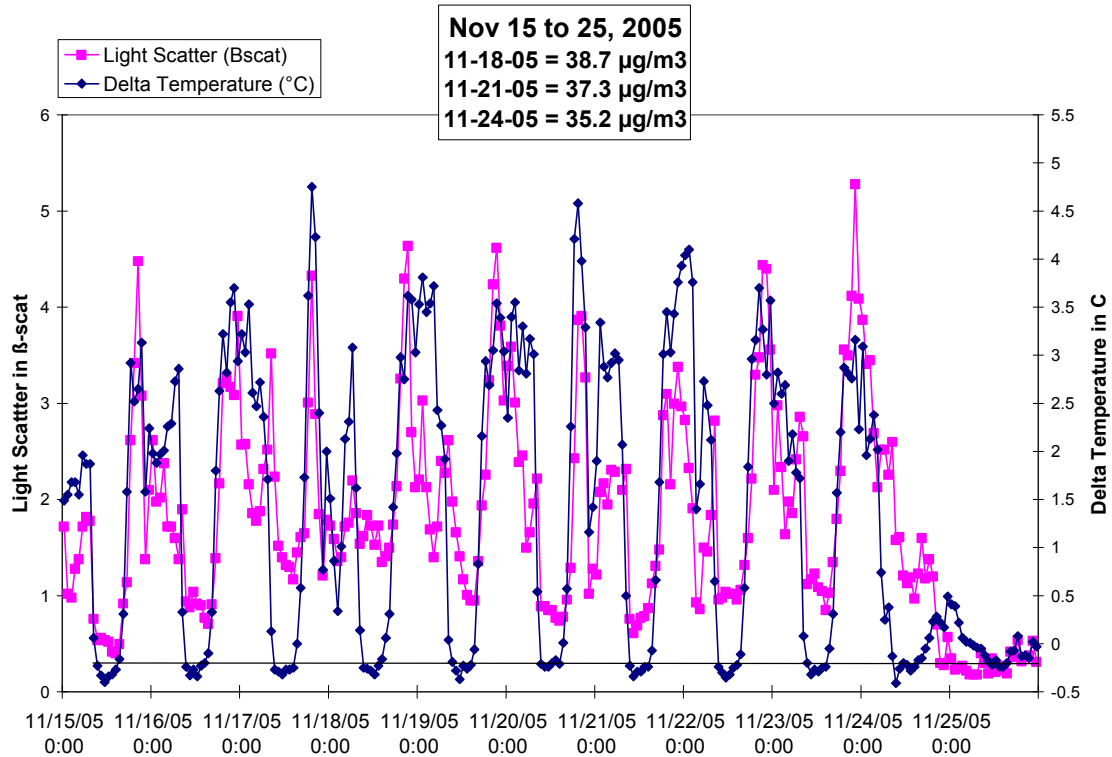
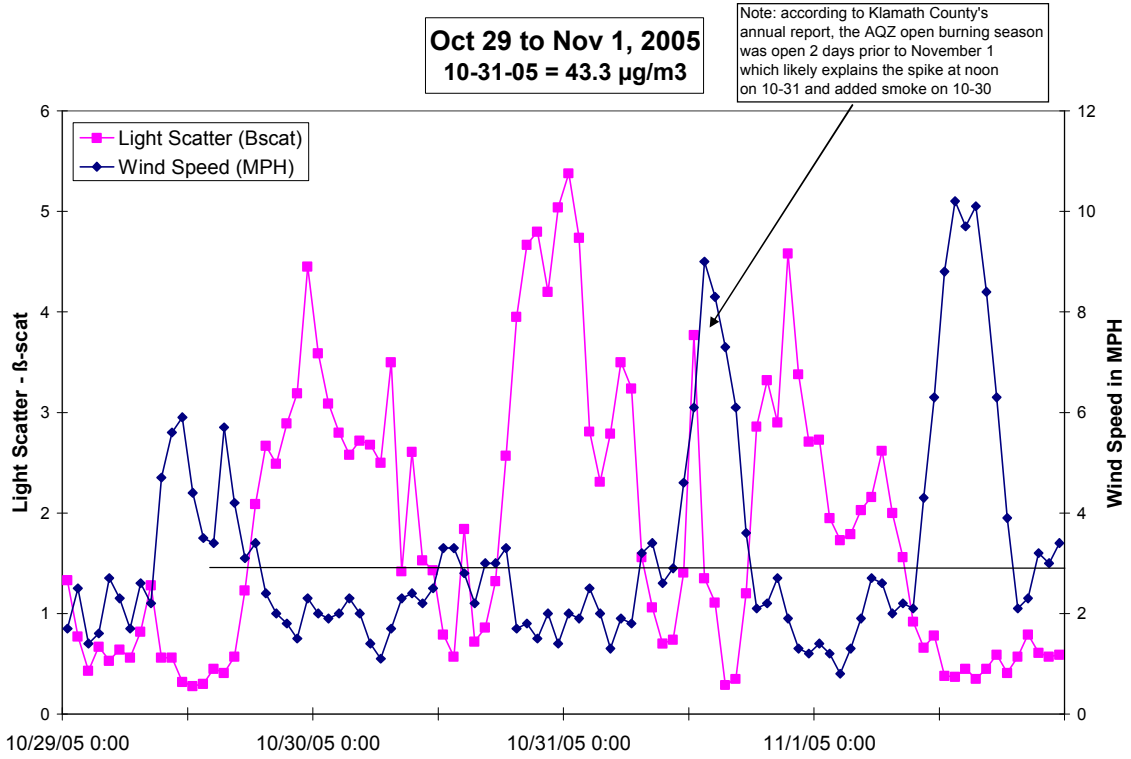
APPENDIX D – Diurnal effects for each exceedance day in 2005 through 2007

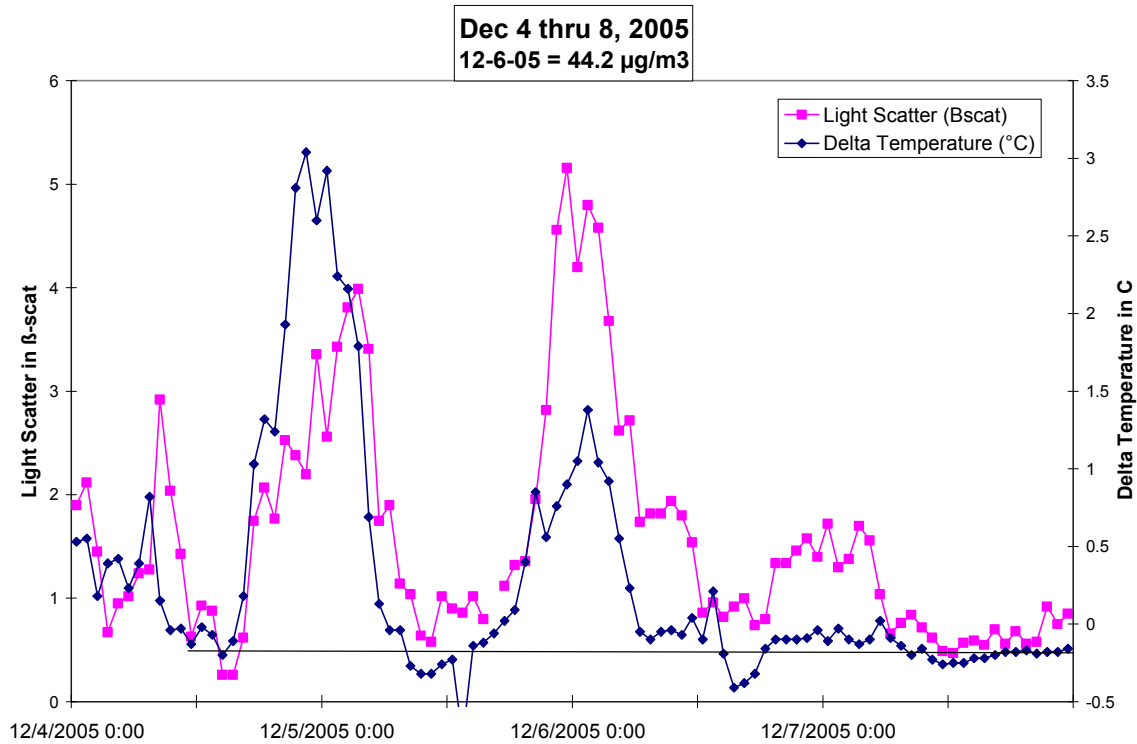
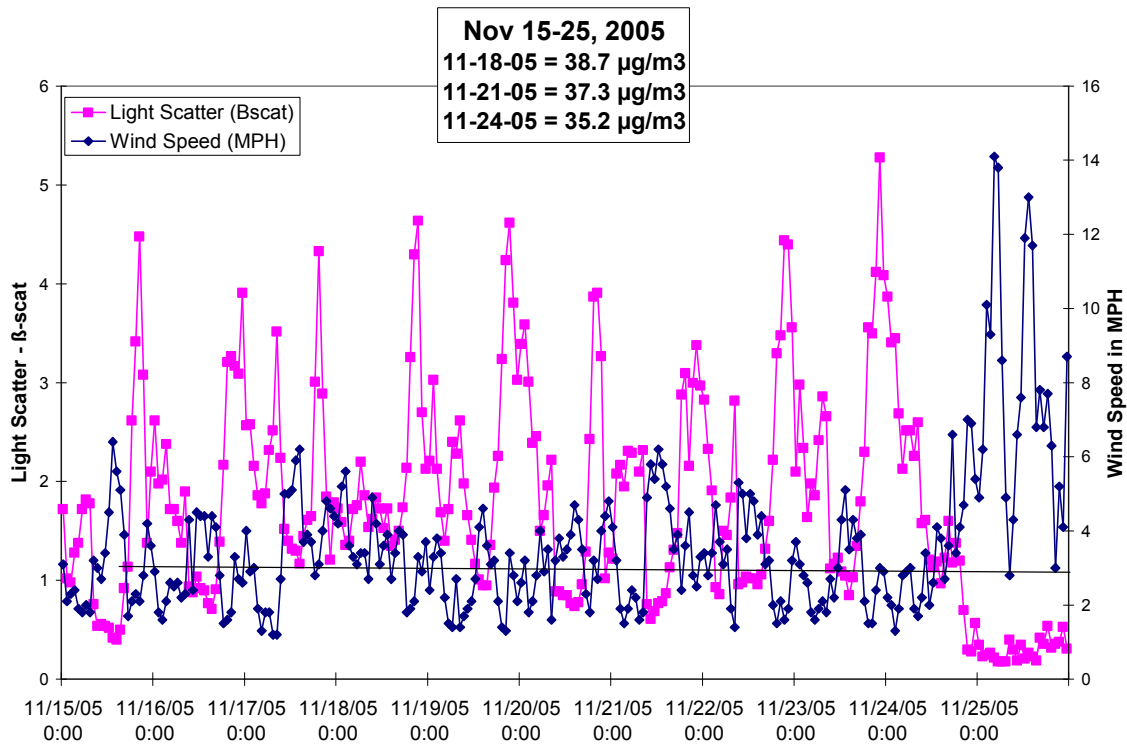




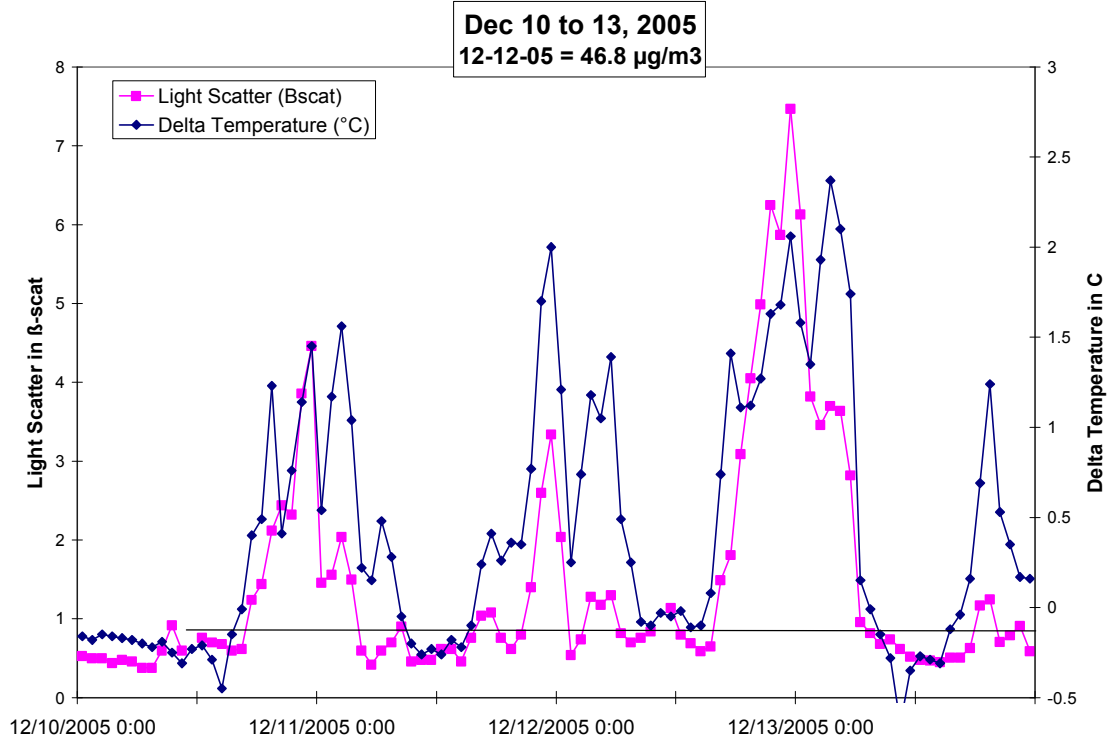
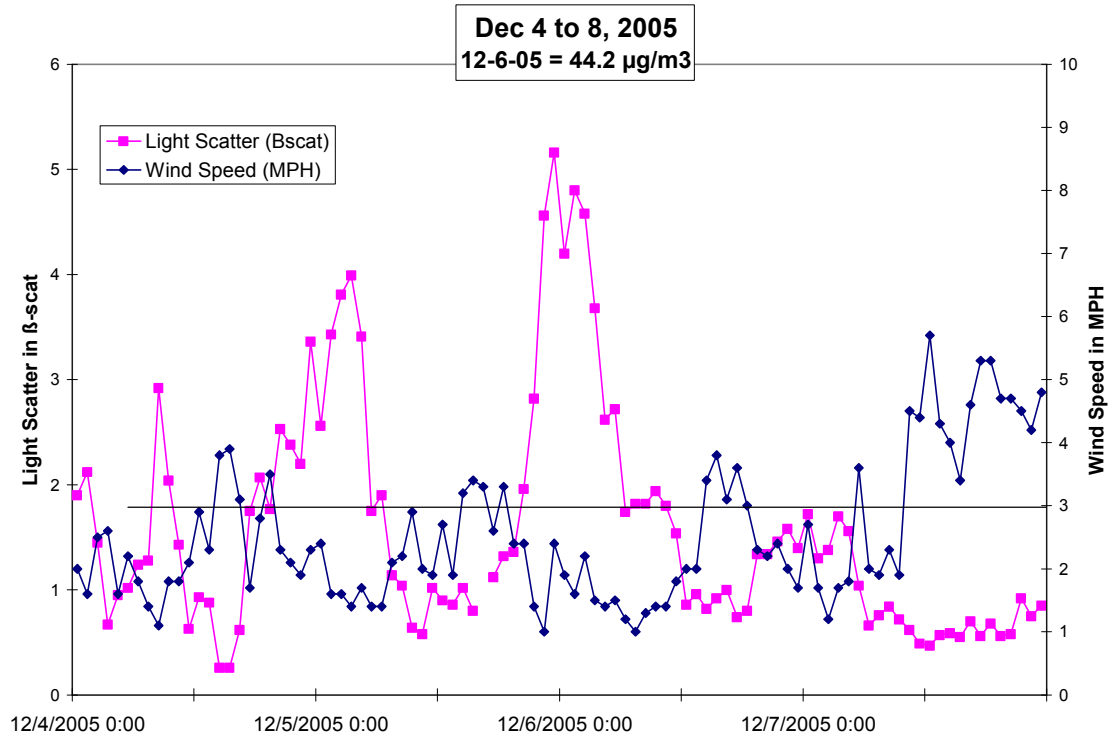


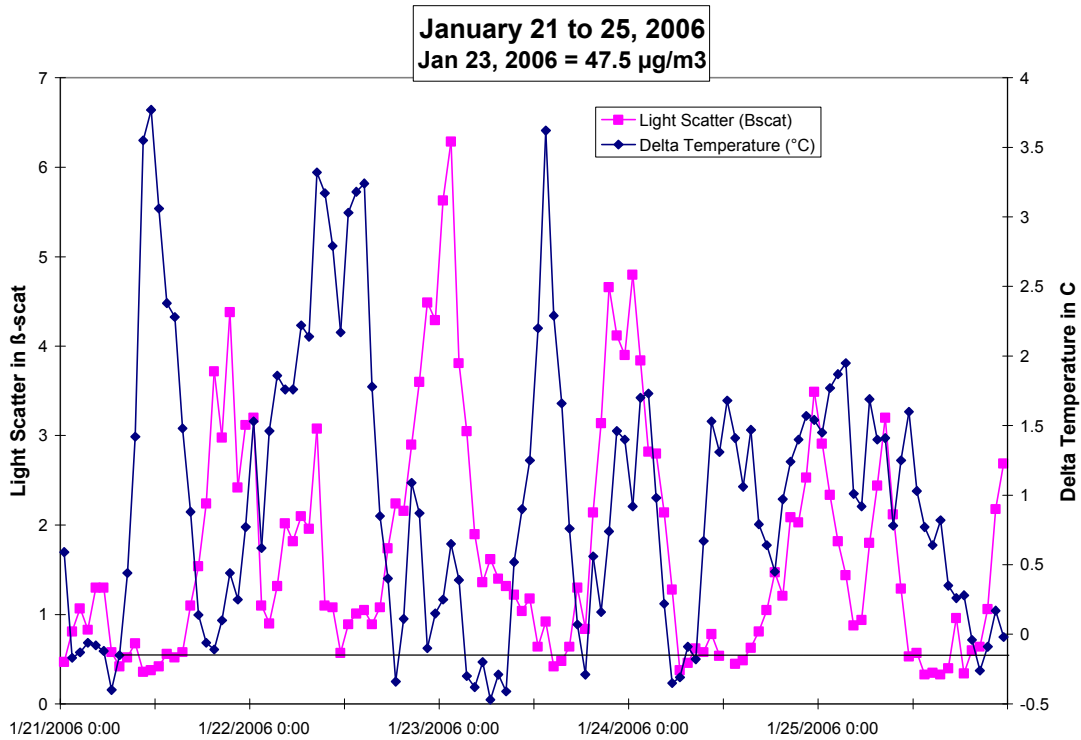
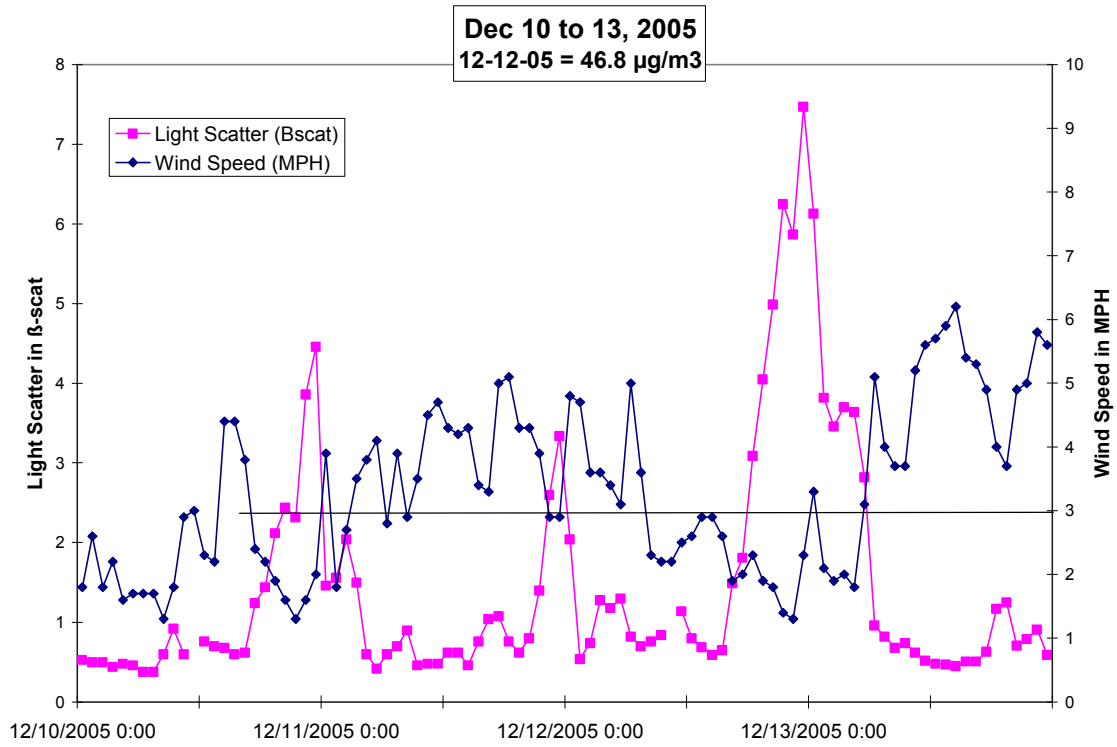
Open burning on October 31, 2005 caused increased daytime beta scatter. Although Klamath Falls area restricts open burning during the winter, they have had a 30 day open burning window often allowed during October and November. This was the case on October 31<sup>st</sup>, but was the only exceedance day that showed a daytime increase in particulate matter. All other exceedance days show a diurnal signature of heavy night smoke concentrations and light concentrations during the day.

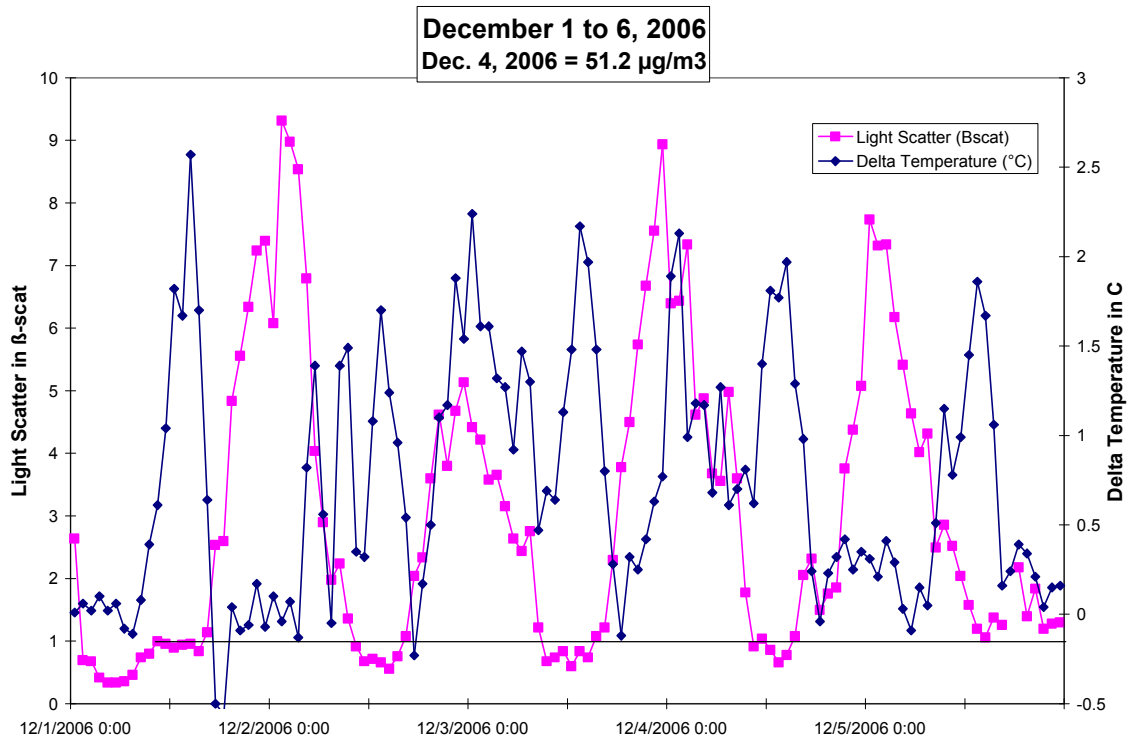
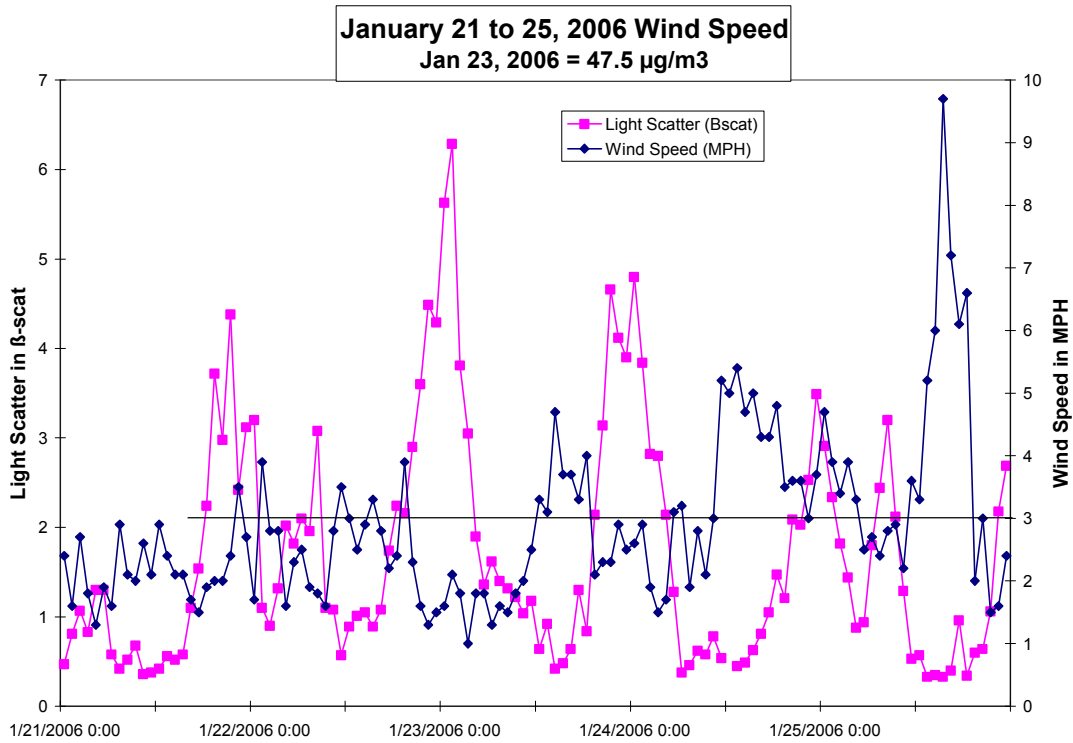


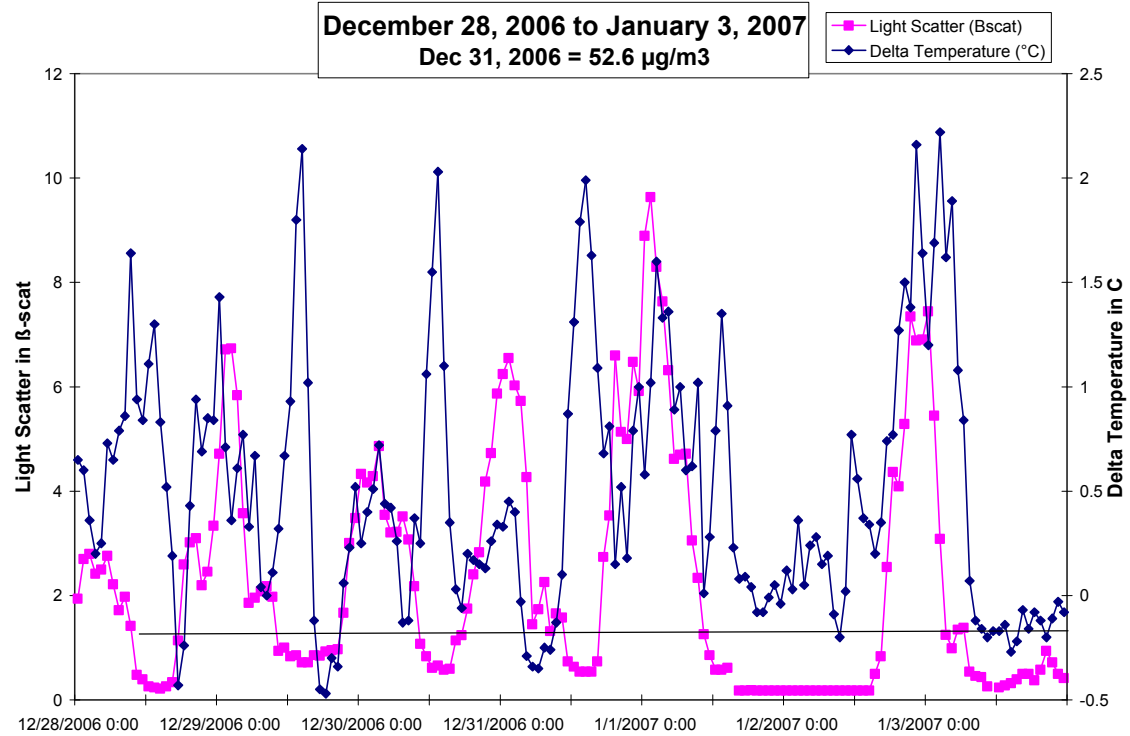
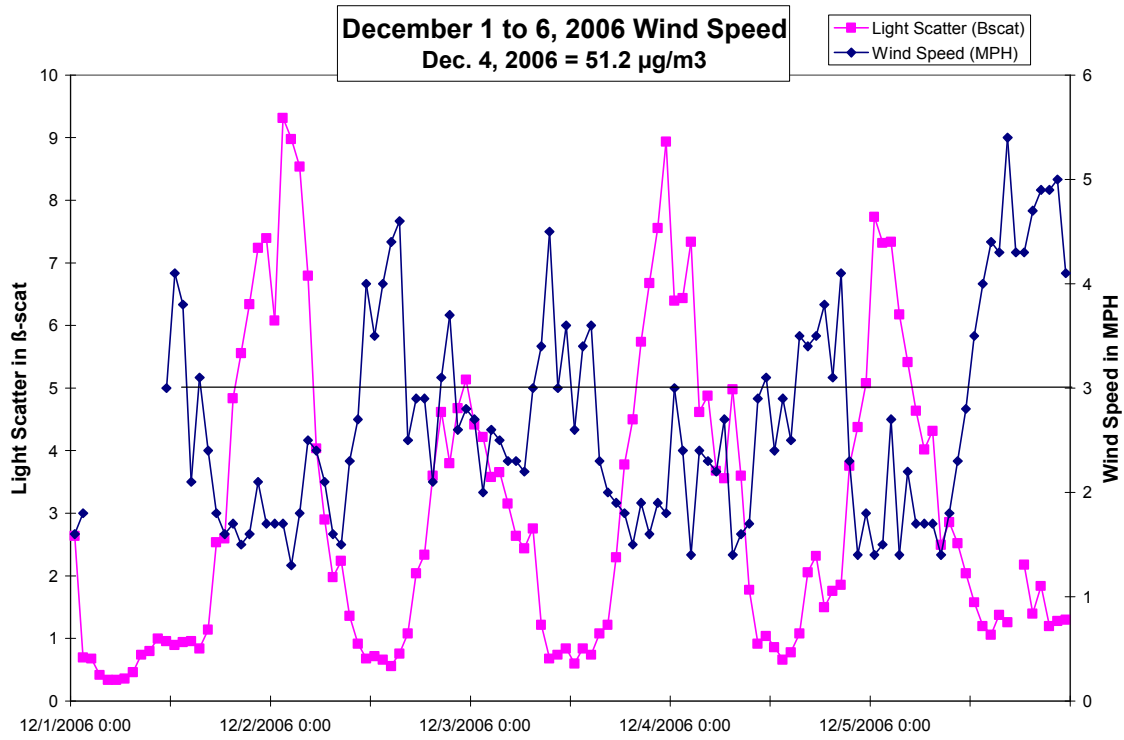


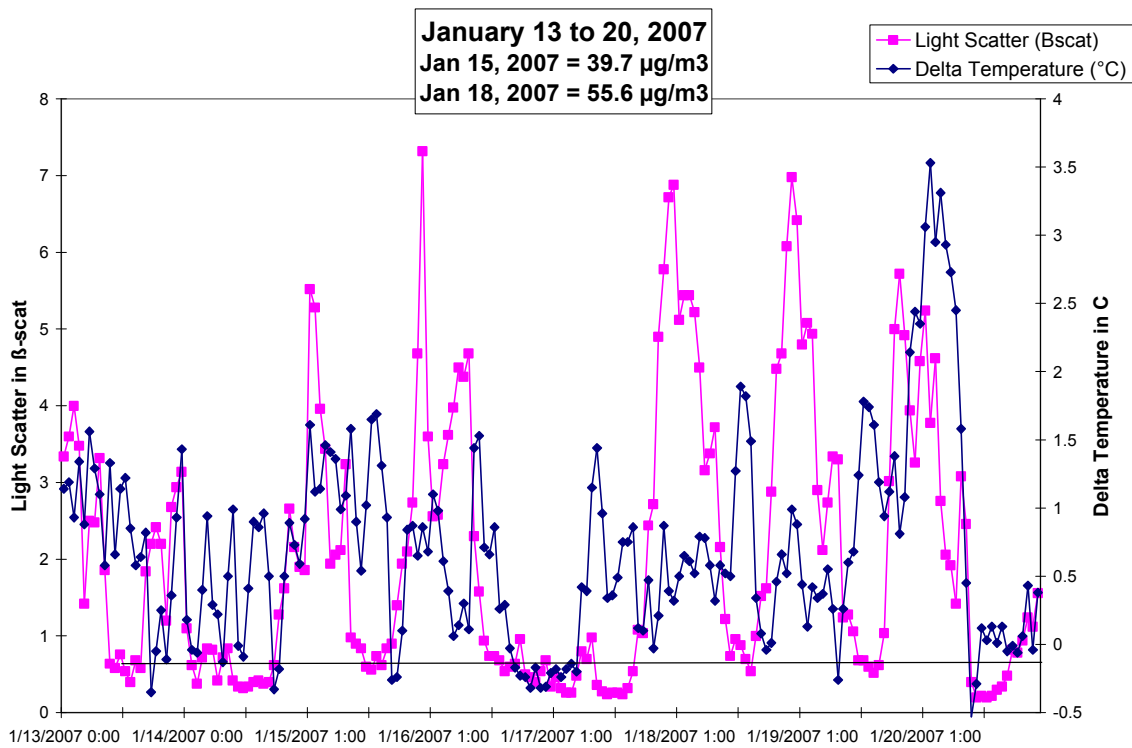
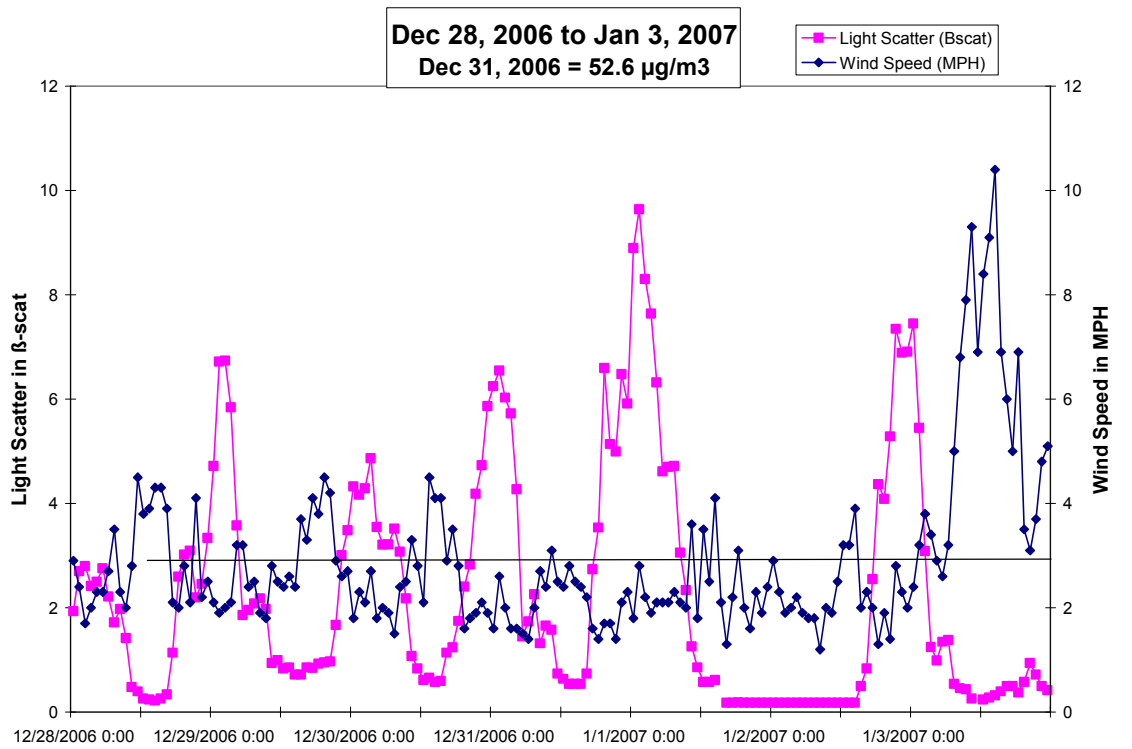


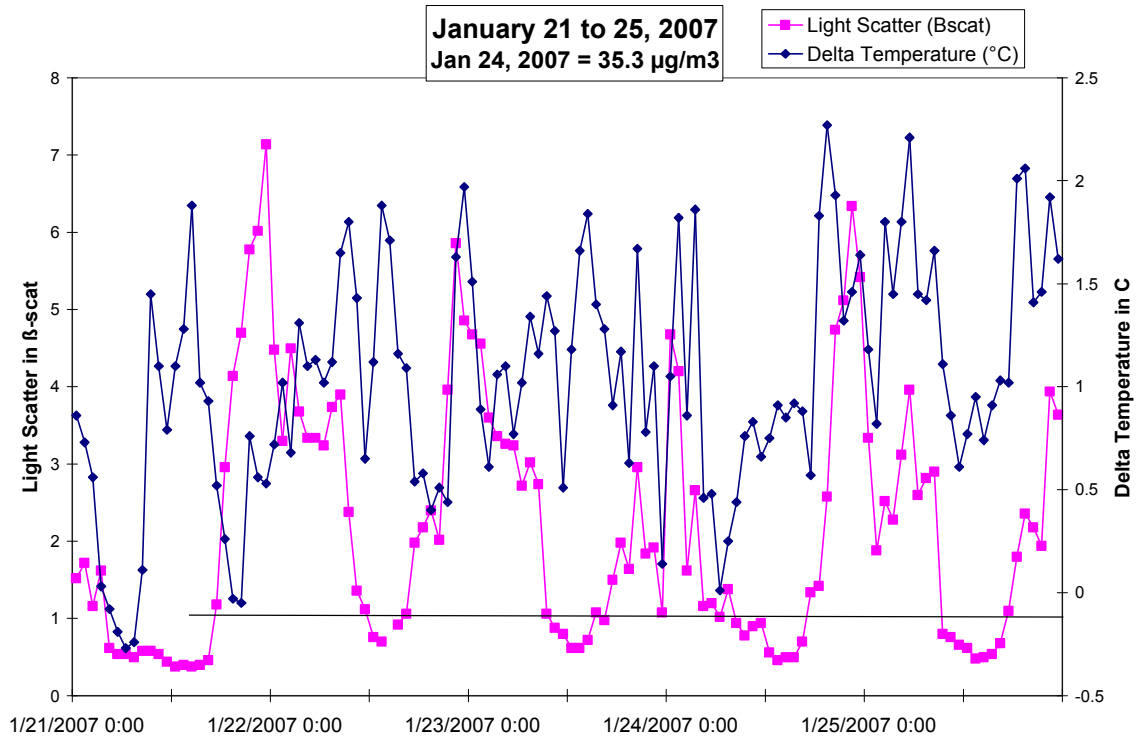
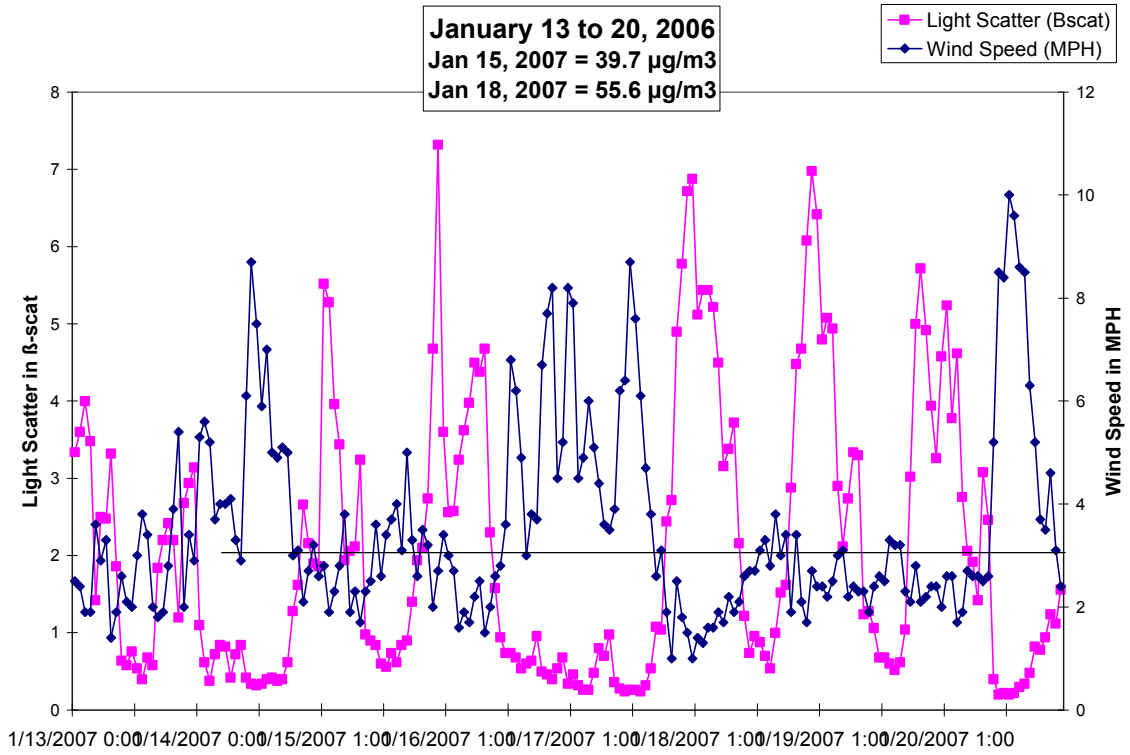


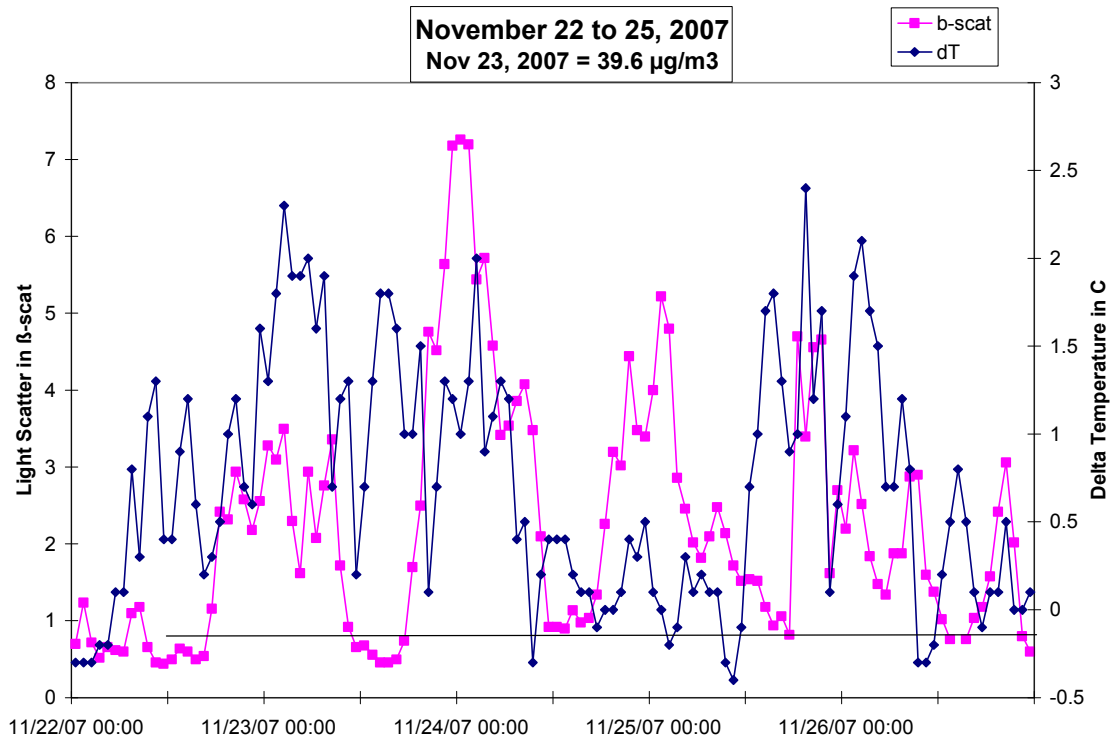
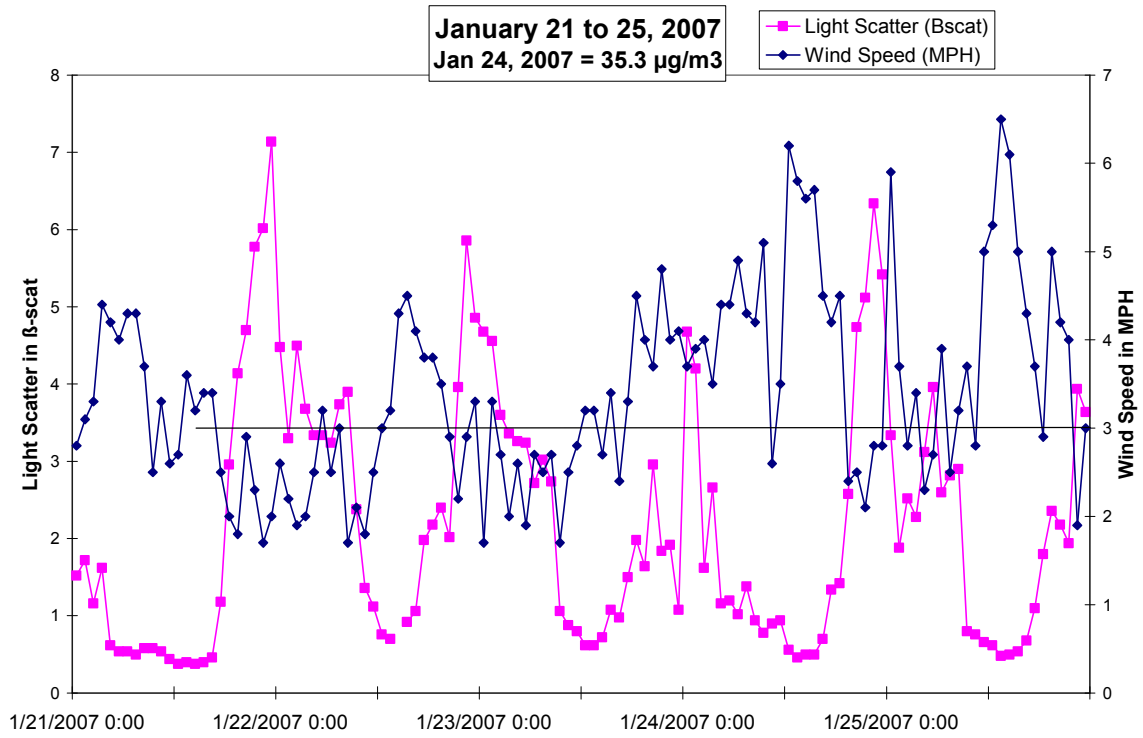


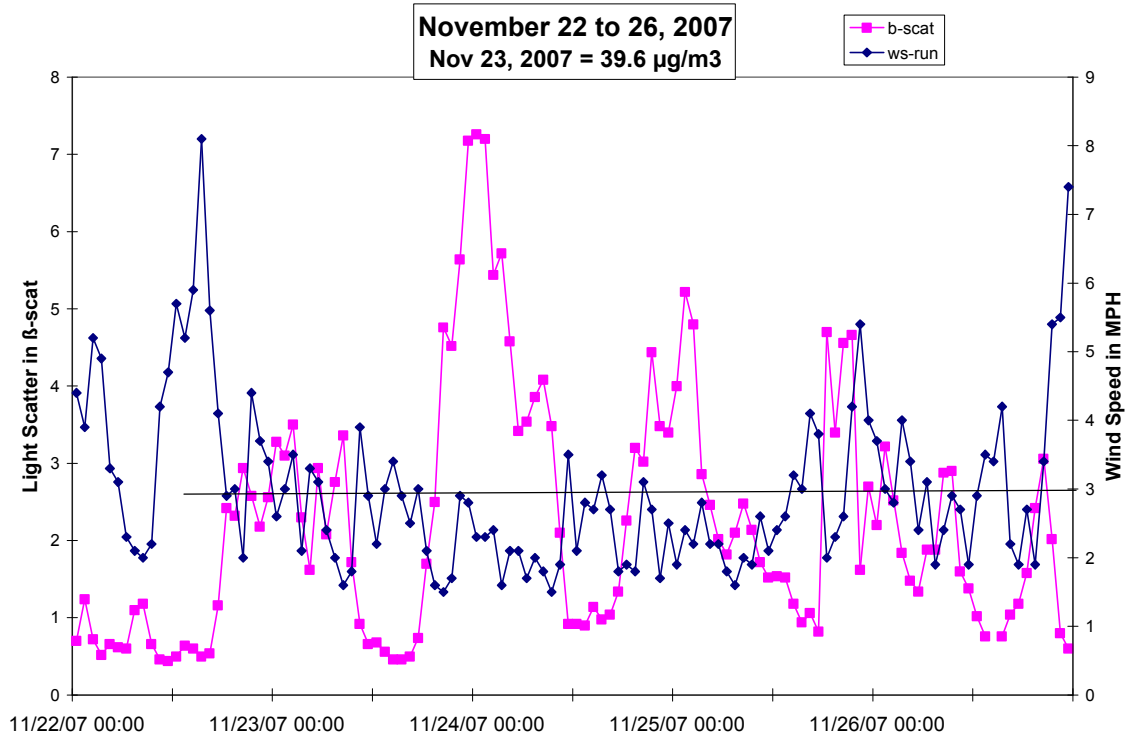














APPENDIX E – PUBLIC COMMENTS SUBMITTED TO ODEQ

On September 24, 2008, the Klamath County Commissioners held a Public Meeting/Hearing on the EPA proposed nonattainment area. The following are results of the testimony at the hearing.

OSU Extension Service -



**Klamath Basin Research and Extension Center**  
*Oregon State University in cooperation with Klamath County and USDA*

<b>Vandenberg Site</b> 3328 Vandenberg Road Klamath Falls, OR 97603-3796 Phone: 541-883-7131 Fax: 541-883-4582 <a href="http://extension.oregonstate.edu/klamath">http://extension.oregonstate.edu/klamath</a>	<b>Washburn Site</b> 6941 Washburn Way Klamath Falls, OR 97603-9365 Phone: 541-883-4590 Fax: 541-883-4596 <a href="http://oregonstate.edu/dept/kes">http://oregonstate.edu/dept/kes</a>
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BOARD OF COUNTY COMMISSIONERS

September 25, 2008

TO: Klamath County Board of Commissioners

FROM: William Riggs, Center Director, Oregon State University *William Riggs*  
Klamath Basin Research and Extension Center

RE: Non Attainment Zone Testimony

Please consider this written documentation supporting my verbal testimony at the meeting held September 24, 2008, 7:00 p.m. in the Commissioners Chambers.

My testimony focused on three key areas: Economics and Community Development; Data Collection, Analysis, and Interpretation; and Agency Status.

The current proposed Attainment Area has been modified by EPA to encompass most of the Klamath Basin, Ridge Top to Ridge Top and to the State Line. The proposed area would negatively and unfairly impact our local economy by hindering the agricultural industry and the communities ability to attract new businesses and industry. I further believe that data collections, interpretation, and application are flawed.

**Economics and Community Development**

This newly identified area includes a vast amount of agricultural properties within the basin. The 2007 Oregon Agricultural Information Network (<http://oain.oregonstate.edu/>) supports that Klamath County Agriculture provides approximately \$298 million worth of sales. This is the second largest business sector within the county ([http://www.city-data.com/business2/econ-Klamath\\_County-OR.html](http://www.city-data.com/business2/econ-Klamath_County-OR.html)). Research has additionally quantified that In Direct and Induced income from Agriculture within the county has a multiplier of .86. Total fiscal value of Agriculture to the County then is calculate in the \$600 million range. Klamath County has had a history of fiscal and employment dependence on its natural resource base. With the loss of our valuable timber industry, Agriculture is attributed as the remaining fiscal driver in the Natural Resource arena. Any attempt to diminish this revenue generating sector within the county should be strongly evaluated by decision, policy, and regulatory entities. Agricultural practices within the county are derived from location and weather events. The region is located in the high dessert which has a limited growing season, April-October. With this limited growing season agriculture should not be identified as a contributor during the periods of non-compliance, November-February.

With the expansion of this area the "Air Shed" in the Klamath Basin is compromised. This has a negative impact on the county and city to attract new business and industry into the basin. This proposed action will further erode the competitiveness of the basin in attracting opportunities to become a solvent and liquid government entity. Again those in regulatory and decision making seats should strongly reconsider expanding the boundaries.

Agriculture, 4-H Youth, Family & Community Development, Forestry, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Klamath county cooperating. The Extension Service offers its programs and materials equally to all people.

**Data Collection, Analysis, and Interpretation**

The data used to support this action is questioned. This decision is based on ONE monitoring station located within a residential area, within the Klamath Falls urban boundary. During my testimony I provided two examples of approved sciences that are utilized in the Klamath Basin. When we evaluate a field for soils testing we refer to the public soils map which provides the basis for evaluation. Once the soils are identified the soils are probed multiple times (20-30 samples per soil type) within the area to generate a representative sample to analyze and develop recommendations. Likewise when we sample a lot or unit of hay that is going to be marketed, a sample will contain 20-30 cores per 200 tons of hay in order to generate a respective sample. When conducting research, random plot designs with four replications at different sites over multiple time frames is the standard for statistical evaluation. Sampling one bale of hay, or relying on one soil sample, or the lack of statistically supported and repetitiveness is not quantifiable for developing a reliable data set. Relying on data from one monitoring station and modeling the data with applications to surrounding areas is not quantifiable.

Given the impact that this decision will have on the basin, multiple monitoring sites should be established from which gathered data can be analyzed in order to quantify the area of non-compliance. At this point the data can only support that the air at the Peterson School site is out of compliance. Without further sites and data points decisions made from this single data generating point are not quantifiable and would not withstand a peer review within a scientific community.

**Agency Status**

At the federal level when dealing with NEPA and the EIS process the local government can apply for Cooperating Agency Status. Is Cooperating Agency Status an option in this process? If so what is the appeal process if Cooperating Agency Status is not granted to the locally elected officials that are responsible for public health and safety. In addition has a social/economic impact analysis of this decision been developed in conjunction with local decision makers?

These were the key points of my testimony provided. Should you desire to use any verbal comments that I supplied that are not covered in this written submission I encourage you to do so. If you have any questions or need further supporting documentation relating to these comments please contact me.

Additional comments by OSU Extension Service:

Our agricultural industry is based on the weather. Our short growing season dictates products grown in the basin. These ag products include grains, potatoes, hay and forage, and livestock. Again given the climate we live in we start farming late in the spring once the frost leaves the soils and they dry enough to begin spring work. Grain is harvested in September and October. Potatoes are harvested in late September through October. Once we have a killing frost all hay and forage production ends. Most haying is finalized

by the end of September, depends on the year and the weather.

For agriculture in the Basin November-March is down time or marketing and shipping of stored products. From my limited time here any field burning is done by mid October and not addressed until most likely April or later.

On the livestock side most calves are shipped in the fall, October/November. I don't know of a data set that shows that livestock contribute to smoke, other than if sites are not grazed of fine fuels those fuels provide a carrier for wildland fire. But that is a wildfire issue not a livestock issue.

In a nut shell our weather dictates our growing season. There is no large agricultural operations being conducted during this time frame. Also note that we are in a dry climate and rely on surface or in some cases sub surface water. The irrigation season ends before the time which PM2.5 emissions are an issue.

Dr. William Riggs  
Center Director  
Klamath Basin Research and Extension Service

Dr. Richard Roseburg's Comments – OSU Extension Service:

I agree with above comments with one slight correction and an additional comment. Grain is mainly harvested in August and September, rarely spills over into October. Also, keep in mind that much of the lower lake area (high organic matter soils) where the most intensive agriculture occurs is under water from late November / early December through March, when draining begins to dry it out for spring tillage and planting which typically occurs from late April (if we're lucky and have a warm spring) until early June.

Richard Roseberg  
Associate Professor, KBREC  
OSU Crop & Soil Science Dept.

---

Robert Flowers – Farmer

September 24, 2008

In regards to the proposed EPA air quality zone.

Being a third generation farmer, and living and farming in this area my whole life I'd like to point out why I feel that the data does not justify the southern portion of the proposed zone to the California border. From the urban growth boundary south to the state line, approximately 12 to 13 miles, is basically all agriculture land, with the exception of the small town of Midland. In fact the land from Midland south to the state line, an area in excess of 40,000 acres is reclaimed lake bed converted to farming. According to your data the days of noncompliance occur November thru February. During these months there is very little agriculture activity due to the winter weather and the fact that most of this land is flood irrigated during these months. Remember this land is below the river level.

Even though EPA states wind action is from the south. Almost all days that don't comply occur during inversion and days of no wind, also according to EPA's data on bad air quality days the air quality at the urban growth boundary is over 50% better than at the only monitoring site used to determine air quality in the basin. The urban growth boundary is not very far from the monitoring site. Also note other possible smoke producing entities, such as the forest service and others are outside the proposed air quality area, some many miles. Data appears to continually point to wood stove issues especially around the monitoring sight, not outside influences. As a side note, Kingsley Field is an active air guard training sight for fighter jet pilots, which also has a detrimental effect, although an unknown amount, which is well beyond the counties control. For these reasons and others I urge EPA to reconsider the boundary so agriculture is not singled out as a contributor during the time of year when agriculture is virtually shut down and we know of no data to justify agricultures inclusion in the air quality area.

Thank You,



Bob Flowers

Eric Schreiner – homeowner

11259 White Goose Dr.  
Keno, OR 97627  
September 25, 2008

Klamath County Commissioners

Dear Sirs,

Thank you for the opportunity to testify last evening about smoke pollution caused by wood burning stoves in Keno during the winter. As I stated the air can be choking at times especially during periods of inversion. Some evenings the pall of smoke looks as thick as the dense fog we sometimes get in this area. Certainly the weather as well as Keno's geography has to do with this since the southeast winds and mountains on the northwest tend to keep the smoke contained in the Keno area. The population of Keno continues to grow and the number of homes burning wood increases yearly only making the problem worse. This is the time of the year people are outside shoveling snow which is very strenuous exercise and breathing this poor air is not good for our health. I believe the EPA's inclusion of Keno in it's non-attainment area is certainly merited.

Also, I don't believe the idea that certified wood stoves will solve the problem since they are most efficient when burning dry, hardwood. I doubt anyone in the basin burns hardwood, and many people are still cutting wood for winter in September. Pellet stoves might be a better solution, but it was brought to my attention that there have been shortages of pellets in past winters. I frequently see freight cars full of sawdust leaving Klamath Falls. Perhaps pellets could be produced in the basin. The benefits would be twofold because of the jobs this would create as well as reducing the winter time pollution.

I may be missing the point, but I don't understand the Council's rejection of the EPA's assessment. The EPA has determined the primary cause of pollution to be wood smoke and is not caused by agriculture or industry in the basin. Therefore this should not be a problem for either of these groups. Furthermore, if the air quality isn't addressed, why would a business locate in an area with a known air pollution problem? Certainly they would consider the possible employee health problems that would be associated with that. And last, but certainly not the least, you must consider the health costs of air pollution to the residents of the basin. The quality of life in the Klamath Basin is mostly wonderful, but frankly, it stinks in Keno during the winter!

Thank you for your kind consideration,



Eric Schreiner

Andrew Green – homeowner

11271 White Goose Dr.  
Keno, OR 97627  
September 25, 2008

Klamath County Commissioners

Dear Sirs,

During the winters here in Keno, the wood smoke concentration in the air reaches levels that cause the area to look like it is covered in fog.

During the Spring of this year there was a huge automobile crash on highway 97 caused by a fog so thick driver were unable to see, a fog that later proved to be smoke caused by agricultural burning.

The use of approved wood burning stoves has had little effect on the problem due, I'm sure, to failure to use them in the correct way, designed to burn dry hardwood at best, at least to burn dry softwood. You cannot cut wood in August and expect it to be dry enough to burn cleanly in September.

Under these conditions, providing or subsidizing more of these stoves is unlikely to show much improvement in air quality.

The argument that during the winter, agricultural burning ceases is negated or at least offset, by the fact that this is exactly when domestic burning reaches it's maximum

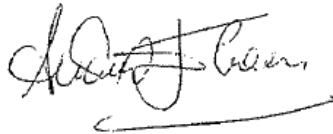
The evidence in the data collected by the AQS monitor shows that the overwhelming majority of the pollutant in our air is wood smoke, over 80% at times, and the largest concentration of particulates is carbon which is produced by burning wood.

The effect on our health, our quality of life, and our safety is, I believe, incalculable.

In my opinion, not only does the Non-Attainment Area need to include Keno and the areas to the South and East as shown by the proposed Non-Attainment Area Boundary, it is vital that it does.

Yours truly,

Andrew Green

A handwritten signature in black ink, appearing to read "Andrew Green", with a long horizontal line extending to the right below the signature.

OCT-02-2008 10:26

USDA FOREST SERVICE

503 808 2469 P. 02/02



United States  
Department of  
Agriculture

Forest  
Service

Pacific  
Northwest  
Region

333 SW First Avenue (97204)  
PO Box 3623  
Portland, OR 97208-3623  
503-808-2468

File Code: 2580  
Date:

Mr. Dick Pedersen  
Director  
Oregon Department of Environmental Quality  
811 S.W. Sixth Avenue  
Portland, OR 97204-1300

Dear Mr. Pedersen:

This letter is in regard to the proposed Klamath Falls Air Quality Zone for the PM2.5 non-attainment area. Designation of non-attainment areas that demonstrate violation of the National Ambient Air Quality Standards (NAAQS) for PM2.5 is a critical step in the control of air pollution sources to protect human health. Federal land management activities that produce fine particulate matter within a designated non-attainment area (NAA) will be held to a more rigorous air quality protection standard, including extra analysis of planning actions and possible restrictions on certain management activities.

For the western United States, it is generally accepted that designation of NAAs for Criteria Pollutants, such as PM2.5, will be something less than the entire county and will be focused on the rural community in which the fine particle pollutants are above the established PM2.5 standard of 35ug/m3.

In this instance, the problem is localized and isolated to residential woodstove smoke occurring on cold, stagnant, winter days during the months of November through February. The Oregon Department of Environmental Quality has recommended that an Air Quality Zone be designated for the NAA boundary. This designation is greater than the previous PM10 Urban Growth Boundary NAA and includes a minimal amount of federal land.

EPA's proposal for a NAA includes over 25,000 acres of federal land that have not been shown to contribute to Non-Attainment and are well outside of the City of Klamath Falls. In addition, this area is outside the range of existing monitoring stations that would be used to determine if the NAA is progressing towards attainment at some point in the future.

EPA's boundary change from that recommended by the Oregon Department of Environmental Quality is not supported by EPA's Nine Factor Analysis and therefore, the determination is inadequate and inappropriate.

For that reason I support the Oregon Department of Environmental Qualities designation of an Air Quality Zone within Klamath County and for the City of Klamath Falls PM2.5 NAA.

Sincerely,

  
CALVIN N. JOYNER  
Acting Regional Forester

cc: Elin D. Miller, Administration, EPA R10, 1200 Sixth Avenue, Seattle, WA 98101



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TOTAL P. 02



## Attachment B

### Additional Supplemental Information the Klamath Falls Nonattainment Boundary Determination

#### October 20, 2008

The Oregon Department of Environmental Quality (ODEQ) is providing additional information to supplement its October 2, 2008 technical supporting document. ODEQ based its recommendation of the PM<sub>10</sub> SIP-approved Air Quality Zone (AQZ) based on monitoring, meteorological, and land-use data indicating residential wood combustion was the primary contributor to PM<sub>2.5</sub> violations.

#### Air Quality Monitoring and Meteorological Data

In the October 2, 2008 submission, ODEQ provided evidence that low wind speeds dominate during violating days, indicating that the pollution was localized and staying in the area. EPA indicated a concern about transport from regional sources particularly from the south, west, and eastern areas. ODEQ conducted additional analysis by examining all exceedance days during 2005-2007. In this analysis ODEQ looked at wind direction, wind speed, and PM<sub>2.5</sub> concentration to determine whether any particular region contributed to pollution in the area.

Figure 1 provides the average visibility and wind direction for winds less than 1 mile per hour (mph). As the graph shows those episodes with a PM<sub>2.5</sub> concentration above 35 ug/m<sup>3</sup> the winds come from all directions, indicating there is no prevailing wind or source from outside the area contributing to PM<sub>2.5</sub> pollution at the monitor.

Figure 1: Klamath Falls Hourly Average Visibility and Total Number of Hours by Wind Direction during Hours with Wind Speed Scalar <1mph (4.4 Bscat = ~80.5 ug/m<sup>3</sup>)

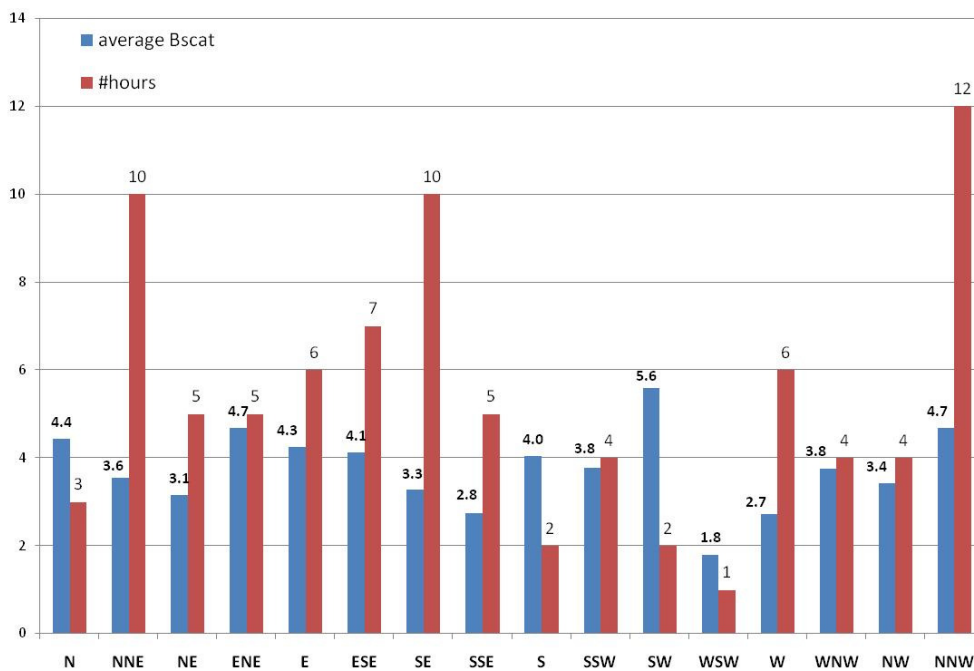


Figure 2 shows wind direction and pollutant concentrations with the wind speed between 1-3 mph. During these episodes, the wind direction is from many different directions but with a primary contribution coming from the north to northwest. There is no wind between 1 mph and 3 mph from the southwest.

Figure 2: Klamath Falls Hourly Average Visibility and Total Number of Hours by Wind Direction During Hours with Wind Speed Scalar Between 1-3mph (3 Bscat = ~ 54.9 ug/m<sup>3</sup>)

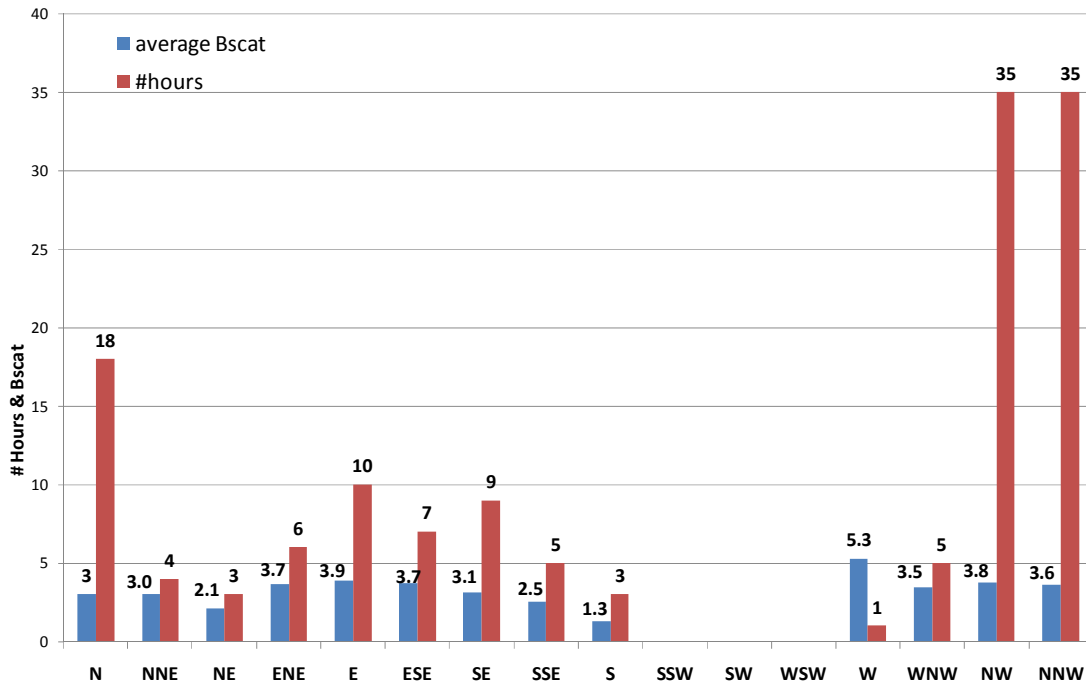
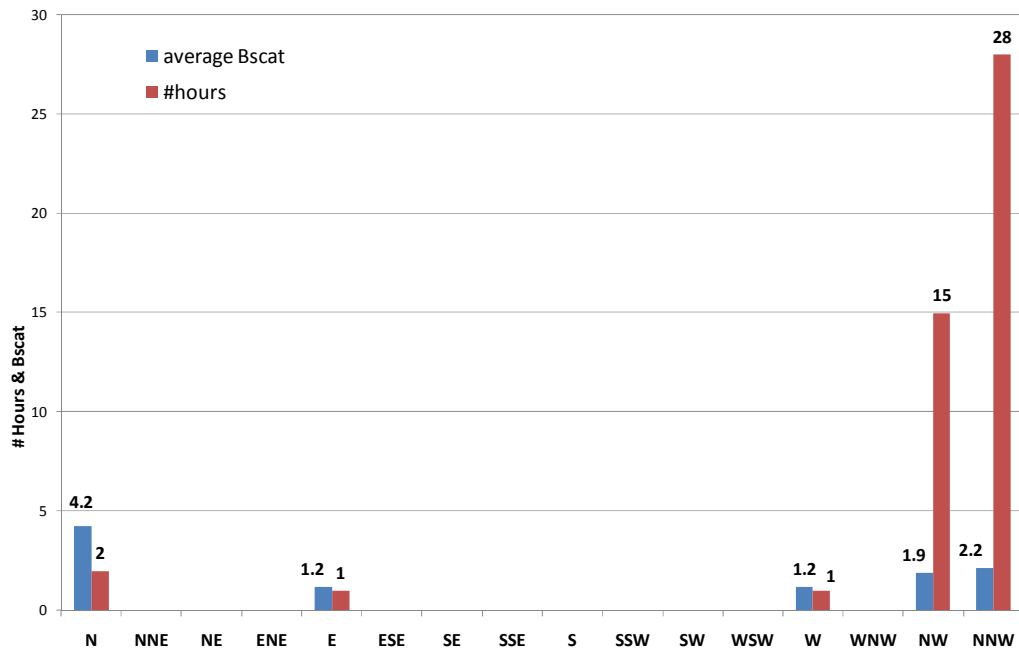


Figure 3 shows the wind direction when wind speeds are above 3 mph. Winds only appear to be coming from a few directions, primarily from the north-northwest direction. It indicates that during exceedance days, winds are primarily below 3 mph indicating stagnant conditions.

Figure 3: Klamath Falls Hourly Average Visibility and Total Number of Hours by Wind Direction during Hours with Wind Speed Scalar >3mph



ODEQ also looked at the time period of January 15-19, 2005, when a typical stagnation event occurred in Klamath Falls. It provides further evidence that high PM<sub>2.5</sub> concentrations are a diurnal effect, primarily caused by woodstoves and temperature inversions. Further, it shows a buildup of pollution during the event. Figures 4 & 5 show the PM<sub>2.5</sub> estimate, delta temperature, and wind speed graphs with PM<sub>2.5</sub> levels rising in the evenings when low inversions set in. The wind speed drops during the evening suggesting that the PM<sub>2.5</sub> did not travel far. It shows a stagnation trend and a pollution buildup during that trend. DEQ believes this trend means pollution generated in the airshed stays in the airshed during the stagnation event. As shown previously, woodstoves are the main contributor to this pollution.

Figure 4: PM<sub>2.5</sub> Estimate and Delta Temperature Klamath Falls Elevated PM<sub>2.5</sub> Episode - Jan 2005

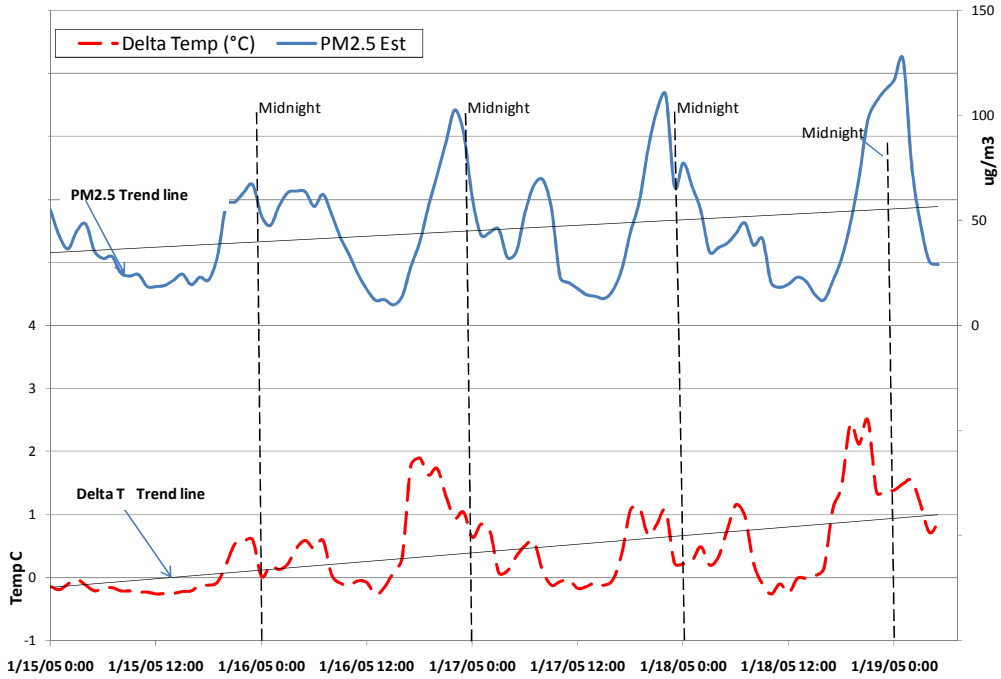
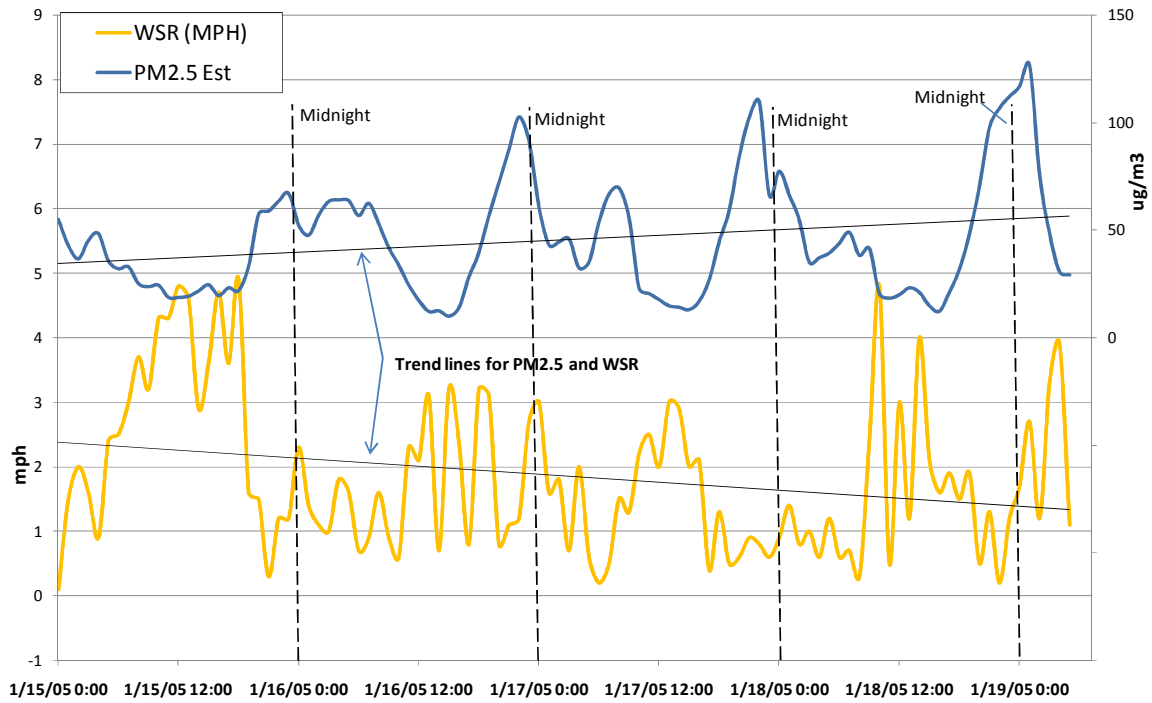


Figure 5: PM<sub>2.5</sub> Estimate and Wind Speed Scalar Klamath Falls Elevated PM<sub>2.5</sub> Episode - Jan 2005 (WSR – wind speed reading)

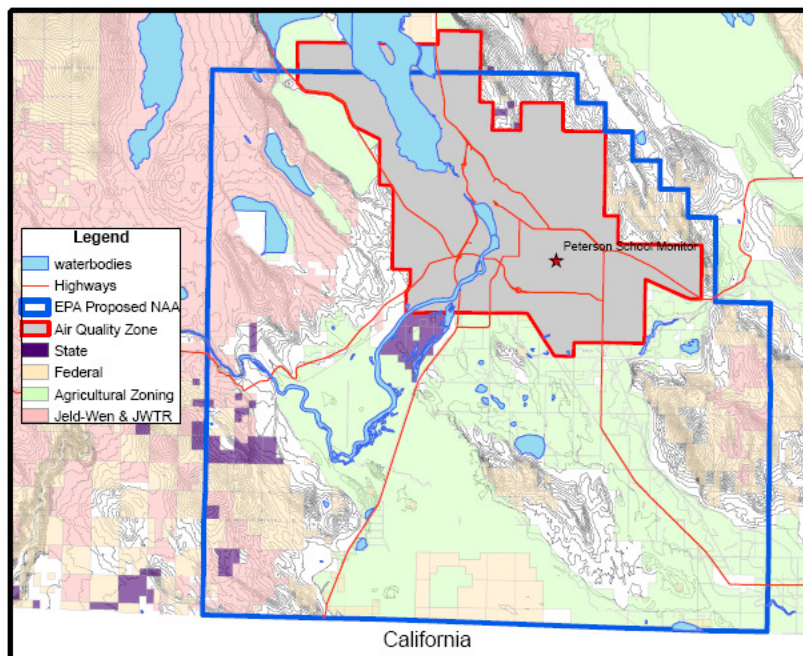


These graphs show that wind speeds drop during the nighttime, typical of wintertime inversions and exacerbated by woodstove use, as people fire up their woodstoves in the evening and early morning hours. It provides further evidence that woodstove use is the primary contributor to  $PM_{2.5}$  emissions, because if emissions were coming from outside the region, emissions would tend to be more constant.

#### Land Use, Population Density, and Growth Rates

As part of the justification for recommending the  $PM_{10}$  SIP-approved Air Quality Zone (AQZ), ODEQ cited Oregon's unique land-use laws and population density. ODEQ provided a map (Attachment A, Figure 12) showing the distribution of land-use within the Klamath Falls area, including the AQZ and EPA's proposed nonattainment boundary (NAA). Many of the lands included in EPA's NAA encompassed large tracts of federal, state, agricultural, forested, and range lands. Figure 6 provides additional details on topography and land use in the area.

Figure 6: Map of Federal, State, Agricultural, Forested and Range Lands with Contour Lines



For those areas not specifically designated as state, federal, agricultural, or other lands, the topography indicates they are "mountainous" regions. Development in these areas would likely be limited and would not contribute emissions to the Klamath Falls area.