UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

August 18, 2008

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

The Honorable Theodore R. Kulongoski
Governor of Oregon
160 State Capitol
900 Court Street
Salem, Oregon 97301-4047

Dear Governor Kulongoski:

Thank you for your recommendations on the status of fine particle pollution throughout Oregon. Fine-particle pollution represents one of the most significant barriers to clean air facing our nation today. Health studies link these tiny particles – about $1/30^{th}$ the diameter of a human hair – to serious human health problems including aggravated asthma, increased respiratory symptoms like coughing and difficult or painful breathing, chronic bronchitis, decreased lung function, and even premature death in people with heart and lung disease. Fine particle pollution can remain suspended in the air for long periods of time and create public health problems far away from emission sources. Reducing levels of fine-particle ($PM_{2.5}$) pollution is an important part of our nation's commitment to clean, healthy air.

We have reviewed your December 17, 2007 letter submitting Oregon's recommendations on air quality designations for the 2006 24-Hour $PM_{2.5}$ standards. We have also reviewed the technical information submitted to support Oregon's recommendations. We appreciate the effort your State has made to develop this supporting information. EPA intends to designate two areas in Oregon as nonattainment; a portion of Lane County and a portion of Klamath County. This letter is to inform you that the U.S. Environmental Protection Agency intends to make modifications to Oregon's recommended boundaries for both of these areas.

We have enclosed a detailed description of areas where EPA intends to modify your state recommendations, and the basis for such modification. Your Environmental Director will also receive a copy of this letter and the enclosure. Should you have additional information that you wish to be considered by EPA in this process, please provide it to us by October 20, 2008.

EPA has taken steps to reduce fine particle pollution both regionally and across the country. These actions include the Clean Diesel Program to dramatically reduce emissions from highway, nonroad and stationary diesel engines, and the Fine Particle Implementation rule, which defines requirements for states with levels of fine particle pollution that do not meet national air quality standards.

Please also be aware that in near future, EPA is planning to publish a notice in the Federal Register to solicit public comments on our intended designation decisions. We intend to make final designation decisions for the 2006 24-Hour $PM_{2.5}$ standards by December 18, 2008. If you have any questions, please do not hesitate to contact me. We look forward to a continued dialogue with you as we work together to implement the $PM_{2.5}$ standards.

Sincerely,

Elin D. Miller for
Regional Administrator

Enclosure

cc: Oregon Department of Environmental Quality

Lane Regional Air Protection Authority

Klamath County Public Health Department

Attachment 1

Oregon
Area Designations For the
24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in Oregon that EPA intends to designate as not attaining the 2006 24-hour fine particle (PM2.5) standard.[1] A county will be designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	OR Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Area 1 Oakridge, Oregon	Lane County (partial)	Lane County (partial)
Area 2 Klamath Falls, Oregon	Klamath County (partial)	Klamath County (partial)

EPA intends to designate the remaining counties in the state as "attainment/unclassifiable."

EPA Technical Analysis for Oakridge Oregon

Discussion

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Oakridge, Oregon area identifies the areas with monitors that violate the 24-hour PM2.5 standard and evaluates nearby areas that potentially contribute to fine particle concentrations in the area. EPA has evaluated these areas based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography

[1] EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour PM2.5 standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for PM2.5 remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

- jurisdictional boundaries
- level of control of emissions sources

Figure 1 is a map of the counties in the area and other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State. Oakridge is located in Lane County which is a large county of 4722 sq mi. The County extends from the Pacific Ocean to the crest of the Cascade Mountains. It is larger than Delaware and Rhode Island combined and almost the size of Connecticut. Although 90 percent of Lane County is forestland, Eugene and Springfield comprise the second largest urban area in Oregon after Portland. In the map below Oakridge is in the south east portion of the County and has a violating monitor with a 2005-2007 design value of 47μg/m^3. See Figure 2.

Figure 1 Lane County and Surrounding County Air Monitoring Sites and Values

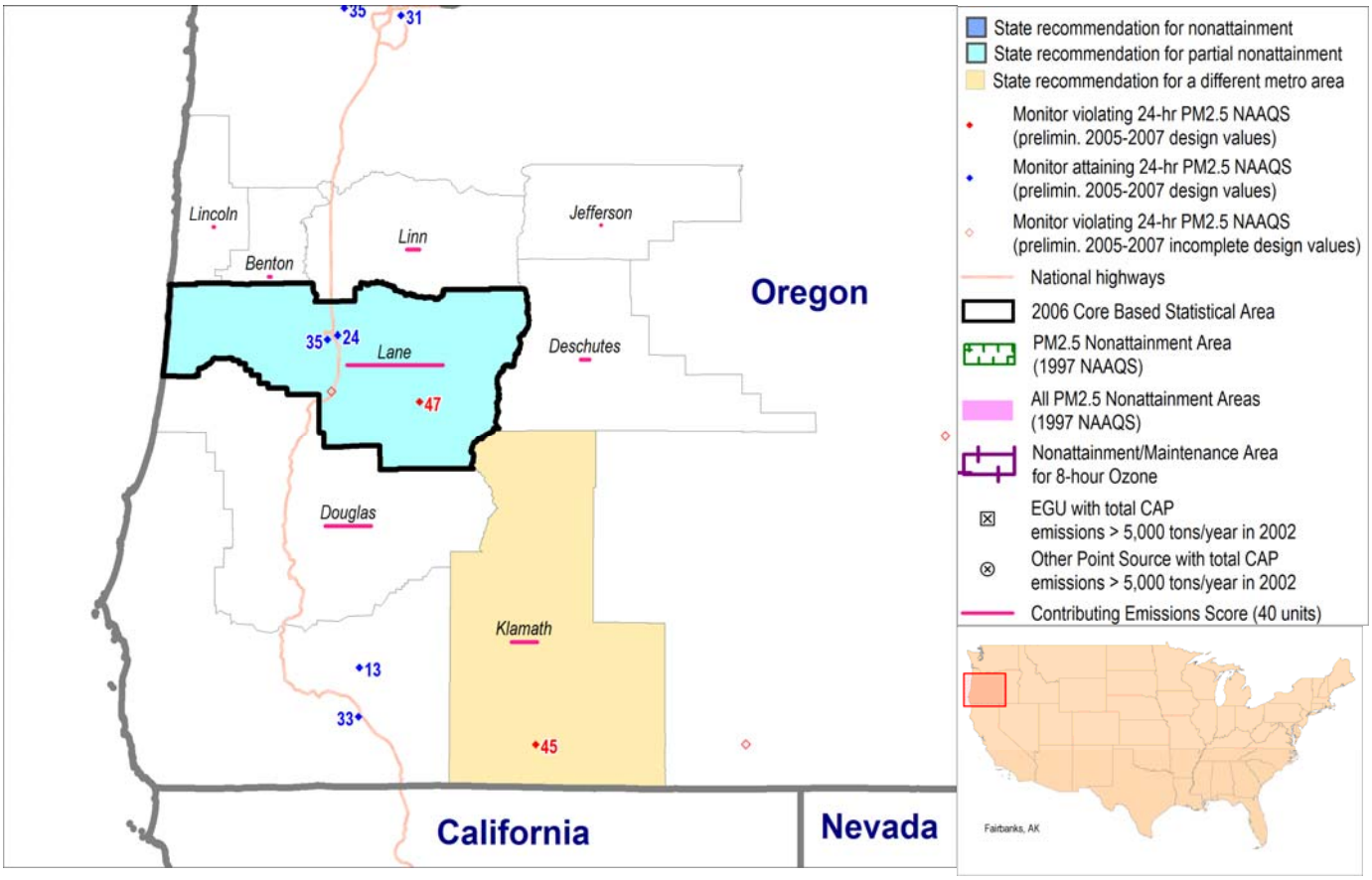
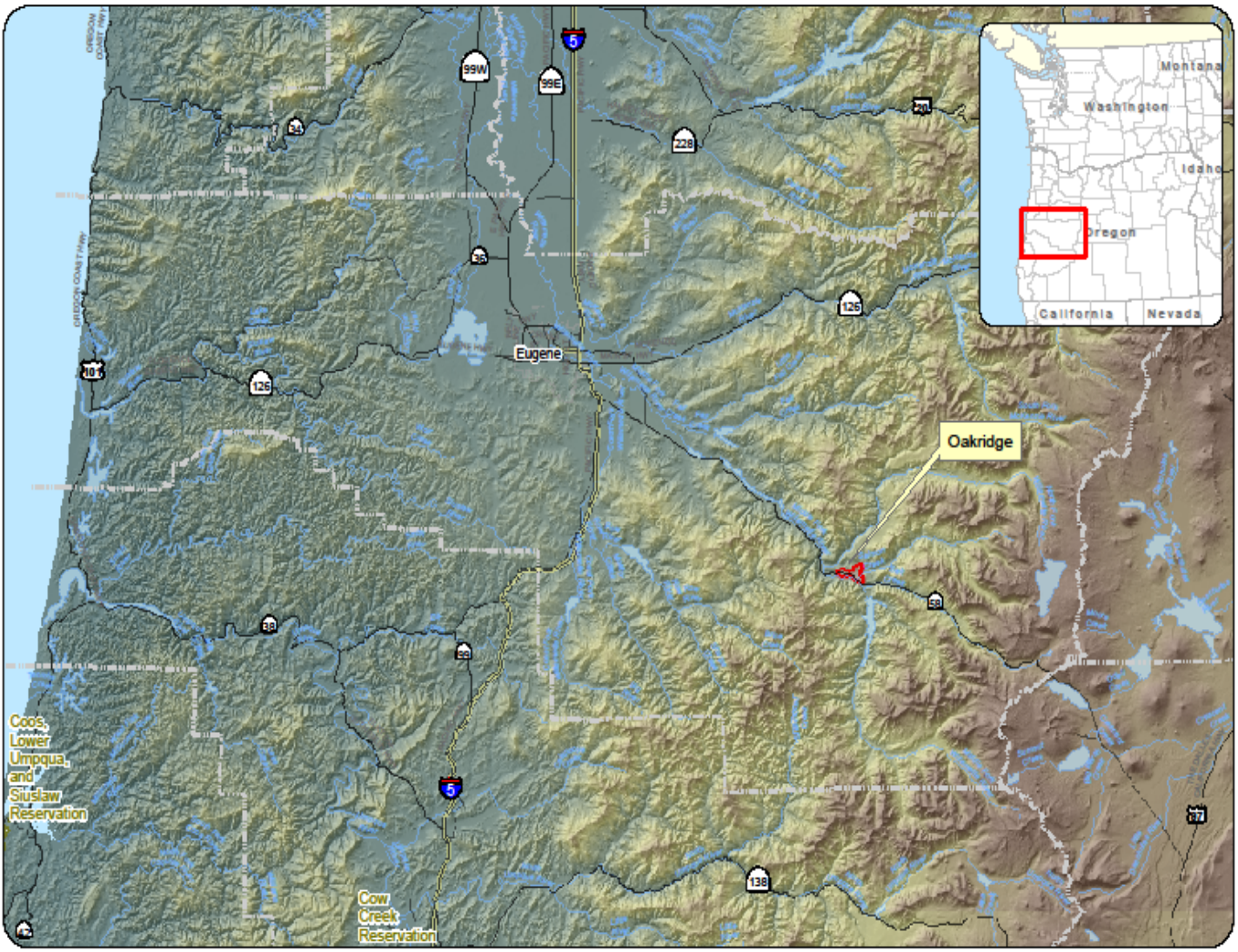


Figure 2 Oregon's recommended nonattainment area boundary for Oakridge and surrounding topography and land area in Lane County



In December 2007, Oregon recommended that the Oakridge Urban Growth Boundary, a portion of Lane County be designated as "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard based on air quality data from 2004-2006. See Figure 3. This data is from the Federal Reference Method (FRM) monitor located in the City of Oakridge, Oregon. See December 17, 2007 letter from Governor Ted Kulongoski to Elin Miller, Regional Administrator EPA Region 10 regarding recommendations for PM2.5 area designations. The State did not submit a nine factors analysis for the Oakridge area. However, EPA conducted a nine factor analysis for the Oakridge area and is modifying the State's recommendation.

EPA's intended nonattainment area boundary for the 24-hour $PM_{2.5}$ air quality standard for the Oakridge area is an expanded area from the State's recommendation of the Oakridge Urban Growth Boundary. See figure 3. EPA's intended nonattainment area for the violating monitor includes populated areas outside of the Oakridge Urban Growth Boundary including the town of Westfir (population 276 and elevation about 1100 ft MSL). EPA's boundary is based on survey sections that generally include sources and populations within the 2000 ft above mean sea level (MSL) contour line. Oakridge is at 1200 ft MSL. See Figure 4.

Figure 3 Oakridge Urban Growth Boundary and Surrounding Area (State of Oregon's Recommended Boundary)

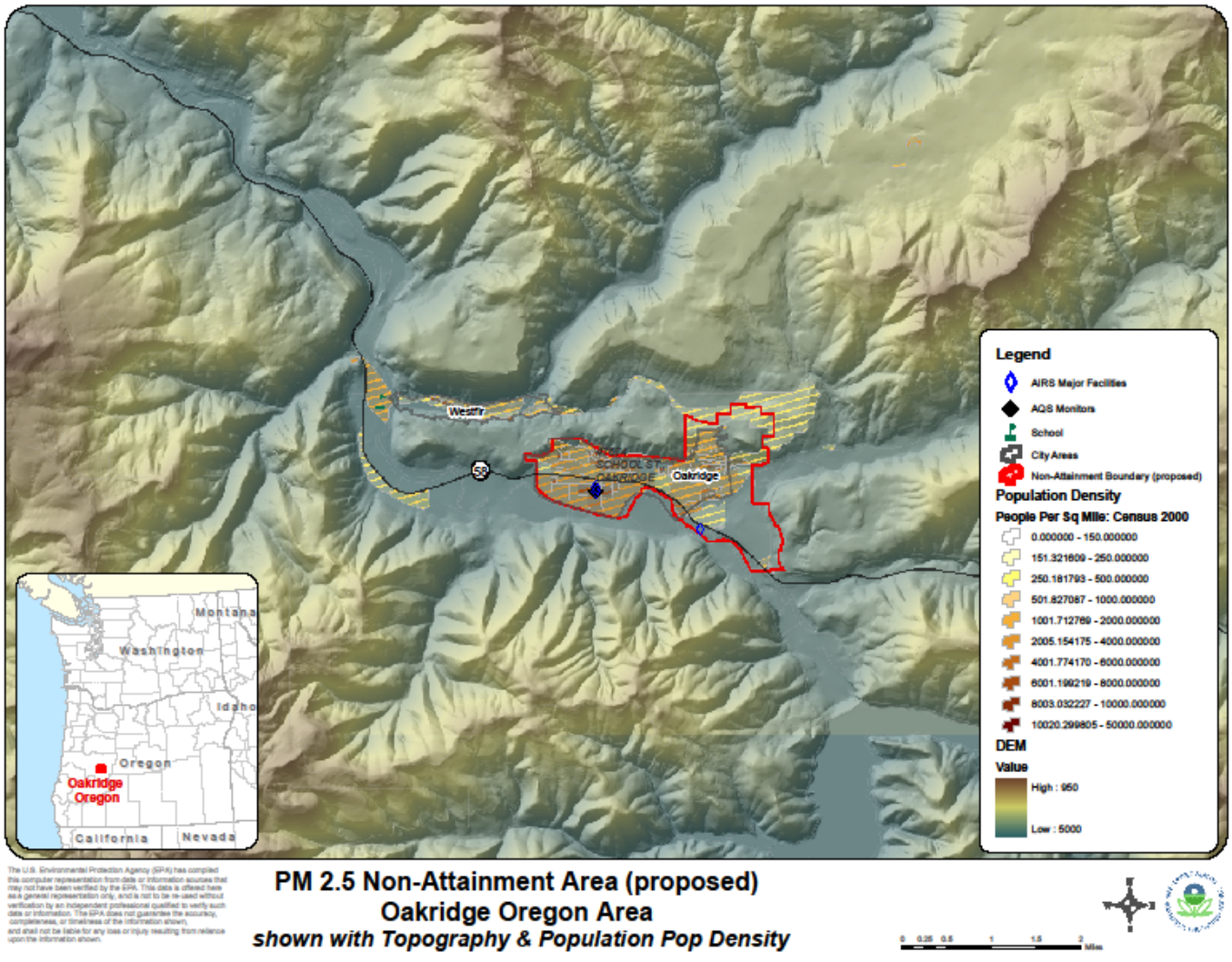
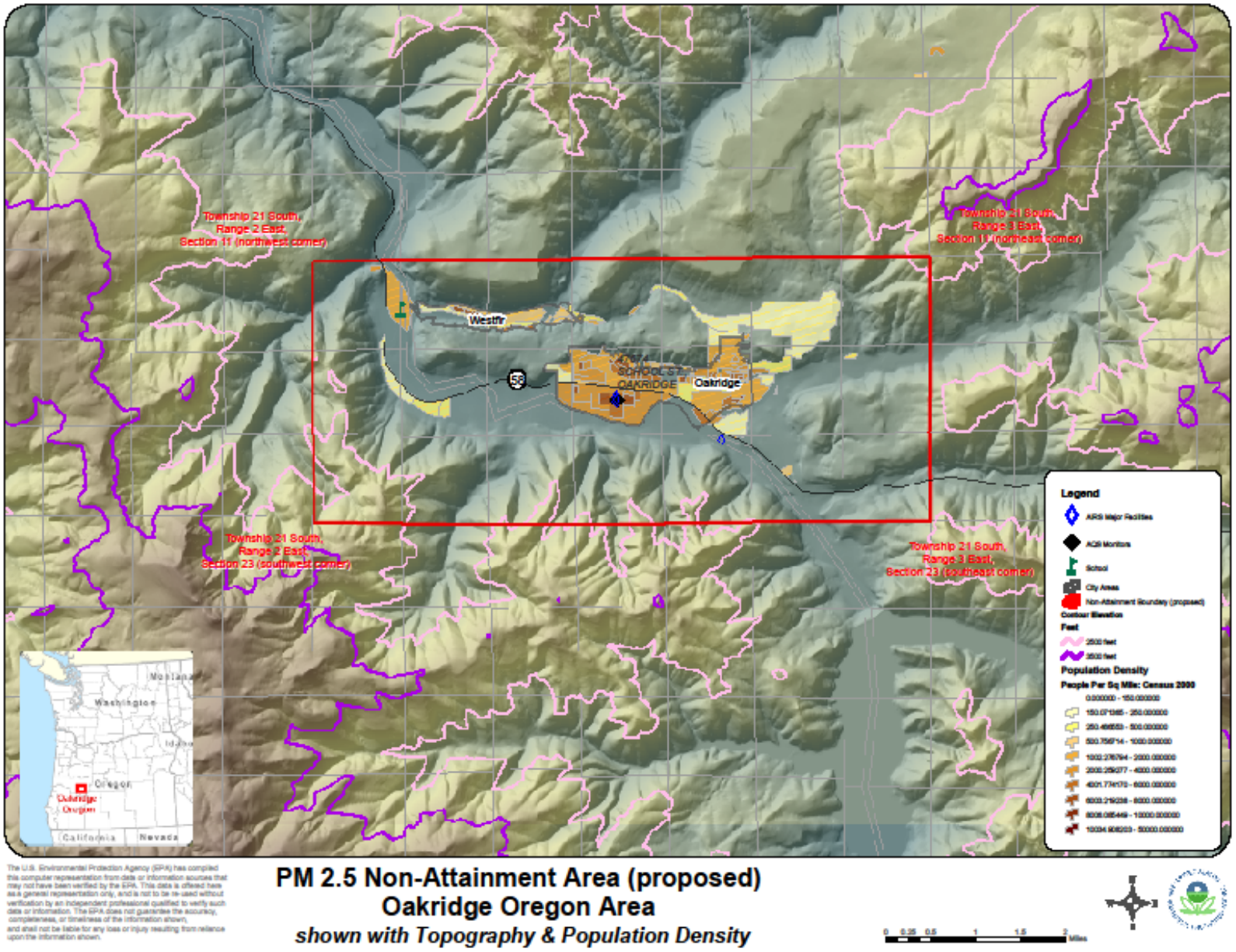


Figure 4 EPA's Intended Nonattainment Area Boundary for the Oakridge, OR Area



EPA's intended boundary is defined as a line from Township 21 South, Range 2 East, Section 11 (northwest corner) east to Township 21 South, Range 3 East, Section 11 (northeast corner), south to Township 21 South, Range 3 East, Section 23 (southeast corner), west to Township 21 South, Range 2 East, Section 23 (southwest corner) connecting back to Township 21 South, Range 2 East, Section 11 (northwest corner).

Below is a summary and then a detailed description of our nine factors analysis.

Summary of EPA's review of nine factors analysis

Oakridge is an isolated, rural mountain community located in a deep mountain valley on the western slopes of the Cascade mountain range in Lane County. As stated above, the town is at an elevation of 1200 feet above mean sea level (MSL), with the surrounding mountains rising to 3500-4500 feet MSL. It is 35 miles east of the Eugene/Springfield urban area on State Highway 58. The population of Oakridge is 3100. The population of the town of Westfir, which is located about four miles to the west of Oakridge is 276. The town of Oakridge supports a withering logging industry and has some railroad activity. The sole major, permitted source in the area is a rock crusher. Oakridge is a medium to low income community with a plentiful supply of free, to inexpensive cord wood that is used for winter residential heating. According to the US Census, the median household income is $26,622 (in 1999 dollars). This income is below the national average of $41,994.

Exceedences of the $PM_{2.5}$ standard at the monitor in the Oakridge, Oregon area occur exclusively in the winter months of November-February when temperatures reach near or below freezing. Air quality and meteorological data collected at the Oakridge monitoring site indicate that the $PM_{2.5}$ levels in Oakridge reach their highest levels in the evening hours, when wind speeds are very low (less than 1 mph) and temperature data from 2 and 10 meters suggest ground based temperature inversions prevent mixing. Mountains surround Oakridge and rise to over 1000 ft above the town and the violating monitor, trapping pollution during these very low wind speed events. Exceedences of the $PM_{2.5}$ standard occur exclusively in the cold winter months (November-February). Survey and demographic data indicate that about 40% of the households in Oakridge heat their homes with wood in woodstoves. Emissions inventory data indicate that emissions from woodstoves comprise at least ¾ of the total PM2.5 emissions in the Oakridge area during the cold winter months. Most of Oakridge's population and growth is confined by the Urban Growth Boundary by Oregon Law. The area is surrounded by US Forest Service Land. EPA's weight of evidence conclusion from this information is that home heating sources within the Oakridge UGB and in the small communities located in the same mountain valley (Westfir) cause and contribute to the violations at the Oakridge monitor.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other", primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO2 and NOx, are part of "PM2.5 emissions total," they are not shown in Table 1 as separate items.) "$PM_{2.5}$ emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "$PM_{2.5}$ emissions other" represents other inorganic particles (crustal). Emissions of SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) are also potential $PM_{2.5}$ precursors and are included for consideration. Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. [2]

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.]. Note the CES is a coarse approximation of potential contributions from neighboring counties. Topography and complex local meteorology for particular areas may not be well represented in the CES application[3].

Table 1 shows emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties around Lane County Oregon. Counties are listed in descending order by CES.

[2] See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

[3] See supporting documentation section on limitations. Because of differences in county size, and topography across the country, the score may require careful interpretation for some areas, particularly in the western United States.

Table 1 $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	Contributing Emissions Score	Preliminary Daily Des Val 0507	PM2.5 emissions - total (tpy)	PM2.5 emissions - carbon (tpy)	PM2.5 emissions - other (tpy)	SO2 emissions (tpy)	NOx emissions (tpy)	VOC emissions (tpy)	NH3 emissions (tpy)
OAKRIDGE, OR		47							
Lane	**100**	**47**	**5,353**	**3,143**	**2,210**	**1,341**	**12,365**	**33,290**	**1,852**
Douglas	48		4,615	2,675	1,940	640	6,900	16,658	1,179
Klamath	27	45	3,760	2,205	1,555	575	7,377	15,688	2,004
Linn	13		3,246	1,479	1,768	1,151	6,621	14,271	3,756
Deschutes	9		3,883	1,876	2,007	524	5,716	14,276	639
Benton	2		1,424	761	664	322	2,299	8,275	1,112
Lincoln	1		1,635	709	926	454	2,625	6,363	175
Jefferson	0		1,049	501	547	116	1,297	3,476	869

Based on emission levels and CES values, Lane County is a candidate for a 24-hour $PM_{2.5}$ nonattainment designation. However, as stated above Lane County is 4722 sq mi. and extends from the Pacific Ocean to the crest of the Cascade Mountains with several large mountain ranges over 5000 ft in elevation. In the whole of Lane County, VOC emissions dominate followed by NOx emissions. Because Lane County is so large and Oakridge is confined by mountains that rise to over 3500 ft in elevation, it is important to look at local emissions data in addition to this countywide emissions data.[4]

Though there is no emission inventory for PM2.5 for the Oakridge area, the most recent PM10 SIP inventory submitted to EPA in 1996 contains data that can be used to better understand sources contributing to PM2.5 violations in Oakridge. The SIP contains a 1991 inventory for a 24-hour, worst case day. The major sources of PM–10 emissions are residential wood combustion (76.3%), paved roads (12.6%), unpaved roads (7.6%), winter road sanding (0.9%), transportation (1.9%), industrial point source (0.6%) and other (.3%). Total PM–10 emissions are 983.1 pounds per day. Since the PM-10 SIP was developed, there has been very little change in emissions in the Oakridge area (no new permitted sources of emissions and very little or no growth). Based on data from the US Census Bureau, the population of Oakridge also has not grown significantly. The population in 2006, 2000, and 1990 was 3,132, 3,148, and 3,063 residents respectively.[5]

EPA reviewed a 2005 survey report by Lane Regional Air Pollution Agency that examined woodstove use in Oakridge, Oregon.[6] According to the report:

[4] Google Maps
[5] US Census Bureau
http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=01000US&_geoContext=01000US&_street=&_county=oakridge&_cityTown=oakridge&_state=04000US41&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=010&_submenuId=population_0&ds_name=null&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=
[6] 2005 Advanced Marketing Research, Inc Survey of Oakridge Residents Conducted for Lane Regional Air Pollution Authority

- Of the 1,200 households in Oakridge, approximately 700 (45%) have woodstoves.
- Ninety percent of the people with woodstoves use them, with about 50 percent of them burning more than two cords of wood a year.
- About 60 percent of the people burn daily during the winter.
- About 35 percent of the stoves are old, uncertified stoves.

Because exceedences in Oakridge occur in the winter, the area is surrounded by complex topography that separates Oakridge from urbanized areas in the County and because Lane County is over 6000 square miles, countywide emissions inventory data were not an important consideration in EPA's analysis. See topography and air quality data factor descriptions below.

The PM10 emissions inventory data and local woodstove survey data are the most recent sources of information on local emissions and EPA has concluded from our review of both of these sources of information that emissions from burning in residential woodstoves are the biggest source of PM2.5 emissions in the Oakridge area.

Factor 2: Air quality data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Oakridge area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 24-hour $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile values are 35 $\mu g/m^3$ or less. A design value is only valid if minimum data completeness criteria are met.[7]

The 24-hour $PM_{2.5}$ design values for counties in the Oakridge/Lane County area are shown in Table 2.

Table 2 Air Quality Data

County	State Recommended Nonattainment?	Design Values 2004-06 ($\mu g/m^3$)	Design Values 2005-07 ($\mu g/m^3$)
Oakridge, Oregon (Lane County)	Yes	48	47
Eugene, Oregon (Lane County)	No	32	35

The Oakridge area in Lane County, Oregon reports a violation of the 24-hour $PM_{2.5}$ standard. Therefore, Oakridge is a candidate for inclusion in the nonattainment area. However, this factor alone is not sufficient to eliminate other nearby areas as areas to be included in nonattainment area boundary. Design values for Eugene, which is a highly urbanized area 40

[7] Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM2.5 NAAQS for designation purposes.

miles to the west of Oakridge were 32 µg/m^3 and 35 µg/m^3 respectively in 2004-2006 and 2005-2007.

In addition to consideration of design values, EPA looked at additional air quality data for the Oakridge and Eugene/Springfield areas. Although Eugene-Springfield is 35-40 miles to the northwest of Oakridge, and separated from Oakridge by mountains, given the high design values for the Eugene-Springfield area, EPA analyzed air quality data for the Eugene-Springfield area to determine if sources originating in the Eugene-Springfield area contribute to the exceedences in Oakridge. This data is discussed below.

Regional PM2.5 Composition Data

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations occur predominantly in the winter, and the average chemical composition of the highest days is 55% carbonaceous PM2.5, 33% nitrate, 9 percent sulfate and 3% crustal/other. See Table 3. Carbonaceous PM2.5 is an indicator of biomass burning including burning in woodstoves and fireplaces.

Table 3 PM2.5 Composition Data for Lane County/Oregon Region

PM2.5 Composition Data	Sulfate (mg/m^3)	Nitrate (mg/m^3)	Carbon (mg/m^3)	Crustal (mg/m^3)	Total (mg/m^3)	Sulfate Percent	Nitrate Percent	Carbon Percent	Crustal Percent
Total Concentration (Cold)	3.3	12.3	20.1	1.1	36.8	9	33	55	3
Regional Concentration (Cold)	0.9	3.5	3.9	0.3	8.6	10	41	45	3
Urban Increment (Cold)	2.4	8.8	16.2	0.8	28.2	9	31	57	3

Seasonality of exceedences

All exceedences in Oakridge over the period 2005-2007 have occurred in the winter months of November-February. This data indicates that PM2.5 exceedences in Oakridge are seasonal. See Table 3 under the meteorology factor for a list of dates of exceedences. No exceedences of the standard were reported for March through September.

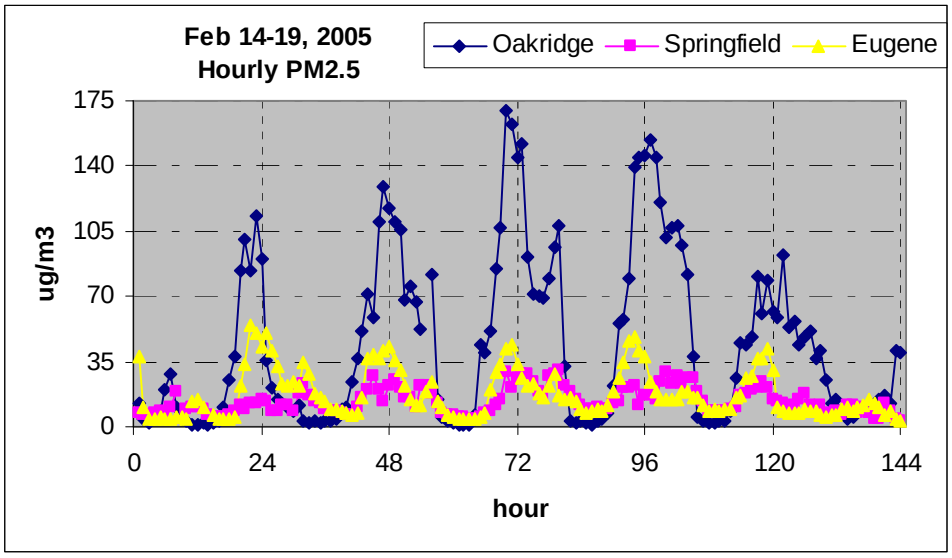
Diurnal patterns and comparison with monitors in the Eugene-Springfield area

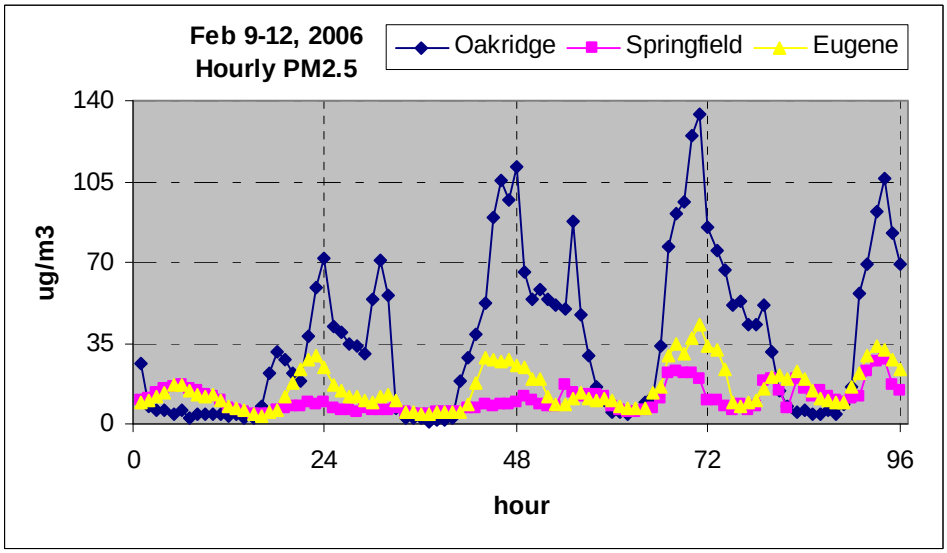
Figures 5-7 display diurnal PM2.5 readings from continuous monitors for three PM2.5 exceedence episodes in Oakridge and the closest cities of Eugene and Springfield (35-40 miles from Oakridge). In each case, exceedences follow a diurnal pattern, with PM2.5 levels peaking in the evenings and dropping during the day. PM2.5 levels in Oakridge are 3-4 times higher than those observed in Eugene and Springfield suggesting that the sources impacting Oakridge are different than sources impacting the monitors in the Eugene/Springfield area. In addition, PM2.5 levels in Oakridge dip below well below those observed in Eugene/Springfield. This further suggests that Oakridge is impacted by sources outside of the Eugene/Springfield area and/or that the sources impacting the Oakridge monitor are local. EPA has analyzed data for the top five percent high days in Oakridge and found that the diurnal PM2.5 levels observed in Eugene and

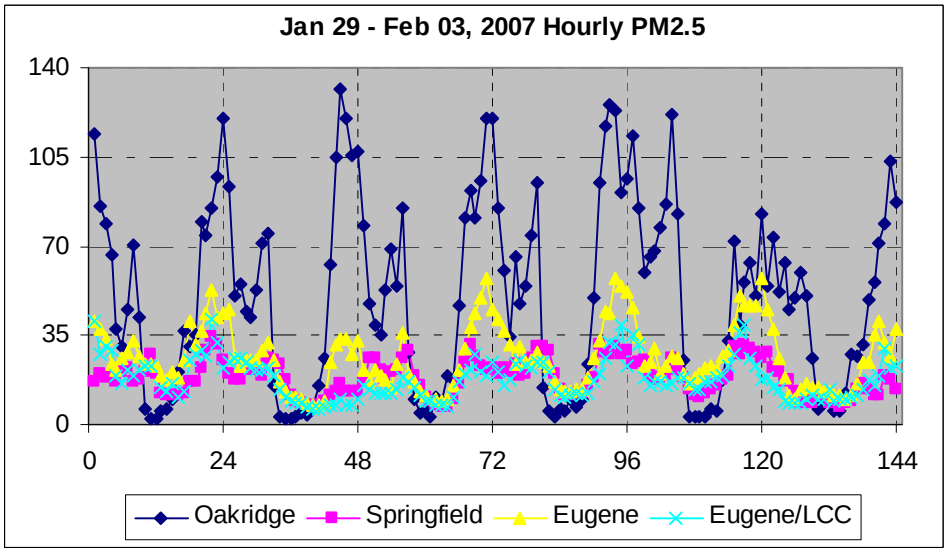
Springfield are consistently different than those observed at the Oakridge monitor. [8]This data for one year is generally summarized by the charts in figures 8-10. These charts plot concentrations above 35 µg/m^3 in Oakridge against concentrations above 35 µg/m^3 in Eugene, and indicate that the high values observed in Oakridge are not correlated or very weakly correlated with high values observed in Eugene. This is the case even with elevated concentrations in Eugene and elevated concentrations in Oakridge offset by three and six hours to allow time for transport from Eugene to Oakridge.

[8] See EPA Excel spreadsheets

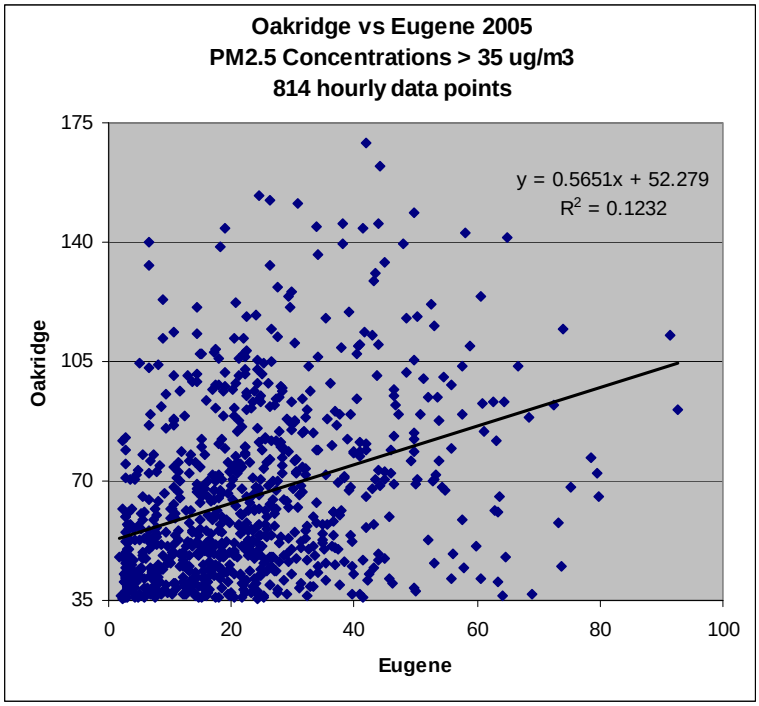
Figures 5-7 PM2.5 readings from continuous monitors for three PM2.5 episodes in the Cities of Oakridge, Eugene and Springfield, Oregon

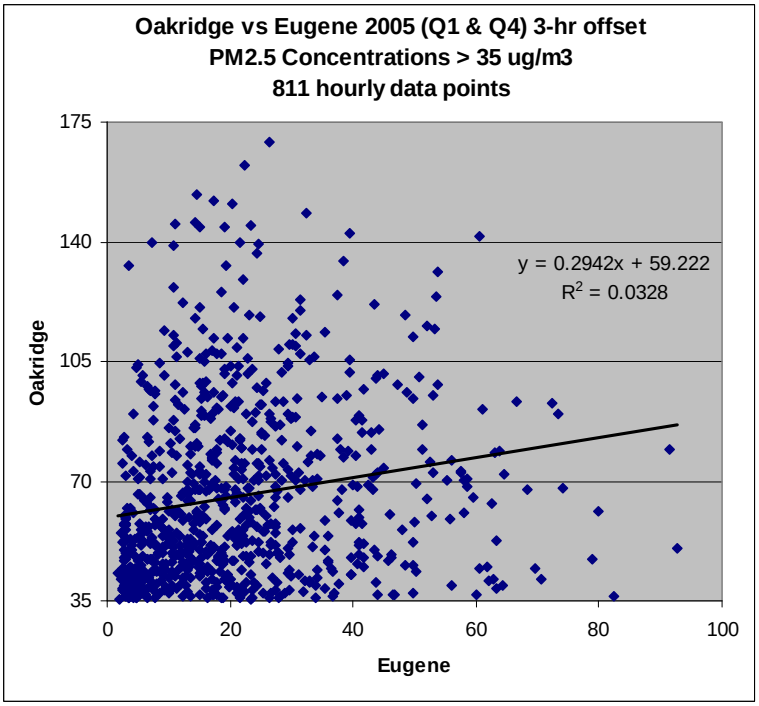


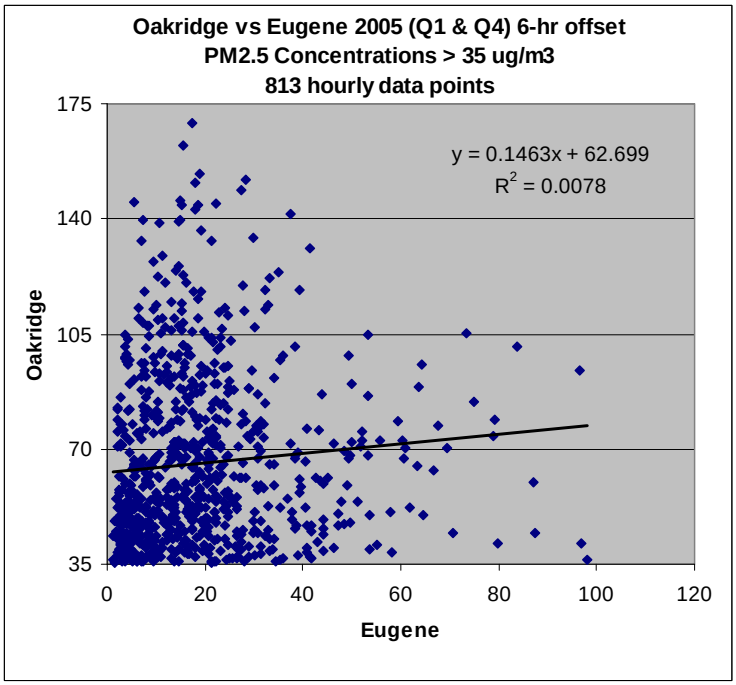




Figures 8 - 10 2005 Oakridge vs. Eugene Concentrations above 35 µg/m^3







Factor 3: Population density and degree of urbanization (including commercial development)

Table 4 shows the population for Lane County and for surrounding counties. The 2005 population of Lane County is 334,486 (Table 4). However, because Lane County is so large and Oakridge is confined by mountains that rise to over 3500 ft in elevation, EPA's analysis focused on a review of local data rather than population data for neighboring counties. The cities of Eugene and Springfield, Oregon are the largest nearby population centers. As of July 1, 2003, the US Census Bureau estimated the population of Eugene to be 142,185. The population density was 3,403.2 people per square mile (1,313.9/km²). As of 2000, there were 52,864 people in Springfield, Oregon. The population density of Springfield was 3,670.7 people per square mile (1,417.4/km²)[9]. The size of Eugene and Springfield indicate some potential contribution to the Oakridge monitor, but air quality data as discussed above, as well as topography and meteorology data, which will be discussed below indicate that these areas are not contributing to the violations at the Oakridge monitor.

The population of Oakridge is 3100 and the city area is roughly 2.0 square miles. The population density in 2000 was 1,659.8 people per square mile (639.7/km²). The City of Oakridge is contained by the Urban Growth Boundary which by Oregon law inhibits growth outside of the area. However, there are nearby areas with populations and potential sources that are not included within the UGB. The town of Westfir is located less than 4 miles from Oakridge.

Outside of the Oakridge area, and areas generally within 5 miles of the UGB, there is no urbanization. Figure 11 is a map of Oakridge and the surrounding area. The rugged land surrounding Oakridge shown in green is US Forest Service land that is unpopulated. Areas in blue are US Army Corps of Engineers land. The gray areas are areas with other land uses. The Oakridge Urban Growth Boundary is the red line and the City boundary is indicated by the dark gray line. Figure 12 is a map of the Oakridge area with nearby areas with populations noted in yellow.

Table 4 Population and population density in Lane County OR and surrounding counties

County	2005 Population	2005 Population Density (people/sq mi)	Percent Population Change (2000-05)
OAKRIDGE, OR			
Lane	**334,486**	**73**	**3**
Douglas	104,139	21	4
Klamath	65,803	11	3
Linn	108,942	47	6
Deschutes	141,288	46	21
Benton	78,597	116	1
Lincoln	45,946	46	4
Jefferson	20,007	11	5

[9] US Census Bureau http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search&geo_id=01000US&_geoContext=01000US&_street=&_county=oakridge&_cityTown=oakridge&_state=04000US41&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=010&_submenuId=population_0&ds_name=null&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=

Figure 11 Oakridge Urban Growth Boundary and Surrounding US Forest Service Land

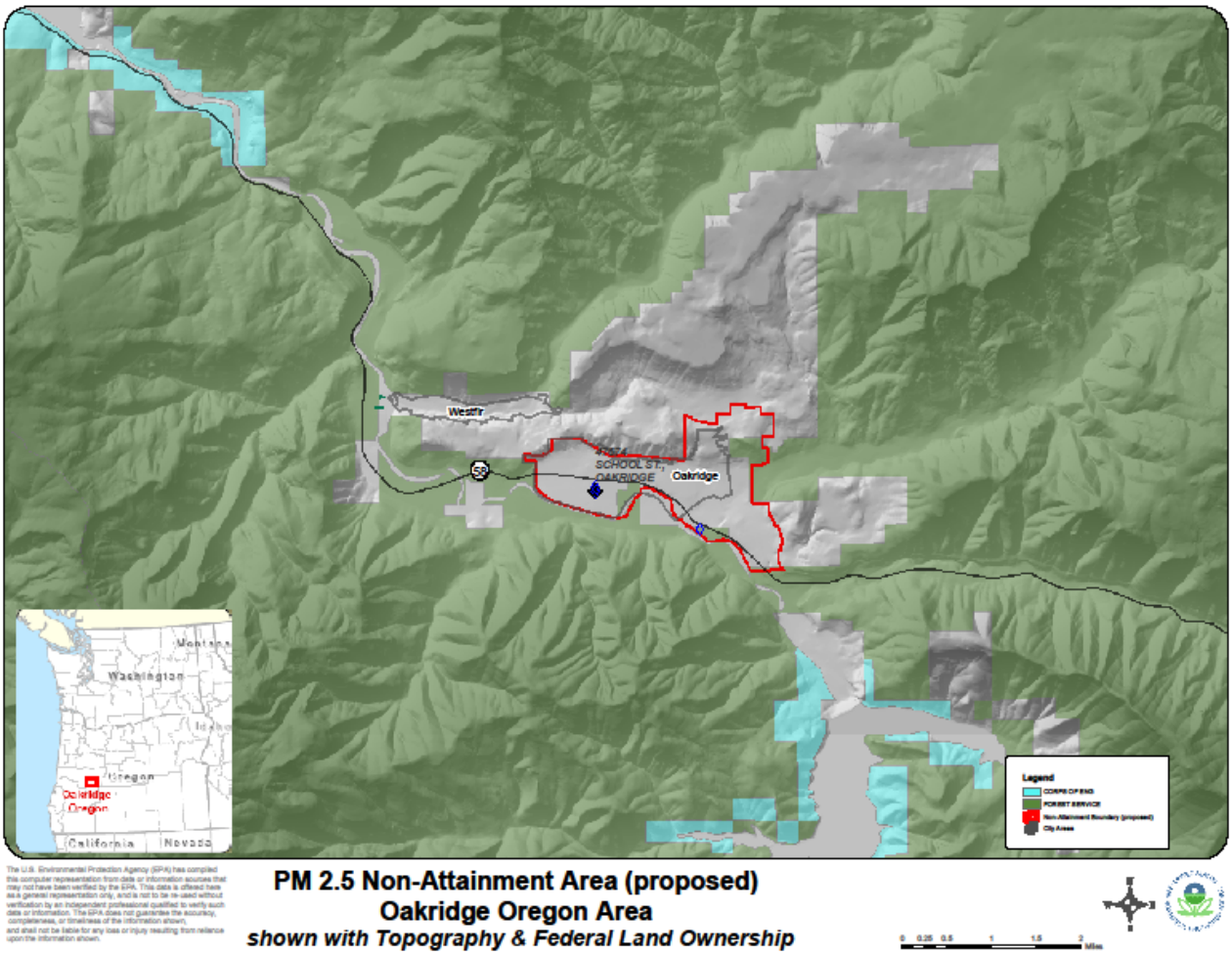


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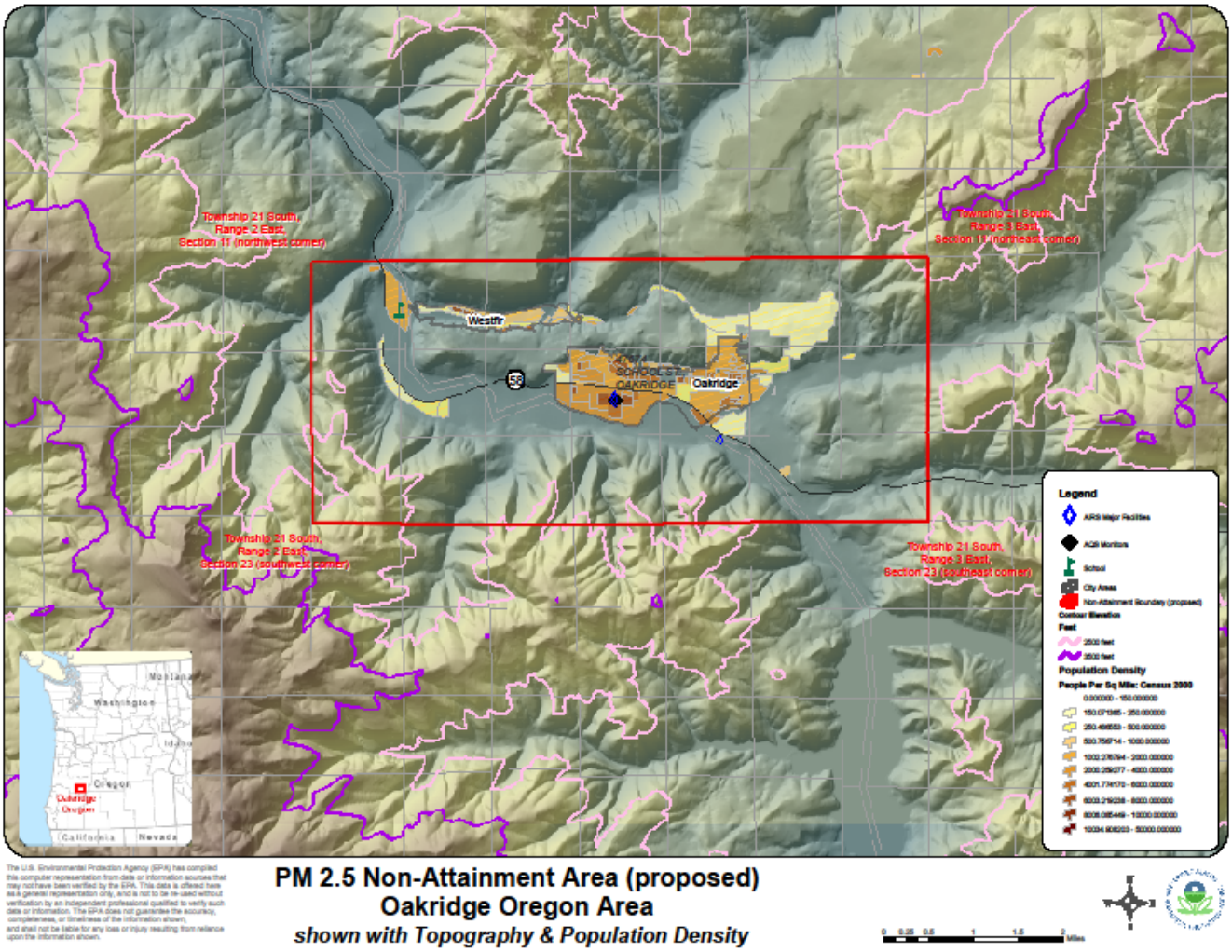
Figure 12 Oakridge Oregon area with nearby populated areas and EPA's intended boundary



Factor 4: Traffic and commuting patterns

Traffic and commuting pattern information is displayed in Table 5 for Lane County and for surrounding counties. This information indicates that traffic has grown in the whole of Lane County by about 8 percent. Given the low population of the Oakridge area, isolation, large county size, and rural nature, traffic and commuting patterns between surrounding counties and Oakridge was not an important consideration in our decision making process.

Table 5 Traffic and commuting patterns in Lane County, OR and surrounding counties

County	Vehicle Miles Traveled in 2005 (millions annually)	Percent VMT Growth (1996-2005)	Number commuting into any violating counties	Percent commuting into any violating counties
OAKRIDGE, OR				
Lane	**2,723**	**8**	**146,470**	**96**
Douglas	1,485	7	1,130	3
Klamath	807	85	24,920	97
Linn	1,433	28	2,160	5
Deschutes	1,227	25	420	1
Benton	450	(5)	950	3
Lincoln	480	30	90	0
Jefferson	217	44		

Factor 5: Growth rates and patterns

As stated above, the population of Oakridge has not changed significantly since 1990, while population for the entire state of Oregon grew by 30% over this period. The reduction in population in Oakridge followed the decline of the logging/wood products industry in the 1990s.[10]

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high days are defined as days where any FRM or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values.

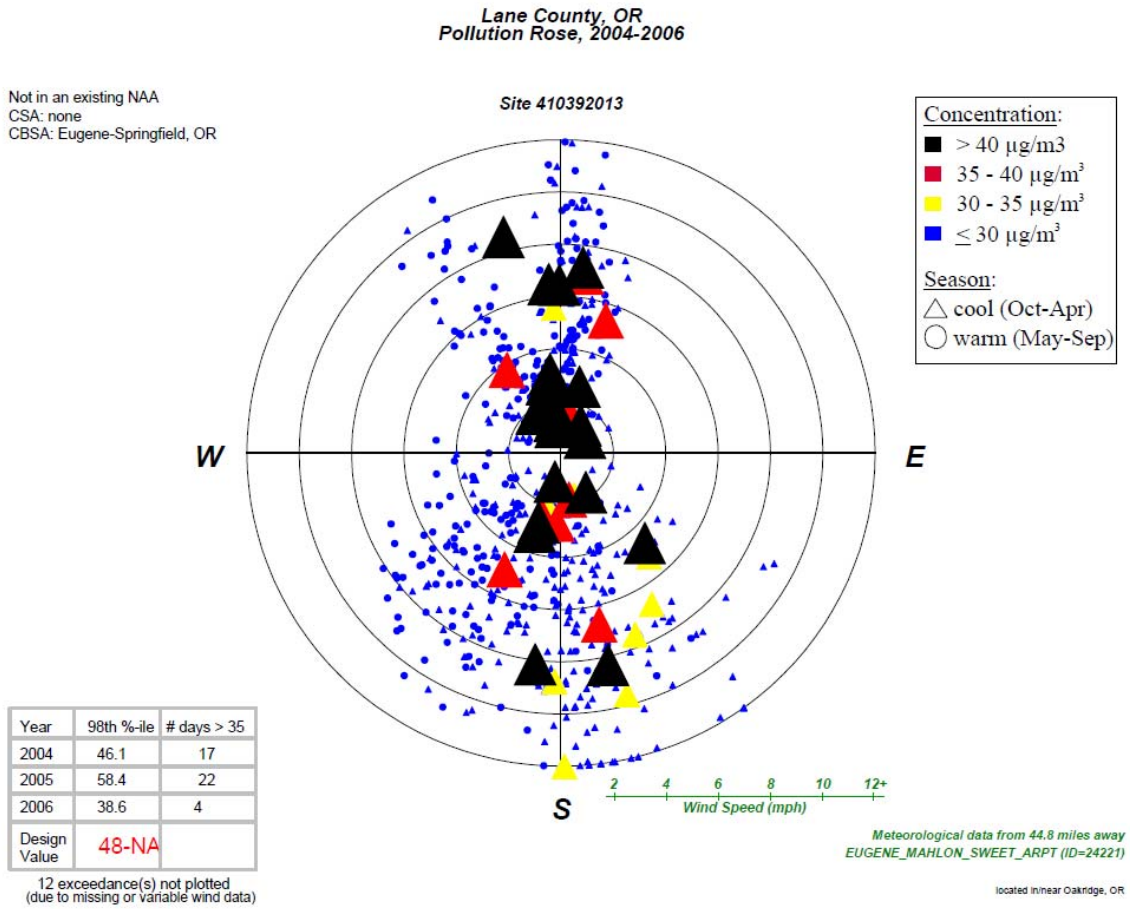
For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The figure identifies 24-hour PM2.5 values by color; days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

[10] http://www.nytimes.com/2006/08/20/us/20poverty.html?_r=1&oref=slogin

Figure 13 is a pollution rose from instrumentation at the Eugene Airport (Mahlon-Sweet Field), a site which is located about 44 miles northwest of the violating monitor. Based on this pollution rose, the average prevailing surface wind direction for high $PM_{2.5}$ days in Lane County is from the north, or the south of the violating monitor. Given that Oakridge is to the northeast, this windrose indicates that winds from Eugene are not flowing toward the violating monitor.

Given terrain influence and complex meteorology in the area, EPA also considered local meteorological data collected by the Lane Regional Air Protection Agency.

Figure 13 Lane County pollution rose



The Lane Regional Air Protection Agency, (LRAPA) operates a meteorological monitoring station co-located with the PM2.5 FRM monitor in Oakridge measuring wind speed and direction as well as temperature at ground level and 10 meters above ground level. The temperature difference between ground level and 10 meters may indicate that temperature inversions occur. Figures 14-15 show temperature data for two high PM2.5 days in 2005 from LRAPA's meteorology station in Oakridge. [11]On all days, in the evening –nighttime hours,

[11] Data submitted from LRAPA to EPA via email from Ralph Johnston to Gina Bonifacino dated 08.04.2008

temperatures at 10 meters (about 32 ft) are 1-2 degrees warmer than temperatures observed at 2 meters (about 6 ft). This data as well as the low wind speeds recorded at the sight suggests that temperature inversions are occurring on these days.

Figure 14 Meteorology data for Oakridge for Feb 03, 2005 PM2.5 exceedence

PM2.5 = 58.4 $\mu g/m^3$

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge
Thursday 03 February 2005 Julian Date 34 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	5.95V	746.0V	125.9	31.7V	30.5V	148V	0.3V
0100	6.57V	745.7V	139.3	30.8V	29.6V	89V	0.5V
0200	5.87V	745.6V	124.2	30.1V	29.2V	98V	0.1V
0300	4.55V	745.5V	95.7	29.5V	28.4V	91V	0.8V
0400	4.06V	745.3V	85.1	29.0V	27.9V	333V	0.2V
0500	3.02V	745.0V	62.7	28.9V	27.3V	72V	1.0V
0600	2.68V	744.9V	55.2D	28.5V	27.2V	20V	0.7V
0700	3.18V	745.0V	65.9	28.4V	27.0V	164V	0.3V
0800	3.93V	745.2V	82.1	31.2V	31.1V	124V	0.1V
0900	1.73V	744.9V	34.7	35.9V	36.5V	206V	0.7V
1000	0.42V	744.1V	6.4	40.5V	41.2V	196V	1.1V
1100	0.40V	743.0V	6.0	47.3V	47.7V	192V	0.8V
1200	0.37V	741.8V	5.3	52.3V	52.8V	189V	1.6V
1300	0.40V	740.6V	6.0	57.3V	57.8V	194V	1.6V
1400	0.37V	739.8V	5.3	59.8V	60.0V	187V	1.6V
1500	0.47V	739.5V	7.5	58.5V	57.7V	235V	3.4V
1600	0.68V	739.5V	12.0	56.8V	54.5V	254V	3.0V
1700	1.06V	739.8V	20.2	50.3V	48.0V	241V	1.2V
1800	1.92V	740.2V	38.8	45.9V	43.9V	146V	0.7V
1900	3.08V	740.4V	63.8	42.7V	41.1V	83V	0.9V
2000	6.16V	740.3V	130.2	40.1V	38.8V	227V	0.7V
2100	2.82V	740.5V	58.2	38.6V	37.5V	108V	1.0V
2200	4.99V	740.4V	105.0	37.1V	35.9V	121V	0.6V
2300	5.51V	740.0V	116.2	35.9V	34.7V	81V	0.9V
Min Hr	0.37	739.5	5.3	28.4	27.0	20	0.1
Max Hr	6.57	746.0	139.3	59.8	60.0	333	3.4
24hr Av	2.92	742.6	60.5	40.3	39.4	158	1.0

Flags:
D = Off-Line Part of Hour - Valid Hour
V = Valid Corrected Data

Figure 15 Meteorology data for Oakridge for Feb 17, 2005 PM2.5 exceedence

PM2.5 = 63.2 $\mu g/m^3$

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge
Thursday 17 February 2005 Julian Date 48 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	6.28V	740.6V	132.8	28.0V	26.9V	10V	0.5V
0100	6.64V	740.6V	140.6	27.3V	26.1V	31V	0.4V
0200	4.00V	740.3V	83.6	26.9V	25.5V	350V	0.6V
0300	3.17V	740.0V	65.7	26.4V	25.1V	37V	0.3V
0400	3.13V	740.0V	64.9	25.8V	24.5V	344V	0.1V
0500	3.08V	739.8V	63.6	25.6V	24.2V	19V	0.2V
0600	3.54V	739.6V	73.5	25.4V	24.1V	6V	0.6V
0700	4.24V	739.8V	88.6	25.9V	24.8V	78V	0.4V
0800	4.73V	739.8V	99.1	27.4V	27.3V	235V	0.2V
0900	1.60V	739.5V	31.6	35.1V	35.7V	199V	0.7V
1000	0.31V	738.9V	3.8	39.6V	40.3V	200V	1.3V
1100	0.27V	737.9V	3.0	45.0V	45.7V	190V	1.0V
1200	0.29V	736.6V	3.4	51.9V	52.5V	167V	1.6V
1300	0.24V	735.5V	2.3	57.6V	58.1V	180V	1.5V
1400	0.23V	734.6V	2.1	59.7V	60.0V	226V	2.9V
1500	0.30V	734.2V	3.6	59.8V	60.0V	252V	5.0V
1600	0.34V	734.3V	4.5	56.0V	55.5V	241V	5.2V
1700	0.48V	734.6V	7.5	50.6V	49.4V	257V	3.8V
1800	1.09V	734.9V	20.7	45.6V	44.3V	287V	2.2V
1900	2.52V	735.1V	51.5	41.0V	39.4V	117V	0.7V
2000	2.60V	735.2V	53.2	38.5V	37.2V	67V	1.1V
2100	3.50V	735.4V	72.6	36.5V	35.3V	121V	0.8V
2200	6.06V	735.4V	127.8	34.5V	33.4V	315V	0.9V
2300	6.28V	735.1V	132.6	33.5V	32.2V	97V	0.8V
Min Hr	0.23	734.2	2.1	25.4	24.1	6	0.1
Max Hr	6.64	740.6	140.6	59.8	60.0	350	5.2
24hr Av	2.70	737.4	55.5	38.5	37.8	168	1.4

Flags:
V = Valid Corrected Data

EPA reviewed LRAPA's meteorological data for the years 2005 through 2007 to determine the time and duration of inversions and wind speed and direction throughout the 24 hours of days reporting exceedences of the PM2.5 NAAQS. Table 6 below provides a summary of this information. Days reporting exceedences of the PM2.5 NAAQS are characterized by meteorology showing low wind speed, generally less than 2 miles per hour (mph) and many hours below 1 mph. Inversions usually become established mid, to late afternoon (2:00-4:00 PM) and continue until morning the next day (7:00-9:00 AM). The duration of an inversion is from sixteen to eighteen hours during a 24 hour period. Wind flow is characterized by down valley, low speed flow during the inversion and up valley flow after the inversion is 'broken'. Temperatures (degrees F) generally range between night time lows of 20's & 30's and daytime highs of 40's & 50's. On two occasions in 2007, (Oct 28 and Nov 8) the temperatures ranged from mid 30's to 60's. Temperature is an indication of heating demand from wood stoves.

Table 6 Oakridge, OR. Meteorological Summary -Days Exceedences Reported

Date	Time Inversion Breaks	Time Inversion Established	Min. Temp Deg F	Max. Temp Deg F	Max W/S Min W/S mph
1/5/05	8:00 AM	3:00 PM	21.2	32.9	1.6 0.1
1/6/05	7:00 AM	3:00 PM	31.7	40.8	1.9 0
1/12/05	11:00 AM	5:00 PM	32.3	43.2	2.8 0.4
1/14/05	9:00 AM	5:00 PM	31.1	44	1.6 0.1
1/22/05	8:00 AM	3:00 PM	31.3	53.5	1.4 0.5
1/23/05	9:00 AM	4:00 PM	33.2	51.7	1.2 0
1/24/05	10:00 AM	3:00 PM	30.0	57.4	1.7 0
1/25/05	8:00 AM	3:00 PM	34.0	55.4	1.4 0.4
1/30/05	8:00 AM	4:00 PM	30.4	54.1	2.1 0.4
1/31/05	7:00 AM	4:00 PM	30.5	53.6	2.7 0.2
2/1/05	8:00 AM	3:00 PM	26.0	52.4	2.1 0.3
2/2/05	8:00 AM	3:00 PM	25.4	57.5	1.7 0.1
2/3/05	9:00 AM	3:00 PM	26.9	59.9	3.5 0.2
2/4/05	9:00 AM	6:00 PM	30.9	47.7	5.8 0.3
2/10/05	8:00 AM	3:00 PM	28.3	56.9	2.6 0.4
2/11/05	8:00 AM	4:00 PM	25.0	60.5	6.3 0.1
2/16/05	8:00 AM	4:00 PM	22.6	58.6	4.1 0.1
2/17/05	9:00 AM	4:00 PM	22.6	59.9	5.2

					0.2
2/18/05	10:00 AM	3:00 PM	27.5	59.3	2.5 0.1
2/23/05	9:00 AM	3:00 PM	28.5	67.7	5.3 0
2/24/05	9:00 AM	5:00 PM	28.9	65.2	8.4 0
12/15/05	9:00 AM	5:00 PM	19.1	38.1	2.4 0.4
12/21/05	8:00 AM	5:00 PM	41.2	47.6	2.3 0.7
2/10/06	10:00 AM	5:00 PM	28.0	62.3	6.8 0.7
2/19/06	8:00 AM	4:00 PM	17.0	49.1	8.1 0.5
2/22/06	7:00 AM	5:00 PM	33.6	55.5	8.6 0.7
12/07/06	10:00 AM	3:00 PM	29.3	48.1	2.3 0.6
1/12/07	9:00 AM	3:00 PM	12.0	29.8	2.0 0.2
1/24/07	9:00 AM	1:00 PM	25.3	47.7	2.3 0.5
1/27/07	9:00 AM	1:00 PM	23.4	54.2	6.7 0.6
1/30/07	9:00 AM	2:00 PM	23.5	52.3	5.3 0.7
2/2/07	9:00 AM	3:00 PM	22.2	48.6	2.1 0.7
10/28/07	8:00 AM	2:00 PM	33.4	65.8	2.2 0.5
11/8/07	8:00 AM	3:00 PM	33.6	59.8	2.5 0.7

The State believes that residential wood combustion (RWC) is the primary source of emissions leading to exceedences of the NAAQS. EPA's meteorological analysis as well as our review of emissions data supports the State's determination[12]. Survey data indicate that generally people begin stoking their wood stoves in the late afternoon-evening at the same time the inversion is established. RWC continues throughout the evening and night and begins again in the early morning.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

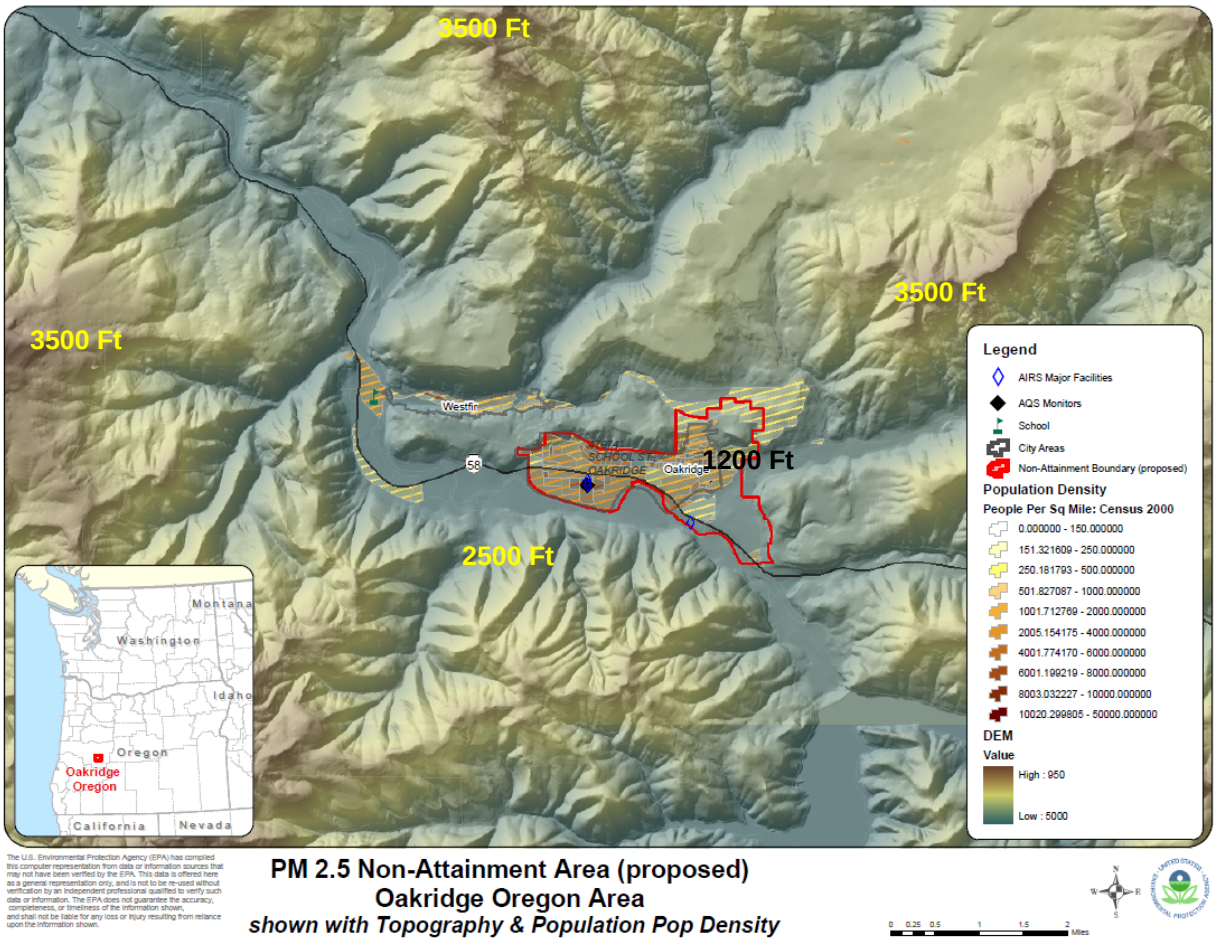
The geography/topography analysis looks at physical features of the land that might have an effect on the airshed and, therefore, on the distribution of $PM_{2.5}$ over the area.

Oakridge is an isolated, rural mountain community located in a deep mountain valley on the western slopes of the Cascade mountain range. Oakridge is at an elevation of 1200 feet, with the surrounding mountains rising to 3500-4500 feet. See Figure 16. It is 35 miles east of the Eugene/Springfield urban area on State Highway 58. Given the change in elevation between

[12] Email communication from Ralph Johnston to Gina Bonifacino dated 08.04.2008

Eugene-Springfield and Oakridge (over 1000 ft) and the very slow wind speeds and inversions in the Oakridge area during exceedences, EPA believes that local emission sources are the sole contributor to violations of the PM2.5 NAAQS and not transport from the Eugene/Springfield area. The town of Westfir is separated from Oakridge by features that rise to 1600 feet, with roughly 400 feet in elevation separating Oakridge and Westfir. However, given the proximity of Westfir to Oakridge, this topographic feature was not alone sufficient to rule out potential contributions from sources in Westfir to the violations in Oakridge.

Figure 16 Oakridge Urban Growth Boundary and surrounding topography



Factor 8: Jurisdictional boundaries (e.g., existing PM and ozone areas)

The City of Oakridge is contained by the Urban Growth Boundary which by Oregon law inhibits growth outside of the area. The Urban Growth Boundary is the State's recommended nonattainment area. Land surrounding the UGB is under the jurisdiction of the US Forest Service. See above, Figure 16. However, as stated above EPA is including potential nearby sources and populations outside of the Oakridge UGB in our intended nonattainment area. Although these potentials sources/populations are outside of the UGB, they are generally located within five miles of the violating monitor. EPA does not have information this time to rule out potential contributions from these nearby areas.

Factor 9: Level of control of emission sources

The Oakridge UGB is a maintenance area for PM-10 and has emission reduction measures in effect, primarily for residential wood combustion; woodstove change out, and episodic curtailment programs. The State and EPA believe that residential wood combustion is the primary cause of violations of the PM2.5 standard.

Description of the Contributing Emissions Score

The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. [13] Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

The CES for each county was derived by incorporating the following significant information and variables that impact $PM_{2.5}$ transport:

- Major $PM_{2.5}$ components: total carbon (organic carbon (OC) and elemental carbon (EC)), SO_2, NO_x, and inorganic particles (crustal).
- $PM_{2.5}$ emissions for the highest (generally top 5%) $PM_{2.5}$ emission days (herein called "high days") for each of two seasons, cold (Oct-Apr) and warm (May-Sept)
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days
- The "urban increment" of a violating monitor, which is the urban $PM_{2.5}$ concentration that is in addition to a regional background $PM_{2.5}$ concentration, determined for each $PM_{2.5}$ component
- Distance from each potentially contributing county to a violating county or counties

[13] A more detailed description of the CES can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

EPA Technical Analysis for Klamath Falls Oregon

Discussion

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Klamath Falls/Klamath County, Oregon area identifies the areas with monitors that violate the 24-hour PM2.5 standard and evaluates nearby areas that potentially contribute to fine particle concentrations in the area. EPA has evaluated these areas based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1 is a map of the area, which includes counties adjacent to Klamath County and other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State. There is no scale on this map, but the distance between the violating monitor in Klamath Falls (marked 45 in red) and the center point of the adjacent counties (Douglas, Jackson, Deschutes and Lane) is greater than 100 miles and over mountains that rise to over 6000 feet in elevation. See Figure 2.

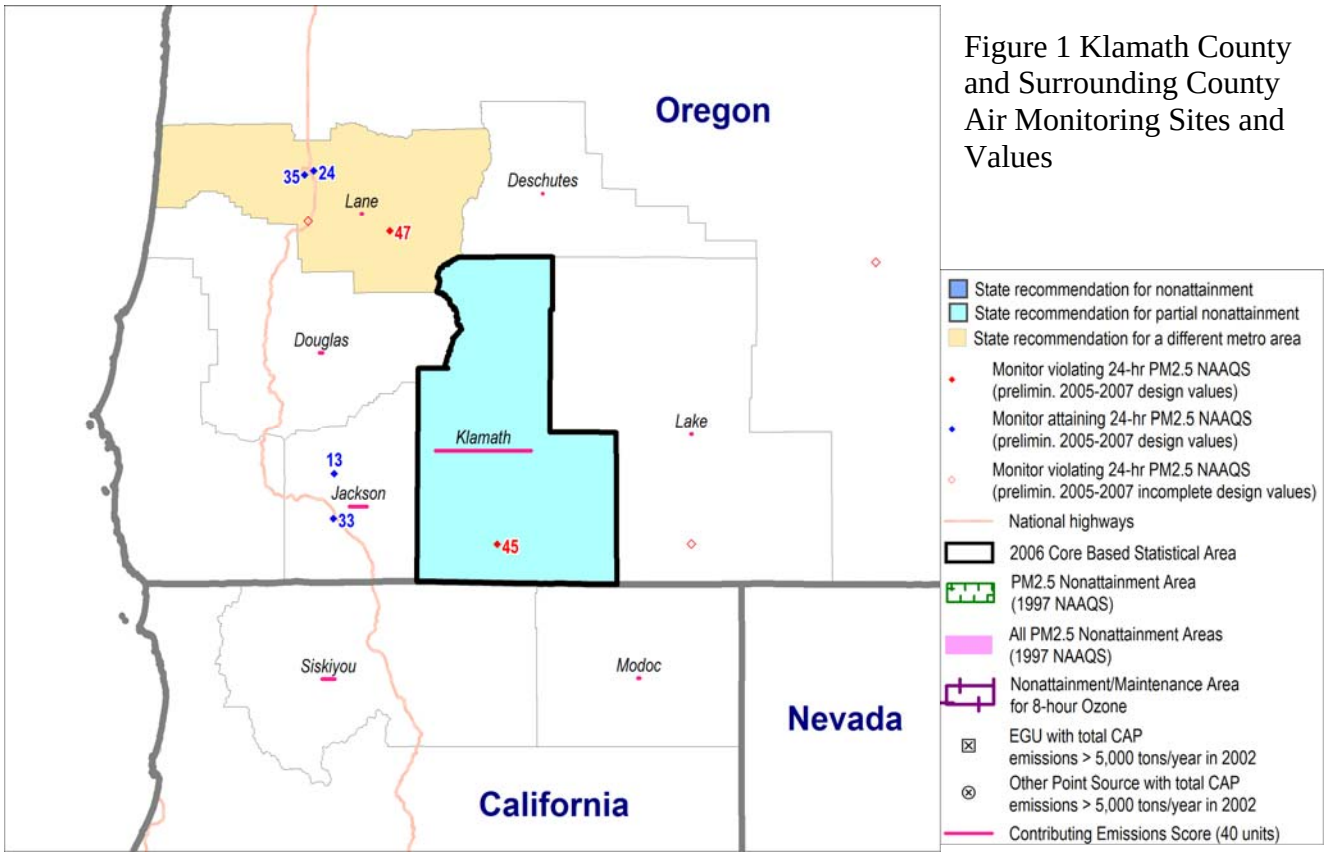
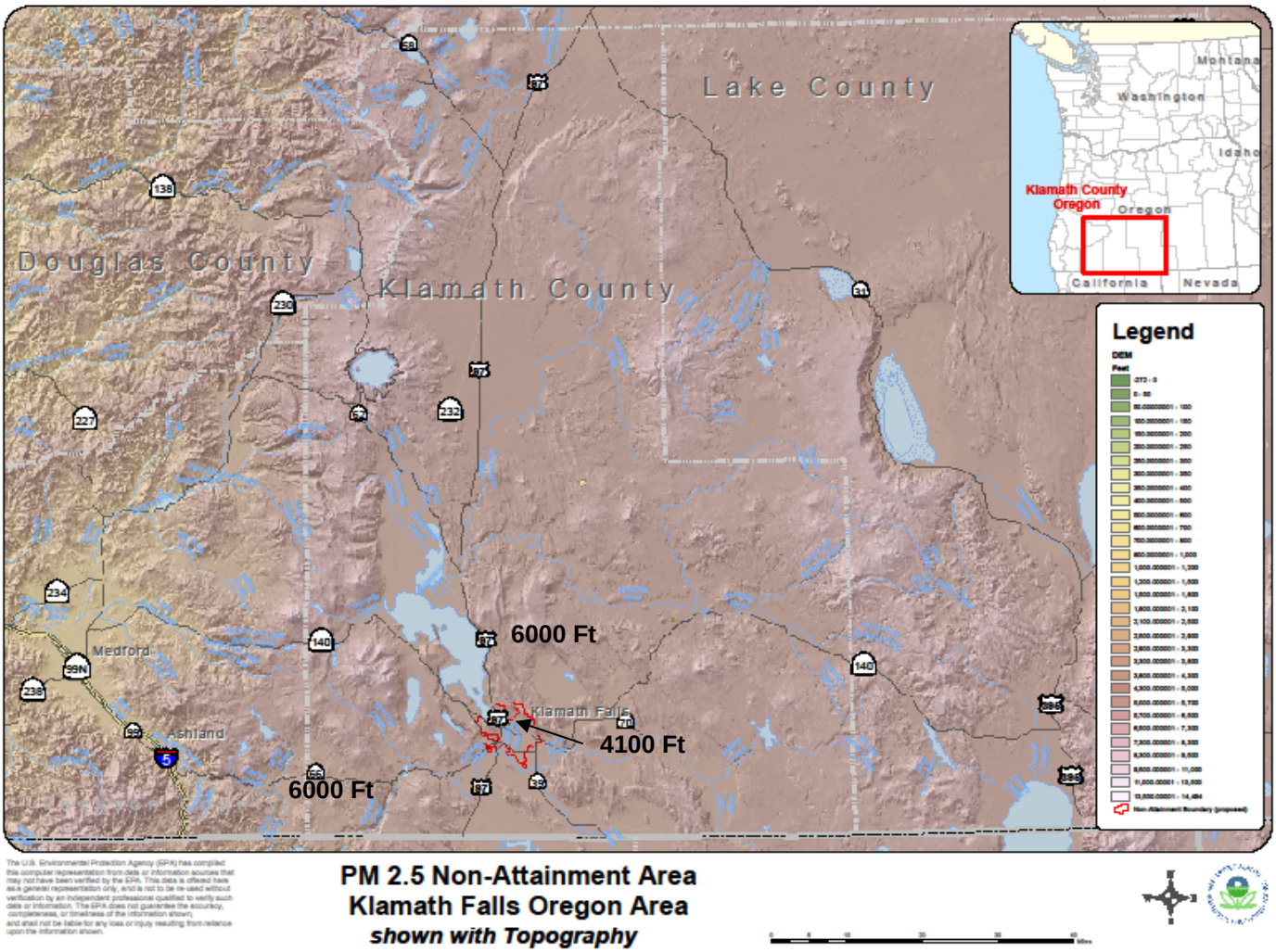


Figure 1 Klamath County and Surrounding County Air Monitoring Sites and Values

Figure 2 Oregon's recommended nonattainment area boundary for Klamath Falls and surrounding topography and land area in Klamath County



The City of Klamath Falls is located on a high plateau at roughly 4100 ft above mean sea level (MSL) and is surrounded by rugged terrain features and mountains to the north, east and west that rise to over 6000 ft MSL in elevation.

On December 2007, Oregon recommended that the Klamath Falls Urban Growth Boundary, a portion of Klamath County be designated as "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard based on air quality data from 2004-2006. These data are from the Federal Reference Method (FRM) monitor located at the Peterson School in Klamath Falls. See December 17, 2007 letter from Governor Ted Kulongoski to Elin Miller, Regional Administrator EPA Region 10 regarding recommendations for PM2.5 area designations.

Based on EPA's 9-factor analysis described below and currently available information, EPA believes that a portion of Klamath County should be designated nonattainment for the 24-hour PM2.5 air quality standard as part of the Klamath Falls nonattainment area as listed below. However, EPA finds that the information provided to date by the State does not adequately

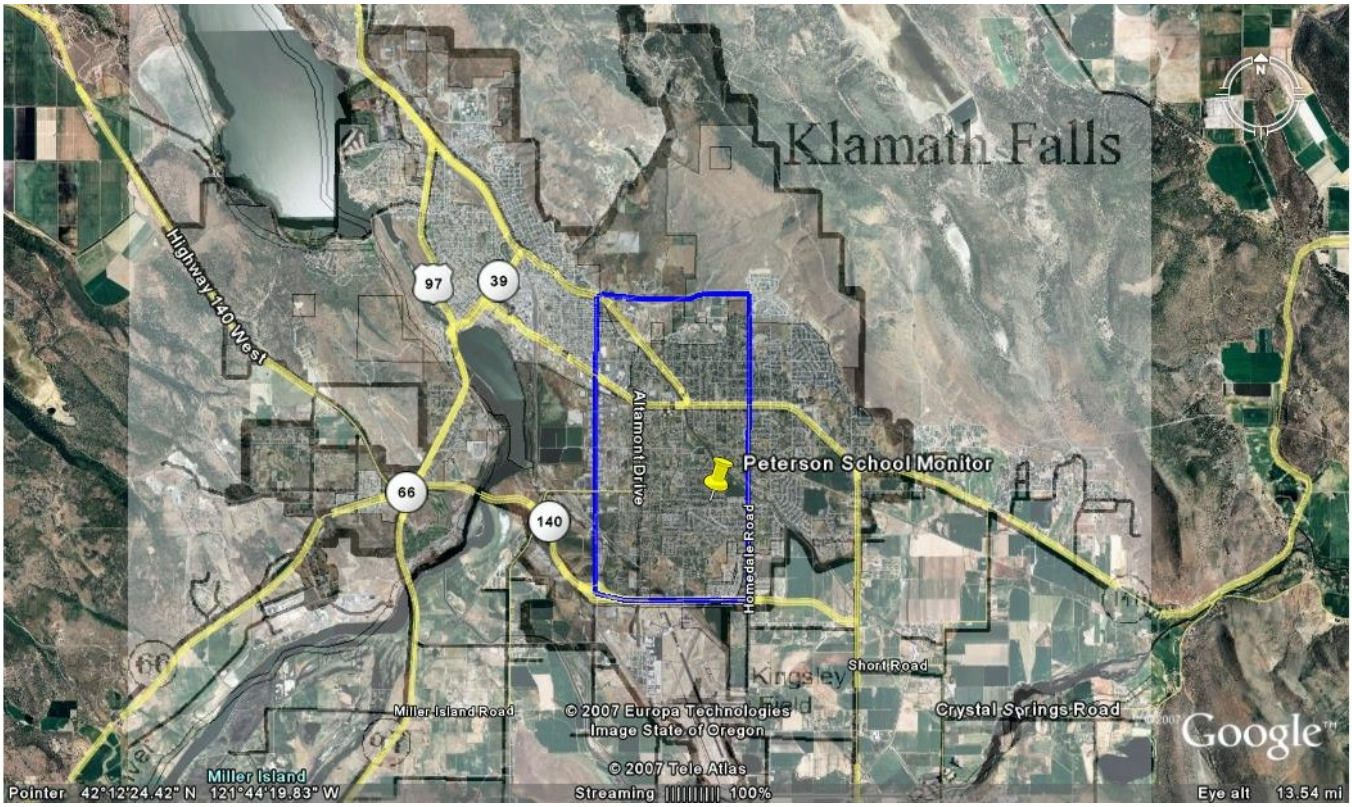
support the State's recommendation for a nonattainment area that includes only the Klamath Falls urban growth boundary (UGB). Accordingly, EPA is expanding the boundary to include major sources and populations outside of the UGB in its intended designation. EPA will consider any additional information provided by the State in making final decisions on the designations. The following is a summary of the 9-factor analysis for the EPA Region 10 portion of the Klamath Falls Nonattainment area.

Proposed geographic boundaries for the Klamath Falls Nonattainment Area

Review of the submittal by the State of Oregon

The State submitted a nine factors analysis for the Klamath Falls area to EPA Region 10 by e-mail March 20, 2008, the document titled, "Nonattainment Area Boundary analysis – Klamath Falls. In this analysis the State evaluated two boundary proposals. The first is to use the UGB similar to the PM_{10} boundary[14]. The second is a smaller area within the UGB but in the South Suburban area. A third undefined boundary that the State acknowledged is one greater than the UGB. The map in Figure 3 shows the UGB (the heavy black line in the opaque overlay) and the proposed South Suburban boundary (the thin line in the opaque overlay) located in the South Suburban area. Although hard to see, Klamath Falls city limits are in the opaque area also. The city limits are depicted by a light or white area overlay. Peterson School, which is the location of the violating monitor is located outside the city limits but inside the UGB in the area called South Suburban. The Peterson School (KFP) location is depicted by a push pin flag.

Figure 3 Nonattainment Area Boundaries Evaluated by the State– Klamath Falls



[14] Klamath Falls was designated "nonattainment" in 1990 for PM-10. The Urban Growth Boundary of Klamath Falls was the nonattainment area.

As stated above the State ultimately decided to recommend using the UGB as the nonattainment area. The State found through saturation studies that PM2.5 concentrations are concentrated in the South Suburban Area near Peterson School, and drop off in areas on the edge of the UGB including industrial areas to the northern border of the UGB and just outside of the southern border of the UGB. In addition, the State analyzed PM2.5 composition data for the Klamath Falls area and found that organic carbon, an indicator of woodsmoke/burning of biomass is the largest component and elemental carbon, also an indicator of woodsmoke/burning of biomass is the second largest component in the samples, indicating that wood smoke is the largest contributor to total PM2.5 during the winter season when the violations occur. The State acknowledged that in addition to residential woodburning inside of the UGB, forest and agricultural burning practices outside of the UGB could be potential sources supporting a boundary proposal greater than the UGB. For its meteorlogical analysis, the State conducted back-trajectory modeling and found that generally air flow during exceedences at the Peterson School monitor is from the southeast. Oregon acknowledged that the back trajectories could also suggest a boundary greater than the UGB but at the current time, the UGB is appropriate.

Other factors that were important in the State's analysis were the level of control factor for sources in and near the Klamath Falls UGB. For this factor, the State acknowledged four stationary sources on the western/southern portion of Klamath Falls with varying levels and types of control. These facilities include Jeld-Wen[15], Collins Products[16], Klamath Energy, and Columbia Forest Products[17]. All of these are AIRS major facilities. The State acknowledged in its submittal that the UGB includes most $PM_{2.5}$ industrial sources of concern but not all of these sources are included in the UGB. At least two of these facilities, the Klamath Cogeneration facility, and Collins Products are located outside of the UGB. The State concluded its nine factors analysis by indicating that the UGB is the best boundary for a nonattainment area at the time they submitted the analysis and sources outside of the UGB will be analyzed and addressed by regulation if needed. The State acknowledged that its analysis was limited by the availability of sample locations outside of the boundary and that they would evaluate the necessity of other samplers outside of the UGB to better define a larger boundary if needed.

Summary of EPA's Analysis

EPA conducted a nine factors analysis of Klamath Falls, Oregon area. Important findings from our review include:

- The Klamath Falls area is isolated from other areas in Klamath County and most population and sources occur within the Klamath Falls UGB or areas within 25 miles. The nearest county is over 100 miles away. The California border is 25 miles to the south.
- The Klamath Falls area is further separated from other areas by topography. Topographical maps show mountains rising over 2000 feet between the Klamath Falls area and other populated areas with potential sources.
- Concentrations are highest in areas around the Peterson School monitor during exceedences and lower toward the outer extent of the Urban Growth Boundary.

[15] Sheet Metal Work Manufacturing and Wood Window and Door Manufacturing
[16] Reconstituted Wood Product Manufacturing and Softwood Veneer and Plywood Manufacturing
[17] Softwood/Hardwood. Veneer and Plywood Manufacturing

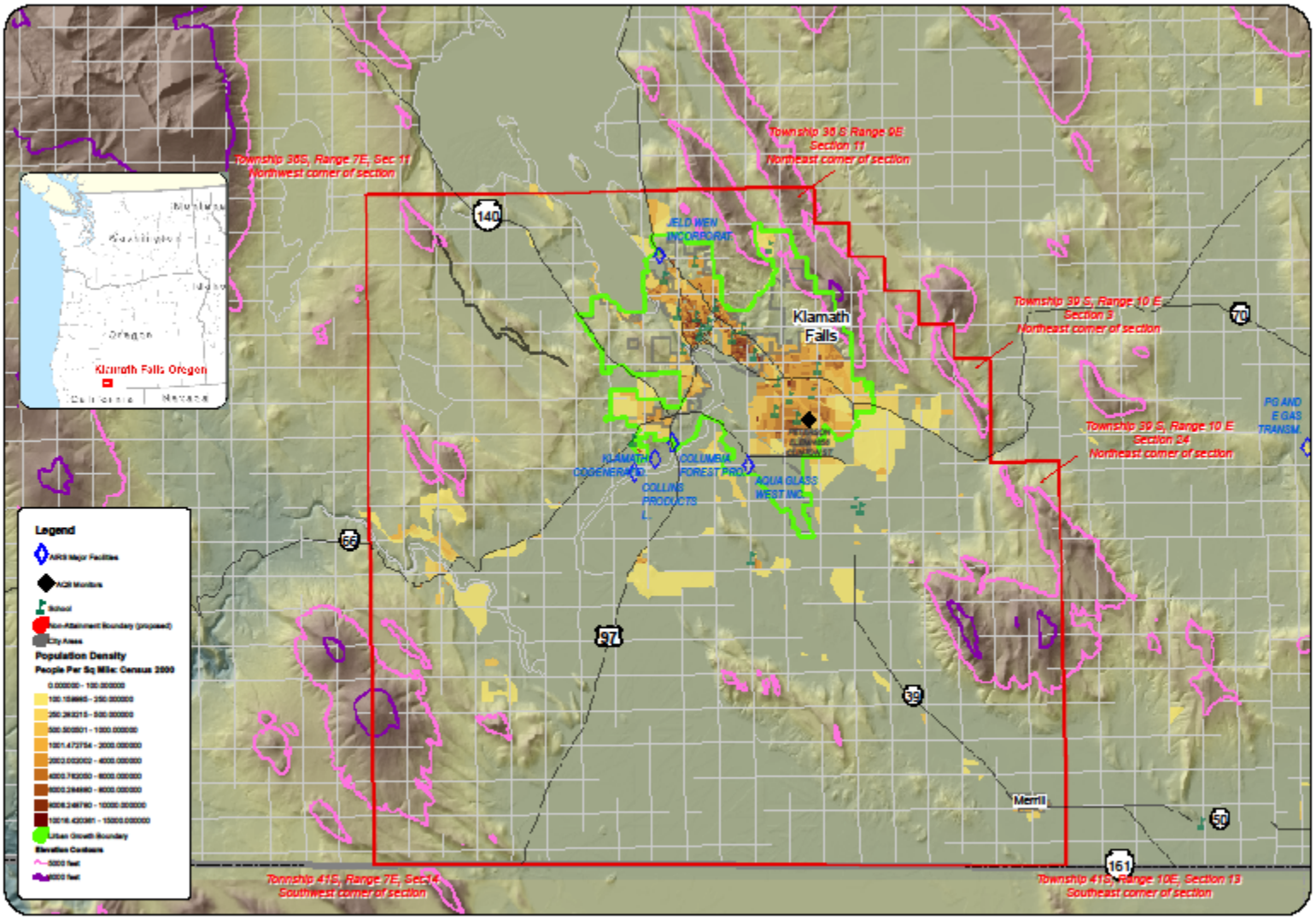
- Biomass burning or wood smoke contributes to the violations of the PM2.5 standard at the Peterson School.
- Air flows mostly from the southeast but also from the south and less frequently the southwest to the violating monitor during exceedences.
- There are at least two major industrial sources within five miles of the southwest portion of the UGB and two communities to the southeast and the southwest within 20 miles of the UGB that are not included in the State's recommendation.

Given topography, population, population density and degree of urbanization information that shows that the populations and potential sources of PM2.5 emissions in Klamath County are generally concentrated in the Klamath Falls area, and those population centers and potential sources that are not within 20 miles of Klamath Falls are separated from Klamath Falls by mountains, EPA believes that a partial county boundary surrounding the Klamath Falls area is sufficient to include sources contributing to the Peterson School monitor violations.

However, EPA's analysis found that the State's recommended area of the UGB does not include all of the sources in the area that could potentially contribute to the violations at the Peterson school and the boundary should be expanded to capture these potential sources. These sources are not separated from the Peterson School monitor by topography. The State's NOAA HYSPLIT analysis, which generally indicates that air flow to the Peterson school monitor is from the southeast, is not sufficient information alone to rule out contributions from these sources.

Accordingly, we are including additional nearby areas with populations and potential sources to the south, east and west of the Klamath Falls boundary in our intended designation boundary. See Figure 4. The revised boundary follows survey sections that contain nearby populations and potential sources and intersect with topographic features to the north, east and west of the UGB. The southern boundary is the boundary of the State of California. To the east and the west, the boundary extent includes populated areas that are not separated from the Klamath Falls UGB by mountains. It generally captures populations/potential sources between the UGB and the nearest ridges to the east and west, generally at 5000 ft contour line. The northern boundary also captures the extent of populations, generally capturing those within contours that reach to 5500 ft as well as Upper Klamath Lake. As stated above EPA will consider any additional information provided by the State in making final decisions on the designations.

Figure 4 EPA's recommended nonattainment area boundary for Klamath Falls



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

The following is a summary of the 9-factor analysis for the EPA Region 10 portion of the Klamath Falls Area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other", primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_x, are part of "$PM_{2.5}$ emissions total," they are not shown on the template or data spreadsheet as separate items). "$PM_{2.5}$ emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "$PM_{2.5}$ emissions other" represents other inorganic particles (crustal). Emissions of SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) are also potential $PM_{2.5}$ precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of $PM_{2.5}$ and precursor components (given in tons per year) and the CES for violating and potentially contributing areas in the Klamath Falls area. Adjacent counties are listed in descending order by CES.

Table 1 $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	State Recommended Nonattainment?	$PM_{2.5}$ emissions total (tpy)	SOx (tpy)	NOx (tpy)	Carbon $PM_{2.5}$ (tpy)	$PM_{2.5}$ emissions other (tpy)	VOCs (tpy)	NH_3 (tpy)	CES
Klamath Co. Or.	Klamath Falls UGB	3760	575	7377	2205	1502	15688	2004	100
Jackson Co. Or.	No	5246	1368	8109	3123	2049	21736	1446	18
Siskiyou Co. Ca.	No	3264	347	4467	2038	1183	10723	1055	13

Based on emission levels and CES values, Klamath County is a candidate for a 24-hour $PM_{2.5}$ nonattainment designation. However, as stated above Klamath County is over 6000 sq mi. and includes mountains over 6000 ft in elevation.

In considering the CES ranking of surrounding counties, it is unlikely that emissions from Jackson County (rank #2 by CES), located 100 miles to the west of Klamath Falls, over the Cascade mountain range, with the population centers of Medford and Ashland are transported during the winter months into the Klamath Basin. NOAA HYSPLIT back trajectories submitted by the State demonstrate this assumption. See meteorological discussion, Factor 6 below.

In the whole of Klamath County, VOC emissions dominate followed by NOx emissions. However, because Klamath County is so large and Klamath Falls is surrounded by mountains, it is important to look at local emissions data in addition to this countywide emissions data.[18]

Table 1 above does not present daily emissions for the winter season when exceedences of the 24 hour PM2.5 standard are recorded. Rather, Table 1 shows annual emissions. Some emission sources such as residential wood combustion (RWC) show a strong seasonal and daily variation, with emission rates dependent on residential heating demands during the winter. The most recent particulate matter emission inventory for the daily worst case emissions for the Klamath Falls UGB is found in the PM-10 maintenance plan. The PM-10 inventory shows the 1996 emission 24 hour distribution as follows:

RWC:	75%
Industry:	22%
Winter Road Sanding:	1%
Transportation:	1%
Other:	1%

Based on the most recent emissions inventory data for the Klamath Falls area for PM-10, emissions from woodstoves and fireplaces account for ¾ of the total PM emissions in the Klamath Falls area Given the large size of Klamath County and rugged topographic features that separate Klamath Falls from other nearby areas with populations and potential sources, this seasonal PM-10 inventory is likely a better indicator of sources of PM2.5 emissions. We note that although this is a PM10 inventory from more than 10 years ago and this data alone is not sufficient to show that RWC is still an important contributor to PM2.5 emissions in the Klamath Falls area, our review of data under the other nine factors, particularly air quality data suggests that RWC may still be an important contributor to PM2.5 exceedences in the Klamath Falls area.

Factor 2: Air quality data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Klamath Falls area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 24-hour $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile values are 35 $\mu g/m^3$ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour $PM_{2.5}$ design values for Klamath County and surrounding counties are shown in Table 2. However, given the large size of Klamath County and the distance and topography that separates Klamath County and the surrounding counties, air quality data from

[18] Google Maps

surrounding counties was not an important consideration in our analysis. Our analysis focused on air quality data for the Klamath Falls area rather than the surrounding counties.

Table 2 Air quality data for the Klamath Falls Area and surrounding counties

County	State recommended Nonattainment?	Contributing Emissions Score	Daily Des Val 0406	Preliminary Annual Des Val 0507
KLAMATH FALLS, OR			46	45
Klamath	Yes (Partial)	**100**	**46**	**45**
Jackson	No	18	34	33
Siskiyou	No	13		
Douglas	No	3		
Modoc	No	2		
Lake	No	1		
Lane	No	1	48	47
Deschutes	No	0		

The proposed designation as nonattainment is based on the sole FRM monitor in the County, located at the Peterson School[19]. This site is within the City of Klamath Falls in a residential area of high PM2.5 concentrations. The design value for this site, using 2005-2007 air quality data is 45 $\mu g/m^3$

EPA also reviewed two intensive monitoring studies presented in the State's submittal, "Nonattainment Area Boundary analysis – Klamath Falls". The studies were conducted to determine the appropriate placement of the permanent monitoring site; one during the winter of 1996-1997 and a second during the winter of 2000-2001. In these intensive studies, monitoring sites were distributed throughout the UGB. Both studies show that the Peterson School reports high PM concentrations, but not necessarily the maximum concentrations. Maximum concentrations are found in South Suburban area, approximately a mile east of the Peterson School. Figure 5 and Figure 6 are the survey locations from the State's nine factors analysis.

[19] Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM2.5 NAAQS for designation purposes.]

Figure 5 1996-1997 Survey locations

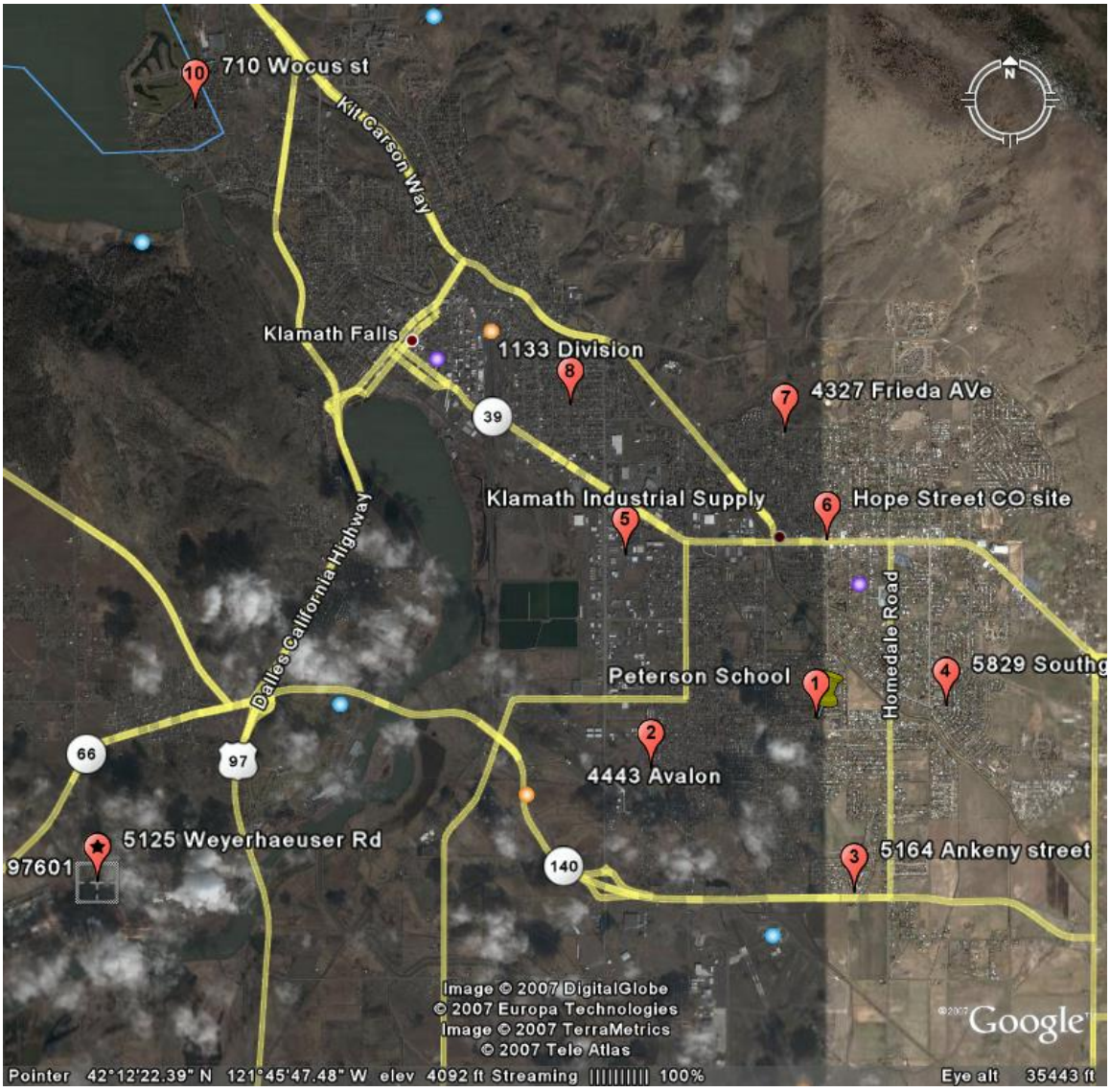
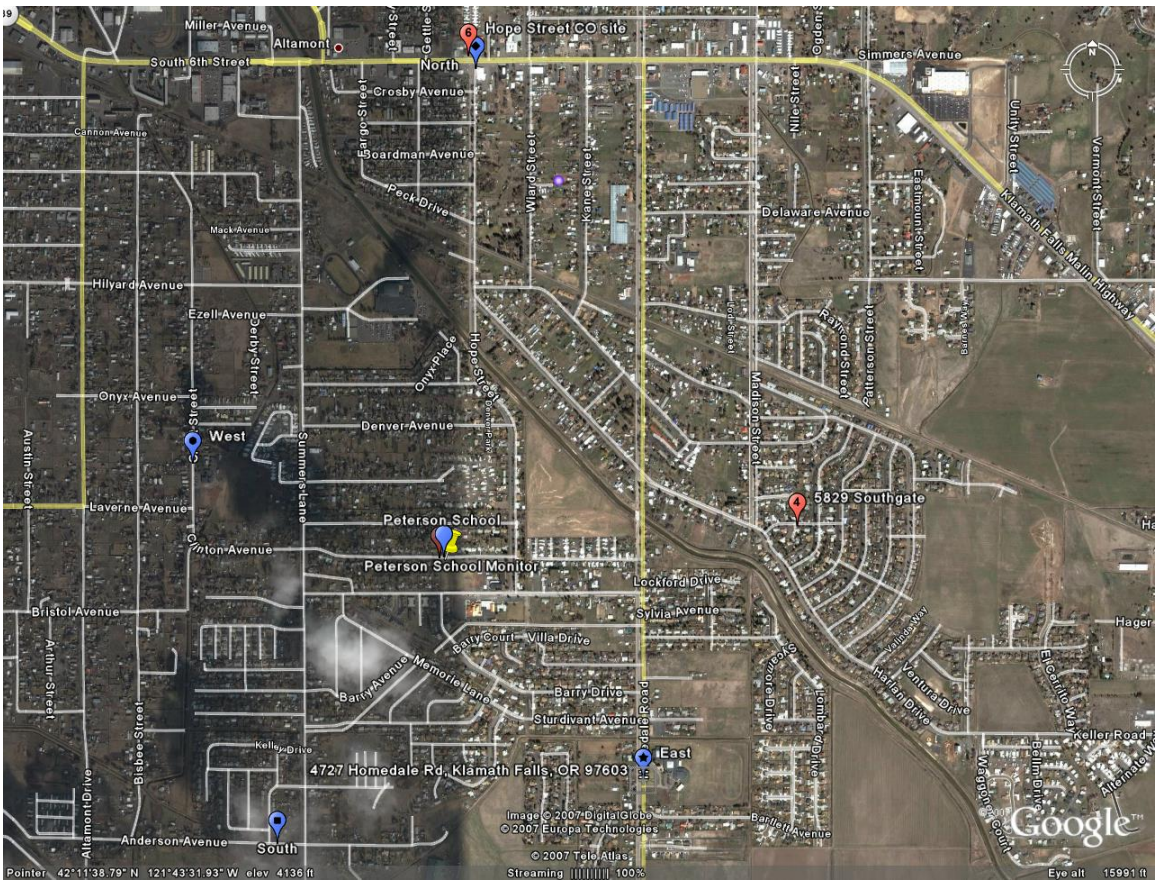


Figure 6 2000-01 Survey locations



The winter ’96-’97 study (Dec-mid Feb), with 9 monitoring sites show that monitors near the boundary of the UGB reported lower PM concentrations (mean PM2.5 concentrations 21.7-28.8 µg/m^3) than sites within the UGB core (mean PM.25 concentrations 46.6-35.9 µg/m^3).

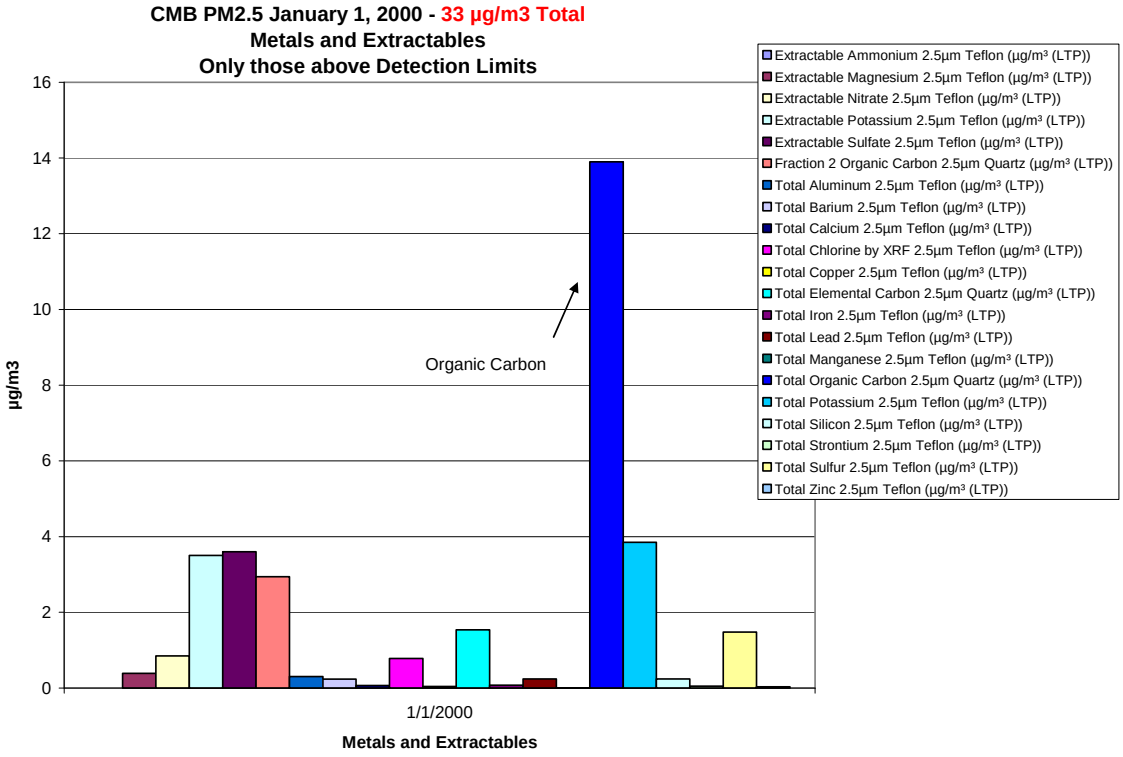
The winter ’00-01 study (Nov-Feb) had 4 sites, within 1-2 miles, north, east, south and west of the Peterson School site and all within the UGB. These monitors reported PM2.5 values considerably lower than the winter ’96-’97 study with mean values ranging from 16.5 to 22.9 µg/m^3.

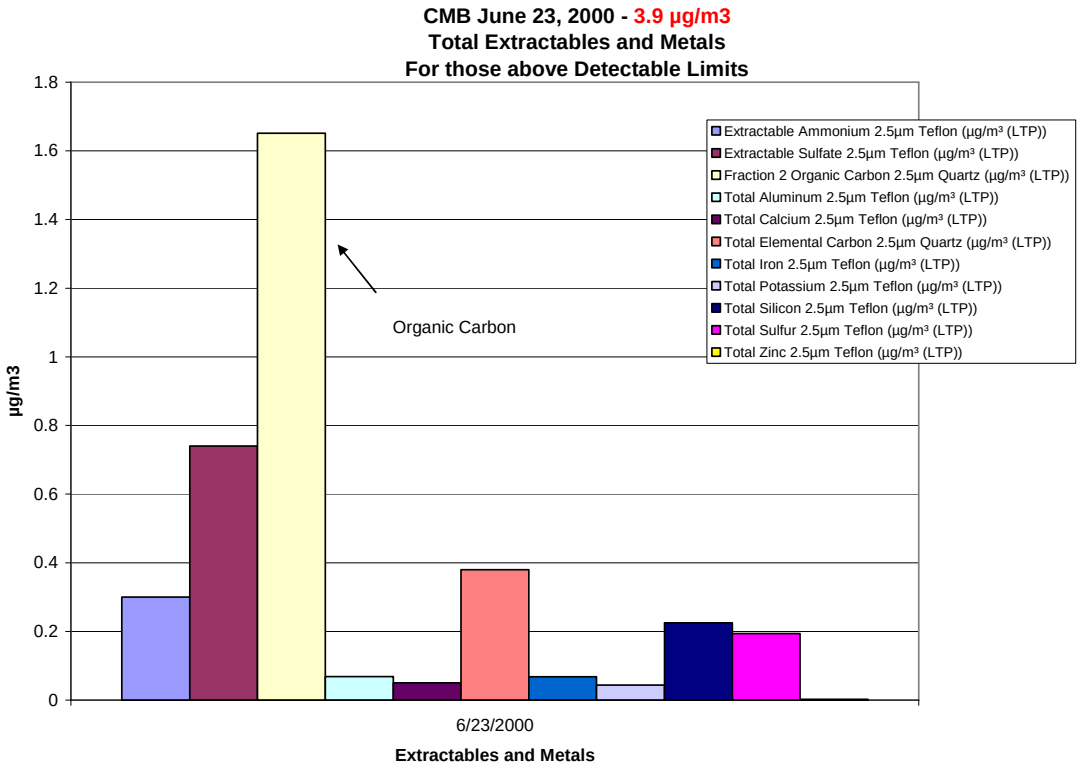
These two studies suggest a homogenous airshed with high PM high levels within the UGB core and decreasing concentrations closer to the UGB boundary, but alone do not provide information on the sources contributing to the violations at the Peterson School monitor

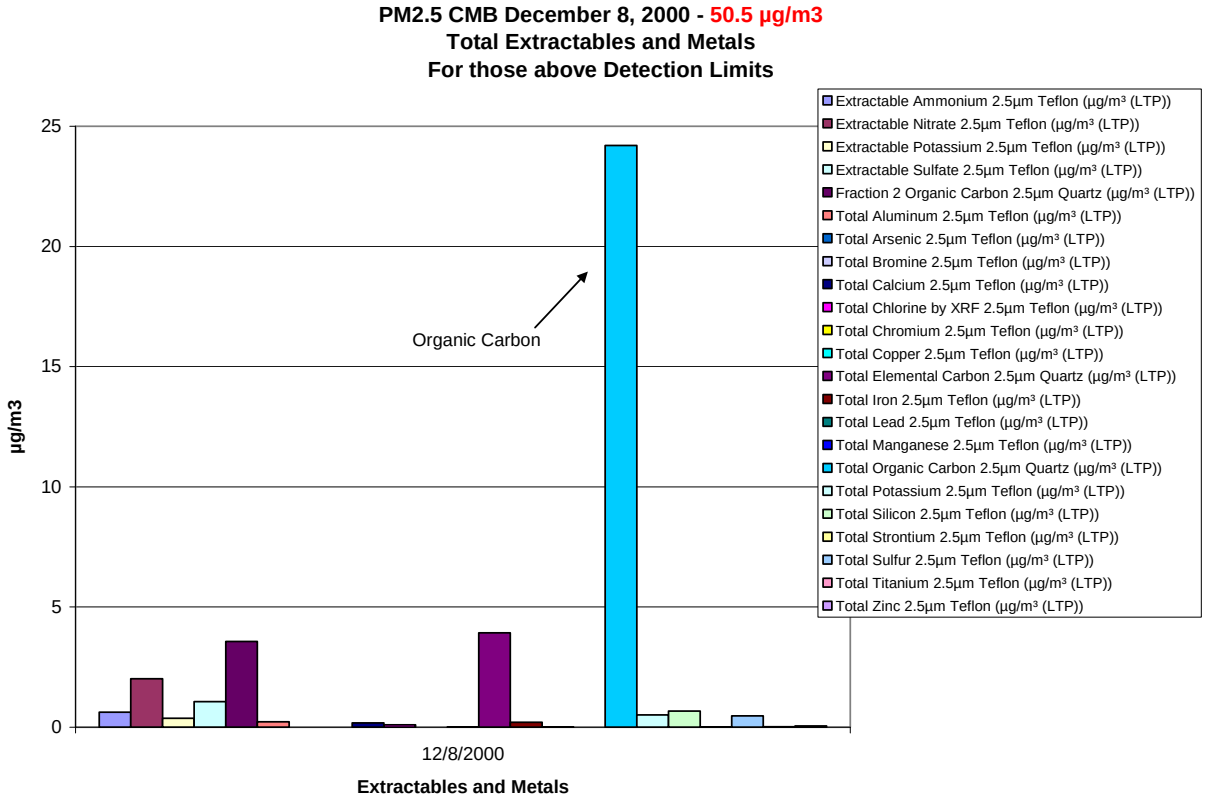
EPA also evaluated the seasonal nature of reported exceedences. Air quality data reported to EPA’s Air Quality System (AQS) database for 2006 through 2007 show that exceedences of the 24-hour standard occur in Klamath Falls exclusively from mid-November through January. No exceedences of the standard were reported for February through October. These data indicate that the PM2.5 exceedences in Klamath Falls are seasonal and correspond with the winter heating season.

The State and EPA considered the mass of constituents of three samples; January 1, 2000, June 23, 2000, and December 8, 2000. Elemental and organic carbon are an indicator of wood smoke/biomass burning. A comparison of these samples shows the differences between winter and summer particulate matter. The January sample had a PM2.5 mass concentration of 33 µg/m^3, of which 15.5 µg/m^3 (50%) is organic and elemental carbon. That same sample consisted of 3.5 µg/m^3 (10%) nitrate and 3.0 µg/m^3 (9%) sulfate. Similarly, the December sample had a PM2.5 mass concentration of 50.5 µg/m^{3}of which 28 µg/m^3 (~50%) is organic and elemental carbon. The same sample consisted of 2.2 µg/m^3 ((4%) nitrate and 1.7 µg/m^3 (3%) sulfate. In contrast, the June sample had a mass concentration of 3.9 µg/m^3 of which 2.0 µg/m^3 (75%) is organic and elemental carbon. The same sample consisted of 0.75 µg/m^3 (20%) sulfate and non-detectable nitrate. These results indicate burning is the major contributor to PM levels regardless of season. See Figure 7 below from the State's Nine Factors Analysis

Figure 7 Speciation Data for the Klamath Falls Peterson School Area




CMB June 23, 2000 - 3.9 µg/m3
Total Extractables and Metals
For those above Detectable Limits
µg/m3
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Organic Carbon
Extractable Ammonium 2.5µm Teflon (µg/m³ (LTP))
Extractable Sulfate 2.5µm Teflon (µg/m³ (LTP))
Fraction 2 Organic Carbon 2.5µm Quartz (µg/m³ (LTP))
Total Aluminum 2.5µm Teflon (µg/m³ (LTP))
Total Calcium 2.5µm Teflon (µg/m³ (LTP))
Total Elemental Carbon 2.5µm Quartz (µg/m³ (LTP))
Total Iron 2.5µm Teflon (µg/m³ (LTP))
Total Potassium 2.5µm Teflon (µg/m³ (LTP))
Total Silicon 2.5µm Teflon (µg/m³ (LTP))
Total Sulfur 2.5µm Teflon (µg/m³ (LTP))
Total Zinc 2.5µm Teflon (µg/m³ (LTP))
6/23/2000
Extractables and Metals


PM2.5 CMB December 8, 2000 - 50.5 µg/m3
Total Extractables and Metals
For those above Detection Limits
µg/m3
25
20
15
10
5
0
Organic Carbon
Extractable Ammonium 2.5µm Teflon (µg/m³ (LTP))
Extractable Nitrate 2.5µm Teflon (µg/m³ (LTP))
Extractable Potassium 2.5µm Teflon (µg/m³ (LTP))
Extractable Sulfate 2.5µm Teflon (µg/m³ (LTP))
Fraction 2 Organic Carbon 2.5µm Quartz (µg/m³ (LTP))
Total Aluminum 2.5µm Teflon (µg/m³ (LTP))
Total Arsenic 2.5µm Teflon (µg/m³ (LTP))
Total Bromine 2.5µm Teflon (µg/m³ (LTP))
Total Calcium 2.5µm Teflon (µg/m³ (LTP))
Total Chlorine by XRF 2.5µm Teflon (µg/m³ (LTP))
Total Chromium 2.5µm Teflon (µg/m³ (LTP))
Total Copper 2.5µm Teflon (µg/m³ (LTP))
Total Elemental Carbon 2.5µm Quartz (µg/m³ (LTP))
Total Iron 2.5µm Teflon (µg/m³ (LTP))
Total Lead 2.5µm Teflon (µg/m³ (LTP))
Total Manganese 2.5µm Teflon (µg/m³ (LTP))
Total Organic Carbon 2.5µm Quartz (µg/m³ (LTP))
Total Potassium 2.5µm Teflon (µg/m³ (LTP))
Total Silicon 2.5µm Teflon (µg/m³ (LTP))
Total Strontium 2.5µm Teflon (µg/m³ (LTP))
Total Sulfur 2.5µm Teflon (µg/m³ (LTP))
Total Titanium 2.5µm Teflon (µg/m³ (LTP))
Total Zinc 2.5µm Teflon (µg/m³ (LTP))
12/8/2000
Extractables and Metals

The PM2.5 saturation studies along with the PM2.5 composition data which indicates that carbonaceous PM2.5 comprises over 50% of the total wintertime PM2.5 in the Klamath Falls area along with the PM10 emissions inventory data that indicates that RWC emissions accounted for over 75% of the PM10 inventory suggests that residential wood heating sources around the Peterson School monitor in the South Suburban area may be important sources impacting the Peterson School monitor. Based on speciation data, components that are more regional in nature (nitrate and sulfate) contributed less than 10% to the violating days at the Peterson School monitor. While this information suggests that wood smoke may be an important source impacting the Peterson School monitor, this information alone does not indicate that other sources (stationary sources, mobile sources, etc) do not contribute to the Peterson School monitor violations.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 shows the 2005 population for counties adjacent to Klamath County, as well as the population density in those counties. Population data give an indication of whether it is likely that population-based emissions from nearby areas might contribute to violations of the 24-hour $PM_{2.5}$ standards. However, given that the adjacent Jackson County is over 100 miles to the west over the Cascade mountain range and in a direction from which transport winds do not blow during periods of high PM2.5 concentrations and there are no population centers in Siskiyou County Ca, population density and degree of urbanization was not an important factor in our decision making process. See meteorological discussion below.

EPA's CES analysis also indicates that including adjacent counties in the nonattainment area is not warranted. However, as with our analysis of emissions above, it is important to look at local populations and nearby areas in Klamath County.

Table 3. Population of Klamath County and Surrounding Counties

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Klamath Co. Or.	Yes	65803	11
Jackson Co. Or.	No	195151	70
Siskiyou Co, Ca.	No	45066	7

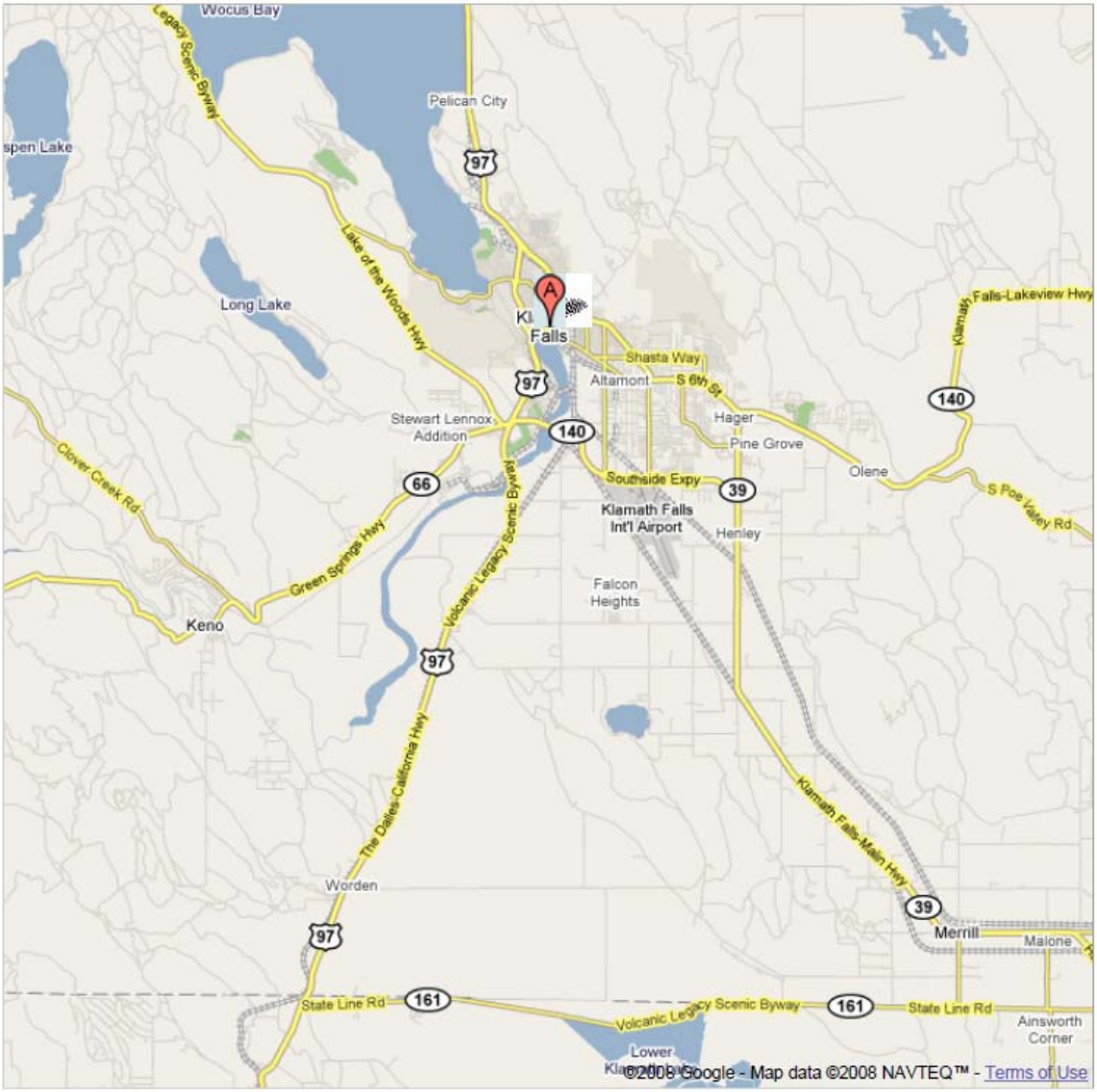
According to the State's nine factors analysis and the Klamath County Chamber of Commerce, Klamath Falls City Limits population is 21,390 people. Another 21,250 people live outside the corporate city limits in what is known as South Suburban for a total in the UGB of 42,640. Klamath County's population is 70,085. Roughly, 50 percent of the population lives in South Suburban area.

The major population in Klamath Falls is zoned into residential, commercial and industrial sites. Generally speaking, Klamath Falls has several industrial sites that are on the outskirts of the main part of the community. Residential areas are separated by commercial

areas. Peterson School, the location of the violating monitor, is in a residential area. Most of the survey samplers are also located in a residential area with the exception of Hope Street along South 6th Street. South 6th Street is a highly commercialized road that bisects several residential areas. There is constant movement through sectors. The State indicated in its nine factors analysis that population density of the City of Klamath Falls supports using the UGB as a boundary and that they would conduct a more detailed analysis of the population during the nonattainment area planning process.

EPA examined populations in areas outside of the Klamath Falls Urban Growth Boundary. Nearby populated areas outside of the Klamath Falls Urban Growth Boundary include Keno and Merrill which are located 12 miles southwest and 20 miles southeast of Klamath Falls respectively. The 2000 census population of Merrill was 897. Keno is unincorporated but the population in the area has been estimated at 1059 in 2000.[20] See Figure 8.

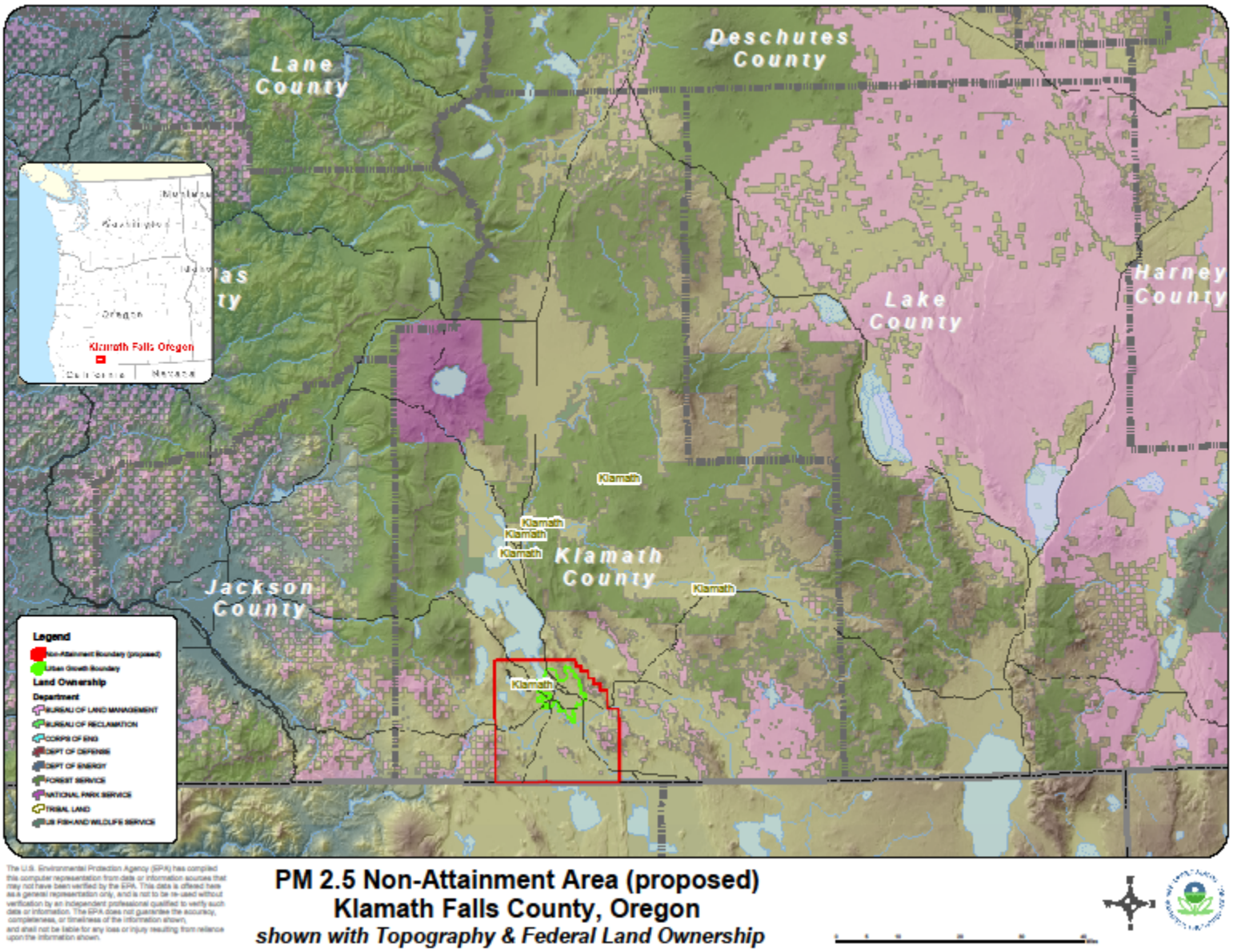
Figure 8 Klamath Falls and Surrounding Communities



[20] http://www.city-data.com/zips/97627.html

Most of the areas outside of the Klamath Falls UGB are Federal Land. (See Figure 9) Land in dark green is US Forest Service Land. Land in pink or dark pink is either Bureau of Land Management or National Park Service land.

Figure 9 Land ownership in Klamath County.



Factor 4: Traffic and commuting patterns

Table 4 indicates traffic and commuting pattern data for Klamath County as well as surrounding counties. The annual VMT in Klamath County is 800 million. For comparison, the annual 2005 for Jackson County, which contains Medford, Oregon, the closest major city and the 8th most populous city in Oregon was about 2000 million miles annually. Percent commuting into Klamath Counties from surrounding counties is very low, less than 2%. As shown in Figure 9 above much of Klamath County is not urbanized. EPA believes that this low rate of commuting along with the low degree of urbanization, and the rugged features that separate Klamath Falls from surrounding counties/areas, indicate that a partial county boundary for Klamath County is sufficient to capture all potential sources contributing to the violations of the monitor in Klamath Falls.

Table 4 Klamath County and surrounding county traffic and commuting patterns

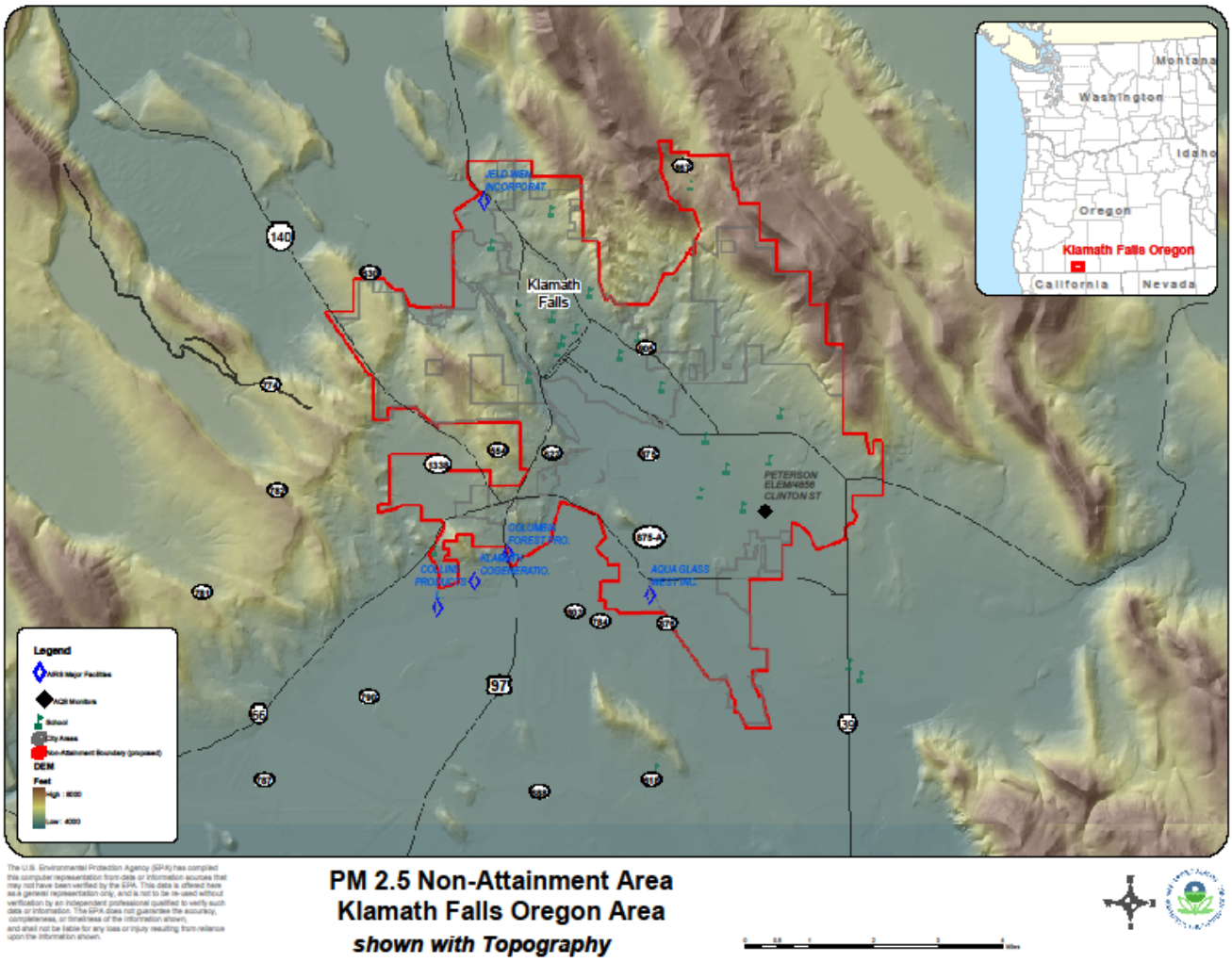
County	Vehicle Miles Traveled in 2005 (millions annually)	Percent VMT Growth (1996-2005)	Number commuting into any violating counties	Percent commuting into any violating counties	Number commuting into statistical area	Percent commuting into statistical area
KLAMATH FALLS, OR						
Klamath	**807**	**85**	**24,920**	**97**	**24,860**	**97**
Jackson	1,948	18	360	0	200	0
Siskiyou	525	(57)	220	1	220	1
Douglas	1,485	7	1,130	3	10	
Modoc	92	(4)	80	2	80	2
Lake	142	153	30	1	30	1
Lane	2,723	8	146,470	96	50	
Deschutes	1,227	25	420	1	280	1

The State noted in its nine factors analysis that the Urban Growth Boundary captures the major roads that move traffic in the Klamath Falls area.

> "The metropolitan area has several major roads that bisect the city, north and south and east and west. From downtown Klamath Falls, South 6th Street moves vehicles through the center of town and the east side by-pass and Highway 97 move vehicles north and south on the east and west sides of town respectively. The south-side bypass moves traffic east and west past the major portion of the city to the north. Main Street, Washburn Way, Altamont and Homedale are connectors that move vehicles through the residential communities to commercial and industrial sites. Major commuting patterns generally support using the UGB".

Figure 10 is a map of the Urban Growth Boundary. This boundary captures a portion of all of the major roads in the Klamath Falls area.

Figure 10 Oregon's recommended nonattainment area boundary for Klamath Falls and surrounding topography, major roads through in Klamath Falls



Factor 5: Growth rates and patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in Klamath Falls area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and likely to be contributing to fine particle concentrations in the area. Due to the low population of the counties in eastern Oregon, large geographic size, and rural nature of eastern Oregon, growth rates in neighboring counties were not an important consideration in our decision making process. However, EPA did consider growth within Klamath County.

According to the State's analysis, the Klamath Falls area is growing. Klamath County is predicted to grow at a 0.5% rate increase per year for the next 5 years, much more than the previous 5 years. The rate is predicted to increase to 0.71% per year to 2040. See Table 5.

Much of that growth will occur in the major metropolitan area of the greater Klamath Falls area. South Suburban will likely see some of this growth. The City of Klamath Falls is contained by the Urban Growth Boundary which by Oregon law generally inhibits growth outside of the area. The State indicated in its nine factors analysis that they believe that the UGB boundary will contain future growth within Klamath Falls.

Table 5 Klamath County Growth Forecasts

Oregon Office of Economic Analysis - Klamath County Data							
Forecasts of Oregon's County Populations and Components of Change, 2000 - 2040							
Total Population							
Note: populations as of July 1							
Release: April 2004							
	Estimates (PSU)		**FORECAST**				
Area Name	**2000**	**2003**	**2005**	**2010**	**2015**	**2030**	**2040**
Oregon	3,436,750		3,618,200	3,843,900	4,095,708	4,891,225	5,425,408
Klamath	63,900	64,600	65,330	66,968	68,851	74,924	80,159
Population Change							
	Estimate	**FORECAST**					
Area Name	**2000-2003**	**2000-2005**	**2005-2010**	**2010-2015**	**2015-2020**	**2030-2035**	
Oregon	104,750	181,450	225,700	251,808	263,550	263,568	
Klamath	700	1,430	1,638	1,883	1,744	2,441	
Yamhill	2,650	4,598	8,834	9,880	10,199	12,044	
Annual Growth Rate							
	Estimate	**FORECAST**					
Area Name	**2000-2003**	**2000-2005**	**2005-2010**	**2010-2015**	**2015-2020**	**2030-2035**	
Oregon	1.00%	1.03%	1.21%	1.27%	1.25%	1.05%	
Klamath	0.36%	0.44%	0.50%	0.55%	0.50%	0.64%	
Net Migration							
Area Name	**2000-2003**	**2000-2005**	**2005-2010**	**2010-2015**	**2015-2020**	**2030-2035**	
OREGON	58,773	103,767	143,442	161,847	171,677	196,057	
Klamath	329	739	868	1,016	945	1,571	

Factor 6: Meteorology (weather/transport patterns)

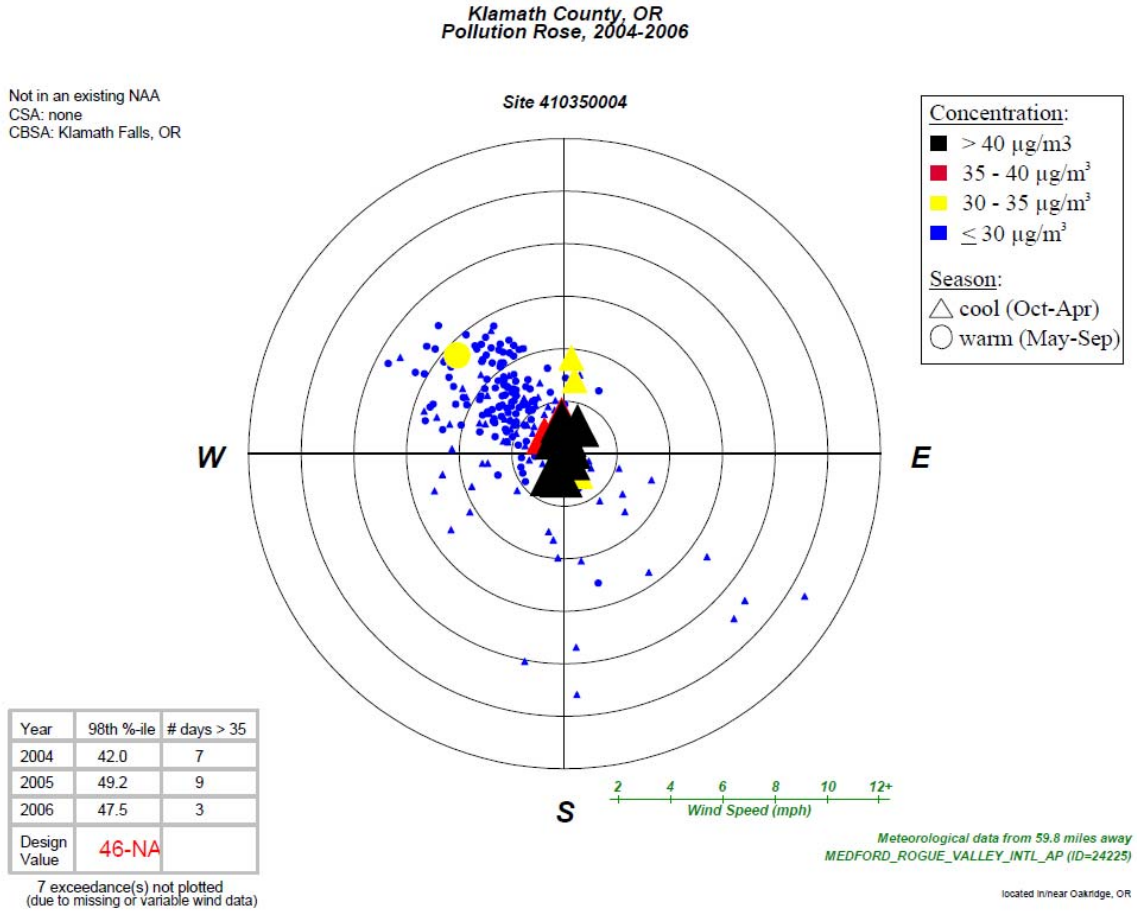
For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high days are defined as days where any FRM or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values.

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The figure identifies 24-hour PM2.5 values by color; days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the

day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 11 is a pollution rose from instrumentation at the Medford, Oregon airport, a site which is located about 70 miles west of the violating monitor. Based on this pollution rose, wind speeds are very low and there is no average prevailing surface wind direction for high $PM_{2.5}$ days in Klamath Falls. Given that Klamath Falls is 70 miles away and over mountains that rise to over 6000 ft, EPA considered local data submitted by the State more important for our consideration than this information.

Figure 11 Klamath County Pollution Rose



EPA considered the NOAA HYSPLIT back trajectory analysis that the State submitted for days with high $PM_{2.5}$ concentrations for the season of reported exceedences. See Figure 12. These high days are defined as days where any FRM or FEM air-quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values. Generally these days are characterized by low wind speed, night time ground based inversion, and shallow mixing height. These trajectories show intrusion from the south, southeast, and/or

east from Eastern Oregon, California, and Nevada. On rare occasions, the air mass follows a northerly flow from rural parts of central Oregon.

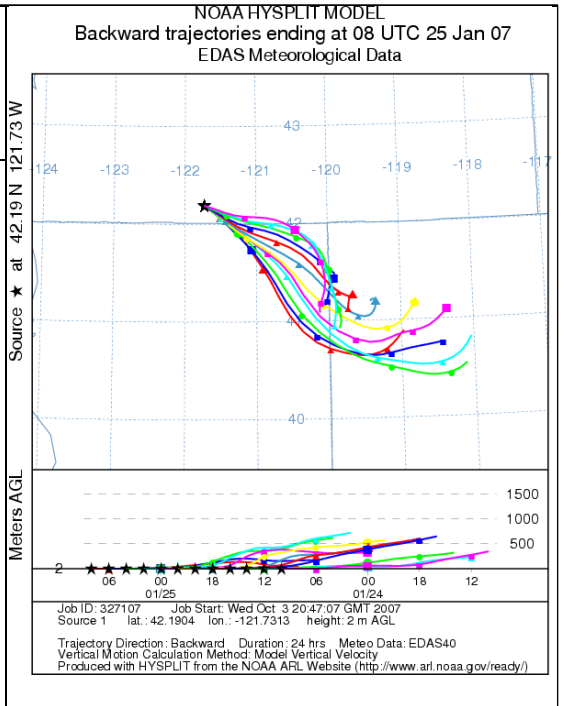
Using the back trajectories along with upwind county CES it is apparent that there is very little or no contribution of pollution transported from neighboring counties to violations of the PM2.5 standard.

Lake County Or., with a CES of 1
Siskiyou County Or., with a CES of 7
Deschutes County Or., with a CES of 0
Modoc County Ca., with a CES of 2
Washoe Co. Nv., with a CES not provided
Humboldt Co. Nv., with a CES not provided

The State suggested in its nine factor analysis that the HYSPLIT analysis would support the concept of local emission sources being the major contributor to violations of the standard. The State noted that while there are some exceptions, based on the HYSPLIT modeling, the air flow comes from the southeast along the ground. Industrial sources are generally located to the west and southwest of Peterson School. To the southeast are residential areas and farm land. Some of the air flow comes from northern California in the Tule Lake area which is roughly 60 miles southwest of Klamath Falls. The State also indicated that it may be possible for some agricultural or forest burning to impact Klamath Falls during this time of the year and that while the back trajectories suggest many of the impacts come within the South Suburban area, they also suggest emissions may come from outside the South Suburban area and even from outside the UGB. The State concluded that although the back trajectories could also suggest a boundary greater than the UGB, at this time the UGB would be appropriate.

Figure 6 NOAA Hypslit Analysis for 1/24/2007

Sample Date Time	Particulate Matter 2.5µm Teflon (µg/m³ (LTP))	Neph Time	Light Scatter (Bscat)
1/24/2007 0:00	35.3		
		1/24/2007 0:00	4.68
		1/24/2007 1:00	4.2
		1/24/2007 2:00	1.62
		1/24/2007 3:00	2.66
		1/24/2007 4:00	1.16
		1/24/2007 5:00	1.2
		1/24/2007 6:00	1.02
		1/24/2007 7:00	1.38
		1/24/2007 8:00	0.94
		1/24/2007 9:00	0.78
		1/24/2007 10:00	0.9
		1/24/2007 11:00	0.94
		1/24/2007 12:00	0.56
		1/24/2007 13:00	0.46
		1/24/2007 14:00	0.5
		1/24/2007 15:00	0.5
		1/24/2007 16:00	0.7
		1/24/2007 17:00	1.34
		1/24/2007 18:00	1.42
		1/24/2007 19:00	2.58
		1/24/2007 20:00	4.74
		1/24/2007 21:00	5.12
		1/24/2007 22:00	6.34
		1/24/2007 23:00	5.42



EPA has reviewed the HYSPLIT data submitted by the State and is concluding that although the major industrial sources outside of the UGB are generally to the southwest of the violating monitor, the NOAA HYSPLIT data alone is not sufficient to show that these sources are not impacting the violating monitor. In addition, there are other potential sources (communities and populations) to the south, to the west and to the east of the violating monitor that are not included in the UGB. EPA has concluded that the HYSPLIT trajectories indicate that a more expansive boundary than the UGB would be appropriate to capture any sources which may be outside of the UGB and contribute to the violations at the Peterson School monitor.

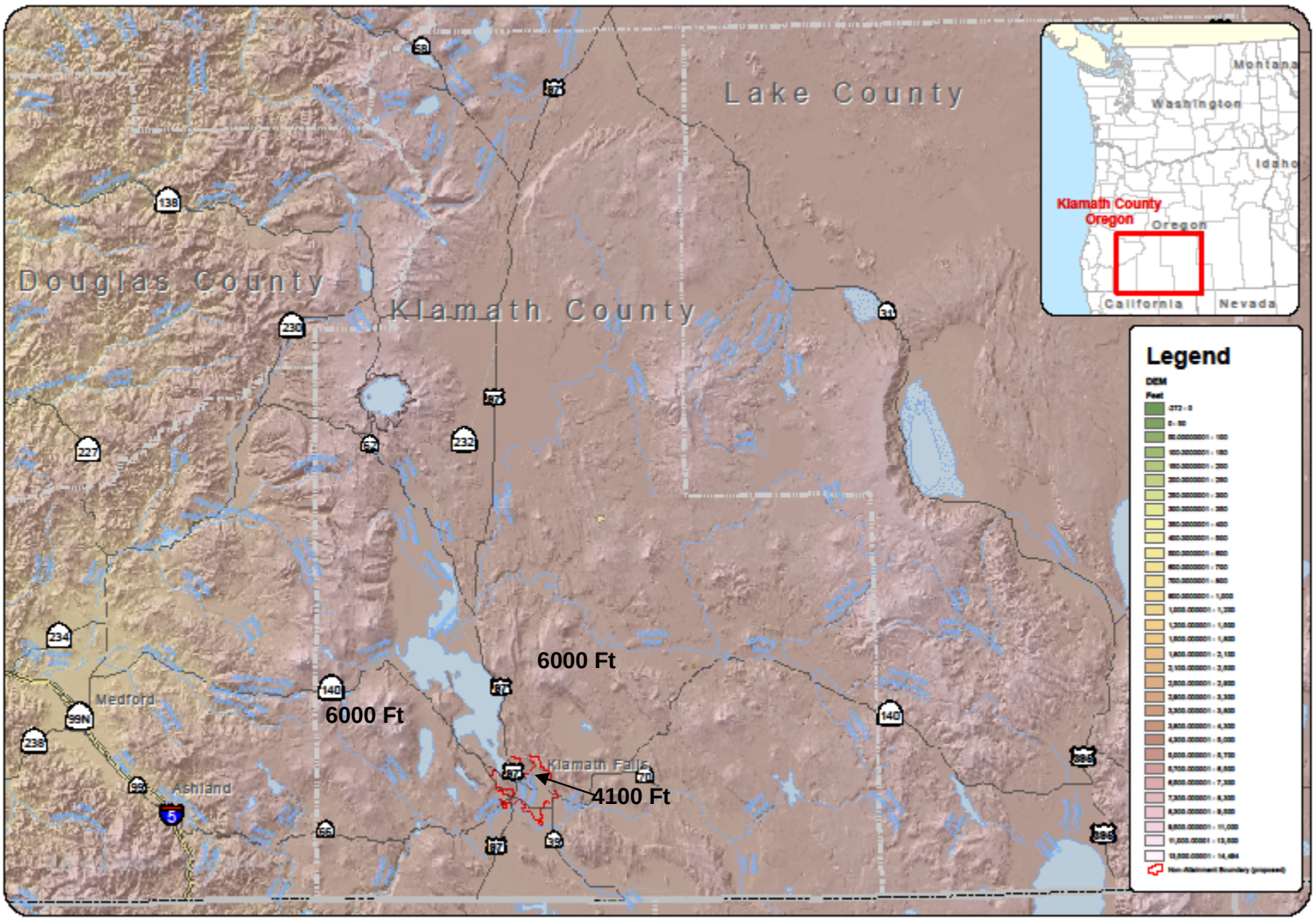
Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geographic/topographic analysis looks at physical features of the land that might have an effect on the airshed and, therefore, on the distribution of $PM_{2.5}$ over the area. In rugged Klamath County, topography is an important consideration. Klamath Falls is at an elevation of approximately 4000 feet, at the northern end of the Klamath Basin. The Klamath Basin follows the Klamath River that flows south into California. Klamath Falls is surrounded to the east, north and west by mountains rising to an elevation of 5000 to 6000 feet, thus forming a bowl from which locally generated pollution remains trapped during cold stagnant winter meteorological conditions. See Figure 13.

The State described the influence of topography along with meteorology in its nine factors analysis and noted that there is a portion of land on the western part of the UGB that is on the western side of the topographic features, but even this portion of land could contribute to emissions in the South Suburban area as emissions filter along the Klamath River on stagnant days. The State also noted that up-slope topography may also contribute to emissions in the flats of the South Suburban area on stagnant days. The State noted in its nine factors analysis that the UGB best incorporates most of the geography and topographical features that are of concern, including the South Suburban area.

However, since the UGB does not capture all potential sources that could contribute to the violating monitor that are contained within the bowl described above and because there are major sources and potential sources of emissions located within the bowl and outside of the UGB, EPA is expanding the boundary from the States' proposed boundary to capture potential sources contributing to the violations at the Peterson School monitor. EPA generally used the 5000 ft. contours to the east and west of Klamath Falls to define the expanded boundary.

Figure 7 Klamath County topography



Factor 8: Jurisdictional boundaries (e.g., existing PM and ozone areas)

The areas considered by the State as potential nonattainment areas included the City of Klamath Falls, the Klamath Falls Urban Growth Boundary, and Klamath County. As noted in the State's nine factors analysis, approximately 60% of the county population resides within the UGB, while only 30% reside within the city. The remaining 40% of the county population is dispersed throughout the 6135 square miles. The Klamath Fall UGB was designated nonattainment for PM-10 and the State recommends that the UGB be the nonattainment boundary for PM2.5.

The State determined through it's analysis that the UGB best incorporates known sources that contributed to Klamath Falls' violation based on its assessment of population density, major commuting patterns, growth rates, meteorology, geography, and topography. However, EPA has noted major industrial sources and other potential sources located out of the UGB that are not separated from the violating monitor by topographic features. Further, NOAA HYSPLIT modeling submitted by the State suggests that sources outside of the UGB to the south and the southeast may contribute to the violations at the Peterson Street monitor. Accordingly, we are expanding the boundary to include these potential sources. EPA is using the jurisdictional boundary of the Oregon-California state line as the southern boundary of the nonattainment area.

Factor 9: Level of control of emission sources

Klamath Falls UGB is a maintenance area for PM-10 and has emission reduction measures in effect, primarily for residential wood combustion. The State also noted in its submittal varying levels of control for major stationary sources in the area:

- Four major industrial sources that produce $PM_{2.5}$ 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.

- 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.

- 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.

- 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.

EPA has reviewed this information and was not able to determine whether or not controls on these stationary sources are federally enforceable. Accordingly, EPA did not consider this information in our decision on our intended boundary for the Klamath Falls area. As mentioned above, EPA intends to expand the boundary to include the major sources located outside of the UGB.

However, EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants already have installed emission controls or plan to install such controls in the near future, EPA requests additional information on:

- the plant name, city, county, and township/tax district
- identification of emission units at the plant, fuel use, and megawatt capacity
- identification of emission units on which controls will be installed, and units on which controls will not be installed
- identification of the type of emission control that has been or will be installed on each unit, the date on which the control device became / will become operational, and the emission reduction efficiency of the control device
- the estimated pollutant emissions for each unit before and after implementation of emission controls
- whether the requirement to operate the emission control device will be federally enforceable by December 2008, and the instrument by which federal enforceability will be ensured (e.g. through source-specific SIP revision, operating permit requirement, consent decree)

Attachment 2
Description of the Contributing Emissions Score

The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

The CES for each county was derived by incorporating the following significant information and variables that impact $PM_{2.5}$ transport:

- Major $PM_{2.5}$ components: total carbon (organic carbon (OC) and elemental carbon (EC)), SO_2, NO_x, and inorganic particles (crustal).
- $PM_{2.5}$ emissions for the highest (generally top 5%) $PM_{2.5}$ emission days (herein called "high days") for each of two seasons, cold (Oct-Apr) and warm (May-Sept)
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days
- The "urban increment" of a violating monitor, which is the urban $PM_{2.5}$ concentration that is in addition to a regional background $PM_{2.5}$ concentration, determined for each $PM_{2.5}$ component
- Distance from each potentially contributing county to a violating county or counties

[A more detailed description of the CES can be found at
http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.]

Attachment 3
Additional Information submitted by the State

Meteorological data for the Oakridge area
Woodstove Survey for the Oakridge area

"Ralph Johnston"
<metman@lrapa.org>
08/04/2008 03:49 PM

To Gina Bonifacino/R10/USEPA/US@EPA
cc "Merlyn Hough" <merlyn@lrapa.org>
bcc
Subject LRAPA met data for PM2.5

History: This message has been replied to and forwarded.

Gina,

As per your request, I have attached the met data for the 5 worst days in Oakridge for the period 2005 - 2007. The 5 worst days all occurred in 2005. I noted at the top of each data page what the official PM2.5 measurement was on that date.

I have also included met data from the Wilkes site in North Eugene. This site is approximately 7 miles NNW of the Amazon site where the PM data is recorded. I have noted on the Wilkes data what the PM2.5 concentrations were at Amazon on that date. I have included the Wilkes met data for the worst 5 days at Amazon as well as the Wilkes met data on Oakridge worst days when Amazon had PM data on the same date. (note: during this period Oakridge sampled daily while Amazon was every third day)

Using the 2 meter and 10 meter temperatures, you will note the strong nocturnal surface based inversions during this period. Combining this with the very light winds and the nature of the source (woodstoves), it is obvious that these are very localized problems.

Given the distance apart, the sources involved, the relative elevations, and the rugged topography, it is obvious that Oakridge and Eugene/Springfield are separate airsheds.

If you have any questions please give me a call: 541-736-1056 ext. 213

Ralph PM2.5metdata.pdf

PM2.5 = 58.4 $\mu g/m^3$

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge

Thursday 03 February 2005 Julian Date 34 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	5.95V	746.0V	125.9	31.7V	30.5V	148V	0.3V
0100	6.57V	745.7V	139.3	30.8V	29.6V	89V	0.5V
0200	5.87V	745.6V	124.2	30.1V	29.2V	98V	0.1V
0300	4.55V	745.5V	95.7	29.5V	28.4V	91V	0.8V
0400	4.06V	745.3V	85.1	29.0V	27.9V	333V	0.2V
0500	3.02V	745.0V	62.7	28.9V	27.3V	72V	1.0V
0600	2.68V	744.9V	55.2D	28.5V	27.2V	20V	0.7V
0700	3.18V	745.0V	65.9	28.4V	27.0V	164V	0.3V
0800	3.93V	745.2V	82.1	31.2V	31.1V	124V	0.1V
0900	1.73V	744.9V	34.7	35.9V	36.5V	206V	0.7V
1000	0.42V	744.1V	6.4	40.5V	41.2V	196V	1.1V
1100	0.40V	743.0V	6.0	47.3V	47.7V	192V	0.8V
1200	0.37V	741.8V	5.3	52.3V	52.8V	189V	1.6V
1300	0.40V	740.6V	6.0	57.3V	57.8V	194V	1.6V
1400	0.37V	739.8V	5.3	59.8V	60.0V	187V	1.6V
1500	0.47V	739.5V	7.5	58.5V	57.7V	235V	3.4V
1600	0.68V	739.5V	12.0	56.8V	54.5V	254V	3.0V
1700	1.06V	739.8V	20.2	50.3V	48.0V	241V	1.2V
1800	1.92V	740.2V	38.8	45.9V	43.9V	146V	0.7V
1900	3.08V	740.4V	63.8	42.7V	41.1V	83V	0.9V
2000	6.16V	740.3V	130.2	40.1V	38.8V	227V	0.7V
2100	2.82V	740.5V	58.2	38.6V	37.5V	108V	1.0V
2200	4.99V	740.4V	105.0	37.1V	35.9V	121V	0.6V
2300	5.51V	740.0V	116.2	35.9V	34.7V	81V	0.9V
Min Hr	0.37	739.5	5.3	28.4	27.0	20	0.1
Max Hr	6.57	746.0	139.3	59.8	60.0	333	3.4
24hr Av	2.92	742.6	60.5	40.3	39.4	158	1.0

Flags:
D = Off-Line Part of Hour - Valid Hour
V = Valid Corrected Data

PM2.5 = 62.6 $\mu g/m^3$

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge

Wednesday 16 February 2005 Julian Date 47 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	5.19V	740.2V	109.3	27.5V	26.4V	300V	0.6V
0100	4.87V	740.1V	102.4	26.8V	25.6V	342V	0.5V
0200	4.71V	740.0V	98.9	26.3V	24.9V	63V	0.7V
0300	3.07V	739.8V	63.6	25.5V	24.2V	301V	0.7V
0400	3.37V	739.8V	70.0	25.1V	23.8V	91V	0.8V
0500	3.02V	740.1V	62.5	24.6V	23.1V	12V	0.6V
0600	2.39V	740.3V	48.9	24.0V	22.7V	329V	0.4V
0700	3.94d	740.5V	82.3d	23.9V	22.8V	309V	0.7V
0800	3.61V	740.7V	75.2D	29.1V	29.3V	237V	0.8V
0900	0.79V	740.7V	14.4	34.4V	34.9V	216V	1.7V
1000	0.39V	740.3V	5.8	40.7V	41.3V	211V	1.5V
1100	0.28V	739.9V	3.4	47.3V	47.8V	205V	1.9V
1200	0.23V	739.2V	2.3	54.2V	54.8V	161V	3.0V
1300	0.21V	738.5V	1.9	56.5V	57.1V	165V	2.8V
1400	0.20V	738.0V	1.7	58.2V	58.7V	140V	4.0V
1500	0.18V	737.8V	1.2	55.6V	55.0V	149V	3.5V
1600	0.40V	737.7V	6.0	51.8V	49.1V	171V	2.7V
1700	2.02V	738.1V	40.9	44.0V	41.5V	267V	2.1V
1800	1.84V	738.8V	37.0	40.9V	38.4V	272V	1.7V
1900	2.34V	739.3V	47.8	36.8V	35.0V	248V	1.0V
2000	3.75V	739.6V	78.2	33.9V	32.2V	278V	0.8V
2100	4.64V	739.9V	97.4	31.7V	30.3V	105V	0.4V
2200	7.33V	740.1V	155.4	30.1V	28.8V	138V	0.0V
2300	7.06V	740.3V	149.6	28.9V	27.6V	264V	0.6V
Min Hr	0.18	737.7	1.2	23.9	22.7	12	0.0
Max Hr	7.33	740.7	155.4	58.2	58.7	342	4.0
24hr Av	2.69	739.6	55.4	36.6	35.6	207	1.4

Flags:
D = Off-Line Part of Hour - Valid Hour
V = Valid Corrected Data
d = Off-Line Part of Hour - Invalid Hour

PM2.5 = 63.2 µg/m³

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge

Thursday 17 February 2005 Julian Date 48 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	6.28V	740.6V	132.8	28.0V	26.9V	10V	0.5V
0100	6.64V	740.6V	140.6	27.3V	26.1V	31V	0.4V
0200	4.00V	740.3V	83.6	26.9V	25.5V	350V	0.6V
0300	3.17V	740.0V	65.7	26.4V	25.1V	37V	0.3V
0400	3.13V	740.0V	64.9	25.8V	24.5V	344V	0.1V
0500	3.08V	739.8V	63.6	25.6V	24.2V	19V	0.2V
0600	3.54V	739.6V	73.5	25.4V	24.1V	6V	0.6V
0700	4.24V	739.8V	88.6	25.9V	24.8V	78V	0.4V
0800	4.73V	739.8V	99.1	27.4V	27.3V	235V	0.2V
0900	1.60V	739.5V	31.6	35.1V	35.7V	199V	0.7V
1000	0.31V	738.9V	3.8	39.6V	40.3V	200V	1.3V
1100	0.27V	737.9V	3.0	45.0V	45.7V	190V	1.0V
1200	0.29V	736.6V	3.4	51.9V	52.5V	167V	1.6V
1300	0.24V	735.5V	2.3	57.6V	58.1V	180V	1.5V
1400	0.23V	734.6V	2.1	59.7V	60.0V	226V	2.9V
1500	0.30V	734.2V	3.6	59.8V	60.0V	252V	5.0V
1600	0.34V	734.3V	4.5	56.0V	55.5V	241V	5.2V
1700	0.48V	734.6V	7.5	50.6V	49.4V	257V	3.8V
1800	1.09V	734.9V	20.7	45.6V	44.3V	287V	2.2V
1900	2.52V	735.1V	51.5	41.0V	39.4V	117V	0.7V
2000	2.60V	735.2V	53.2	38.5V	37.2V	67V	1.1V
2100	3.50V	735.4V	72.6	36.5V	35.3V	121V	0.8V
2200	6.06V	735.4V	127.8	34.5V	33.4V	315V	0.9V
2300	6.28V	735.1V	132.6	33.5V	32.2V	97V	0.8V
Min Hr	0.23	734.2	2.1	25.4	24.1	6	0.1
Max Hr	6.64	740.6	140.6	59.8	60.0	350	5.2
24hr Av	2.70	737.4	55.5	38.5	37.8	168	1.4

Flags:
V = Valid Corrected Data

$PM2.5 = 65.3 \mu g/m^3$

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge

Friday 18 February 2005 Julian Date 49 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	6.33V	734.8V	133.7	32.2V	31.0V	270V	0.3V
0100	6.67V	734.4V	141.0	31.5V	30.6V	126V	0.6V
0200	6.30V	734.3V	133.0	31.3V	30.1V	355V	0.6V
0300	5.29V	733.9V	111.2	30.3V	29.2V	307V	0.6V
0400	4.48V	733.6V	93.8	29.7V	28.6V	132V	0.1V
0500	4.70V	733.5V	98.5	29.5V	28.4V	358V	0.5V
0600	4.74V	733.4V	99.4	28.8V	27.6V	345V	0.2V
0700	4.31V	733.5V	90.1	28.6V	27.8V	64V	0.5V
0800	3.68V	733.3V	76.5	31.6V	31.6V	261V	0.0V
0900	1.77V	732.9V	35.3	36.7V	37.4V	181V	0.7V
1000	0.41V	732.1V	6.0	43.4V	44.0V	192V	1.3V
1100	0.28V	731.1V	3.2	49.5V	50.2V	199V	1.5V
1200	0.23V	730.0V	2.1	55.5V	56.3V	201V	2.2V
1300	0.25V	729.2V	2.5	57.6V	58.0V	170V	1.7V
1400	0.32V	728.5V	4.0	59.1V	59.3V	186V	1.7V
1500	0.29V	728.3V	3.4	56.8V	55.9V	211V	1.5V
1600	0.53V	728.3V	8.6	56.6V	54.7V	237V	2.4V
1700	1.26V	728.3V	24.3	52.7V	50.3V	255V	2.4V
1800	2.04V	728.9V	41.1	47.3V	46.0V	138V	0.4V
1900	2.01V	729.3V	40.5	44.6V	43.4V	296V	0.4V
2000	2.19V	729.6V	44.4	42.7V	41.6V	182V	0.5V
2100	3.56V	730.0V	73.9	40.8V	39.5V	279V	0.5V
2200	2.78V	730.6V	57.1	39.6V	38.8V	89V	0.9V
2300	3.49V	731.0V	72.2	38.7V	38.0V	282V	0.6V
Min Hr	0.23	728.3	2.1	28.6	27.6	64	0.0
Max Hr	6.67	734.8	141.0	59.1	59.3	358	2.4
24hr Av	2.83	731.4	58.2	41.5	40.8	222	0.9

Flags:
V = Valid Corrected Data

PM 2.5 = 73.0 ug/m³

Daily Data WAC

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

WAC - Oakridge

Thursday 15 December 2005 Julian Date 349 (Local Time) Clock Hours

Param	NEPH	PBar	PM2.5	T10	T2	WDV	WSA
Units	Bscat	mmHg	ug/M3	DegF	DegF	Deg	MPH
FS	40.00	1145.0	1000.0	150.0	150.0	360	100.0
Zero	0.00	455.0	0.0	-50.0	-50.0	0	0.0
Chan	01	06	X	05	04	00	02
0000	4.27V	738.6	97.6	24.0	23.6	319	0.2
0100	4.15V	738.3	94.8	23.8	23.2	61	0.7
0200	2.79V	738.3	62.7	23.3	22.5	69	0.4
0300	3.30V	738.1	74.7	22.5	21.6	16	0.7
0400	3.59V	738.0	81.6	22.1	21.0	64	0.6
0500	2.35V	738.1	52.3	21.6	20.5	79	0.6
0600	2.56V	738.1	57.2	21.0	19.7	339	0.2
0700	2.54V	737.9	56.8	20.9	19.3	17	0.3
0800	3.36V	738.0	76.1	21.8	20.0	90	0.4
0900	3.41V	737.7	77.3	26.0	26.4	228	0.4
1000	0.62V	737.1	11.4	29.0	29.9	199	1.4
1100	0.38V	736.2	5.7	32.1	33.0	202	1.7
1200	0.56V	735.3	10.0	35.1	35.6	192	2.0
1300	0.70V	734.7	13.3	37.9	38.2	189	1.6
1400	1.62V	734.8	35.0	37.4	37.3	186	1.4
1500	1.34V	735.0	28.4	34.5	34.2	165	0.6
1600	1.62V	735.3	35.0	32.8	32.1	200	0.3
1700	2.78V	735.3	62.4	31.3	30.5	247	-0.1
1800	3.07V	735.0	69.3	30.3	29.6	292	0.2
1900	4.63V	734.8	106.1	29.5	28.7	107	0.4
2000	4.46V	734.7	102.1	28.6	28.0	60	0.1
2100	4.96V	734.7	113.9	28.2	27.3	349	0.6
2200	5.43V	734.8	125.0	27.2	26.5	108	1.3
2300	5.87V	734.9	135.4	26.1	25.3	253	1.0
Min Hr	0.38	734.7	5.7	20.9	19.3	16	-0.1
Max Hr	5.87	738.6	135.4	37.9	38.2	349	2.0
24hr Av	2.93	736.4	66.0	27.8	27.3	168	0.7

Flags:
V = Valid Corrected Data

PM2.5 = 39.6 ug/m³ AT AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Sunday 16 January 2005 Julian Date 16 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	760.8	32.9	32.8	334	0.3
0100	760.9	33.1	32.9	254	0.2
0200	761.2	33.5	33.3	19	0.2
0300	761.7	33.8	33.6	4	0.8
0400	761.9	33.9	33.8	359	0.8
0500	762.0	34.2	34.0	252	0.2
0600	761.9	34.5	34.3	209	0.4
0700	761.7	34.9	34.7	278	0.3
0800	761.5	35.3	35.2	286	0.2
0900	762.1	36.3	36.4	354	2.5
1000	762.6	37.0	37.2	16	3.8
1100	761.9	39.7	41.0	342	3.3
1200	761.7	41.1	42.1	345	3.6
1300	761.5	42.9	43.8	357	2.7
1400	761.2	43.8	44.6	39	2.0
1500	760.9	44.4	44.9	42	0.9
1600	760.7	44.4	44.6	342	3.1
1700	760.7	42.4	42.3	5	3.6
1800	760.5	41.0	41.1	322	1.9
1900	760.3	40.5	40.6	21	0.2
2000	760.0	40.2	40.4	310	2.0
2100	760.8	39.6	39.8	21	3.0
2200	760.7	39.1	39.3	307	0.3
2300	760.5	39.4	39.6	35	0.7
Min Hr	760.0	32.9	32.8	4	0.2
Max Hr	762.6	44.4	44.9	359	3.8
24hr Av	761.2	38.2	38.4	202	1.5

Flags:
None

PM2.5 = 35.6 µg/m³ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Thursday 03 February 2005 Julian Date 34 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	761.7	33.5	33.8	355	1.1
0100	761.4	33.2	33.5	315	0.9
0200	761.3	33.2	33.5	10	0.3
0300	761.0	33.2	33.5	352	1.1
0400	760.8	33.6	33.8	191	0.4
0500	760.6	33.7	33.9	150	0.3
0600	760.7	33.3	33.5	129	0.3
0700	761.0	32.8	33.2	351	1.3
0800	761.2	32.2	32.5	23	0.6
0900	760.8	33.1	33.6	327	0.9
1000	760.6	33.6	34.5	350	3.2
1100	760.2	34.8	35.8	346	2.8
1200	759.0	36.7	37.6	296	0.5
1300	758.1	38.7	39.1	345	3.2
1400	757.7	39.1	40.2	355	4.4
1500	757.2	39.8	40.8	315	3.6
1600	757.1	39.7	40.2	353	2.3
1700	757.0	38.9	39.2	359	1.2
1800	756.6	38.5	38.6	140	0.6
1900	756.6	38.8	38.9	141	1.2
2000	756.5	38.3	38.4	130	2.2
2100	756.5	37.8	37.8	169	0.4
2200	756.2	37.1	37.0	189	0.2
2300	755.7	36.2	35.6	200	0.2
Min Hr	755.7	32.2	32.5	10	0.2
Max Hr	761.7	39.8	40.8	359	4.4
24hr Av	759.0	35.8	36.2	246	1.4

Flags:
None

PM2.5 = 28.9 µg/m³ at AM420W

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Thursday 15 December 2005 Julian Date 349 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	758.3	28.5	28.7	39	2.7
0100	758.1	28.2	28.3	18	1.7
0200	758.1	27.9	28.0	90	2.2
0300	757.9	27.6	27.7	59	1.3
0400	757.9	27.5	27.6	59	1.0
0500	757.6	27.4	27.6	126	1.6
0600	757.7	27.0	27.0	117	1.5
0700	757.6	26.6	26.7	344	1.3
0800	757.4	26.5	26.6	120	1.1
0900	757.2	26.5	26.7	163	1.5
1000	757.0	26.7	27.2	351	3.4
1100	756.6	26.9	27.7	324	3.5
1200	756.3	26.6	27.6	360	5.5
1300	756.0	27.1	28.1	14	3.9
1400	755.8	28.5	29.6	352	2.4
1500	755.8	29.2	29.3	23	2.4
1600	755.7	28.6	28.5	41	1.7
1700	755.3	28.0	27.7	111	0.7
1800	755.0	27.5	26.9	13	1.6
1900	754.9	26.7	26.1	315	0.8
2000	754.9	26.1	25.4	304	0.9
2100	754.8	25.6	24.7	177	1.0
2200	754.7	26.1	25.2	88	1.4
2300	754.6	26.7	26.7	11	2.1
Min Hr	754.6	25.6	24.7	11	0.7
Max Hr	758.3	29.2	29.6	360	5.5
24hr Av	756.5	27.3	27.3	151	2.0

Flags:
None

PM2.5 = 22.1 µg/m³ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Friday 18 February 2005 Julian Date 49 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	750.3	38.0	35.5	344	1.6
0100	749.9	36.0	32.8	347	1.1
0200	749.7	34.3	31.5	216	0.2
0300	749.5	32.5	29.8	327	0.2
0400	749.2	31.9	29.7	204	0.3
0500	749.0	31.3	29.1	206	0.2
0600	748.9	30.4	28.2	140	0.3
0700	748.9	30.6	28.9	169	0.2
0800	748.8	33.2	33.3	166	0.2
0900	748.6	36.0	36.6	332	0.6
1000	748.3	38.6	40.0	344	3.1
1100	747.8	43.3	45.1	356	7.7
1200	747.0	45.3	47.2	353	6.6
1300	746.5	47.9	49.3	359	6.8
1400	745.6	50.2	51.9	343	7.6
1500	745.4	51.5	52.8	346	7.0
1600	745.1	51.6	52.0	350	5.4
1700	745.0	50.5	49.6	329	1.6
1800	745.1	48.2	46.2	275	0.4
1900	745.3	45.2	42.3	186	0.2
2000	745.5	43.5	40.3	186	0.2
2100	746.1	42.5	38.5	210	0.5
2200	746.7	42.1	38.5	157	2.6
2300	746.7	42.9	42.4	134	4.5
Min Hr	745.0	30.4	28.2	134	0.2
Max Hr	750.3	51.6	52.8	359	7.7
24hr Av	747.5	40.7	39.6	266	2.5

Flags:
None

PM2.5 = 38.9 $\mu g/m^3$ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Monday 12 December 2005 Julian Date 346 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	756.2	28.5	28.2	203	1.4
0100	756.2	28.5	28.5	120	1.8
0200	756.2	28.5	28.4	140	1.6
0300	756.2	27.9	28.0	169	1.5
0400	756.2	27.6	27.6	187	1.4
0500	756.5	27.6	27.5	184	1.0
0600	756.8	28.0	28.0	164	0.8
0700	756.8	27.9	27.8	167	1.9
0800	756.9	29.1	29.1	180	1.7
0900	757.4	29.8	30.1	303	1.3
1000	757.5	29.9	30.2	7	2.6
1100	757.2	30.7	31.0	41	1.6
1200	756.8	31.2	32.4	356	3.4
1300	756.6	32.3	32.8	88	2.3
1400	756.6	33.7	35.7	307	1.8
1500	756.9	33.7	36.5	353	2.3
1600	757.0	35.4	35.7	99	1.8
1700	757.2	35.8	35.5	110	1.7
1800	757.4	35.7	35.6	133	3.3
1900	757.8	35.6	35.5	138	2.9
2000	758.0	35.5	35.4	144	3.8
2100	758.3	35.6	35.5	153	2.7
2200	758.7	35.2	35.1	155	2.1
2300	759.0	35.0	34.6	150	2.2
Min Hr	756.2	27.6	27.5	7	0.8
Max Hr	759.0	35.8	36.5	356	3.8
24hr Av	757.1	31.6	31.9	169	2.0

Flags:
None

PM2.5 = 43.3 µg/m³ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Friday 08 December 2006 Julian Date 342 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	752.1	36.4	36.5	340	1.3
0100	751.6	36.1	36.2	71	0.3
0200	751.1	35.9	36.0	91	0.7
0300	750.6	35.7	36.0	318	1.3
0400	749.8	35.3	35.5	346	1.1
0500	749.2	35.4	35.6	302	1.7
0600	748.8	35.2	35.5	330	1.8
0700	748.4	35.2	35.4	334	2.3
0800	748.2	35.1	35.4	307	2.8
0900	748.2	35.0	35.4	295	2.4
1000	747.9	35.3	35.7	299	1.6
1100	746.9	35.7	36.1	289	0.9
1200	746.2	36.4	36.6	357	2.1
1300	745.4	36.6	36.6	76	1.0
1400	744.9	36.7	36.8	338	0.9
1500	744.5	36.8	36.7	355	1.9
1600	744.0	36.3	36.1	314	1.7
1700	743.7	35.9	35.6	356	1.3
1800	743.4	35.4	35.5	343	1.5
1900	743.4	35.6	35.6	303	1.3
2000	743.1	35.1	35.0	235	1.0
2100	742.6	35.4	35.4	290	1.1
2200	742.1	35.4	35.1	282	0.9
2300	742.0	35.5	35.7	304	2.7
Min Hr	742.0	35.0	35.0	71	0.3
Max Hr	752.1	36.8	36.8	357	2.8
24hr Av	746.6	35.7	35.8	286	1.5

Flags:
None

PM2.5 = 43.0 µg/m³ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

Monday 05 February 2007 Julian Date 36 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	757.8	40.8	39.0	11	0.7
0100	757.8	40.7	38.7	311	1.1
0200	757.7	40.1	38.0	176	1.2
0300	757.4	39.6	38.3	283	1.3
0400	757.3	39.3	37.6	240	0.7
0500	757.3	38.7	36.5	210	1.0
0600	757.1	38.5	36.9	133	2.2
0700	756.9	38.5	36.3	205	1.4
0800	756.8	38.1	37.6	343	2.0
0900	756.7	40.6	41.4	347	1.5
1000	756.8	44.1	45.0	29	2.1
1100	756.3	47.3	48.4	11	3.2
1200	755.8	51.5	52.8	339	3.3
1300	755.2	52.6	53.8	345	4.5
1400	754.8	52.0	52.9	3	4.9
1500	754.6	51.8	52.2	5	4.1
1600	754.3	51.5	51.5	343	2.8
1700	753.8	49.9	49.5	352	2.1
1800	753.4	47.9	45.8	18	1.5
1900	753.1	46.7	44.4	325	1.4
2000	753.0	45.1	42.8	247	0.8
2100	752.9	43.3	40.3	271	1.4
2200	752.9	41.4	39.2	210	1.0
2300	753.0	40.5	39.0	200	1.9
Min Hr	752.9	38.1	36.3	3	0.7
Max Hr	757.8	52.6	53.8	352	4.9
24hr Av	755.5	44.2	43.2	206	2.0

Flags:
None

PM2.5 = 40.7 µg/m³ at AMAZON

Daily Data WILKES

Lane Regional Air Pollution Authority
1010 Main Street, Springfield, OR 97477

Wilkes Dr.

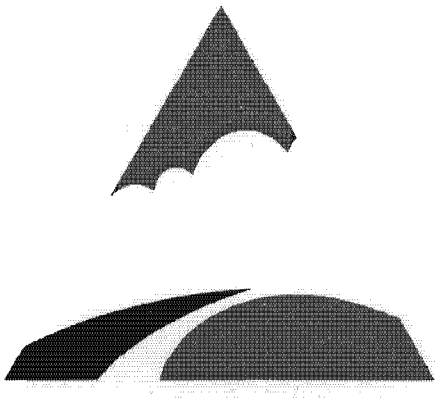
Friday 23 November 2007 Julian Date 327 (Local Time) Clock Hours

Param	PBar	T10	T2	WDV	WSA
Units	mmHg	DegF	DegF	Deg	MPH
FS	1140.0	150.0	150.0	360	100.0
Zero	450.0	-50.0	-50.0	0	0.0
Chan	05	04	03	00	01
0000	759.7	32.2	28.1	342	2.2
0100	759.7	31.0	27.5	336	2.0
0200	759.9	29.7	27.1	332	1.4
0300	759.8	27.9	25.1	287	1.5
0400	759.7	27.0	24.8	148	1.0
0500	759.9	26.2	23.9	194	0.6
0600	759.9	25.4	23.1	163	0.7
0700	760.1	25.1	23.1	150	1.1
0800	760.0	26.8	26.7	150	1.2
0900	760.0	30.5	31.2	325	1.8
1000	759.8	33.1	34.6	336	2.8
1100	758.9	36.5	37.4	187	1.2
1200	758.8	38.4	40.0	350	5.1
1300	758.2	39.8	40.9	11	3.6
1400	757.6	41.6	42.5	23	2.0
1500	757.2	42.8	43.3	337	2.4
1600	757.0	40.9	39.9	358	2.9
1700	757.1	38.6	35.7	5	1.8
1800	757.2	35.6	32.4	230	1.2
1900	757.4	33.8	31.2	171	0.5
2000	757.3	33.7	30.3	170	1.4
2100	757.2	34.3	31.9	170	1.8
2200	757.1	32.1	30.2	212	1.3
2300	757.2	30.0	28.4	303	0.8
Min Hr	757.0	25.1	23.1	5	0.5
Max Hr	760.1	42.8	43.3	358	5.1
24hr Av	758.6	33.0	31.6	220	1.8

Flags:
None

SURVEY OF OAKRIDGE RESIDENTS
CONDUCTED FOR
LANE REGIONAL AIR POLLUTION AUTHORITY

March, 2005



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EXECUTIVE SUMMARY

Wood-Burning Devices
45% of Oakridge residents have a wood stove or fireplace with insert. 9% have a pellet stove. 6% have an open fireplace. 41% have no wood-burning devices.

Wood Consumption
Of those with pellet stoves (n=26), 12% do not burn any pellets, 34% burn two to ten bags of pellets per winter, 31% burn 30 to 50 bags, and 23% burn 60 to 170 bags of pellets.

Of those with an open fireplace (n=19), 37% do not burn wood in their open fireplace, 16% burn less than a cord, 37% burn one to two cords, and 11% burn three to five cords of wood per winter.

Of those with a wood stove or fireplace with insert (n=134), 9% do not burn wood in it, 8% burn less than a cord, 43% burn one to two cords, and 41% burn over two cords per winter.

Age of Wood Stove
17% of the wood stoves or fireplaces with inserts are less than five years old. 31% are five to ten years old. 31% are over ten years old. 20% of those with a wood stove or fireplace with insert do not know the age of the device.

EPA Certified Stoves
67% believe that their wood stove or fireplace with insert is EPA certified as "clean burning." 10% say their stove in *not* EPA certified. 23% are unsure if their stove is certified.

Frequency of Burning Wood
Of those with a wood stove, fireplace with insert, or open fireplace (n=152), 61% burn wood daily in the winter months. 13% burn several times a week, 14% burn several times a month, and 2% burn less often than once a month. 10% never burn wood in these devices.

How is Wood Stored?
The vast majority of wood (94%) is stored covered and dry.

Aging of Wood
79% of those burning wood use wood that has aged for a year or more. 7% use wood that has aged for seven to eleven months. 4% use wood that has aged for six months or less. 10% are unsure how long their wood has aged when they burn it.

Sources of Heat
For 30% of those who burn wood (not including pellets), their wood-burning device is the only heat source for their residence. 70% have an alternate source of heat.

Awareness of Wood Heating Advisory Program
95% of Oakridge residents are aware of the Home Wood Heating Advisory Program with its red, yellow, and green advisory system. 5% are unaware of the program.

Advisory Phone Calls

80% of Oakridge residents receive occasional phone calls notifying them of whether or not they should burn wood based on air quality in their community. 20% do not receive such phone calls.

Of those not receiving calls (n=59), 63% don't know why; they have never been called. 10% say they don't know why; the calls just stopped. 22% asked to be removed from the list.

Should The Call Program Continue?

54% of Oakridge residents feel that the notification call program is a useful program that should continue. 34% do not feel it should continue. 12% are unsure.

Those who do not feel the program is useful (n=138) gave the following reasons: "We don't burn wood" (25%), "the timing or frequency of the calls is poor or annoying" (22%), "the calls are ineffective; some have to burn to keep warm" (17%), "it's a waste of money" (11%), "the information is on other media" (8%), and "it is obvious when we shouldn't burn" (8%).

Following the Advisory

Of those who receive advisory calls (n=241), 14% said that this year they followed the wood burning advisory more often than in past years. 1% said they followed the advisory less often than in past years. 34% reported no change in following the advisory. 51% said "not applicable;" they either didn't live in the area in past years, they didn't burn wood then, or they don't burn wood now.

Awareness of Air Quality

Of those who receive advisory calls (n=241), 38% feel that the telephone advisory program has made them more aware of air quality in Oakridge. 1% feel that they are less aware of air quality. 59% feel there is no difference in their awareness. 3% are unsure.

Internet Access at Home

36% of Oakridge residents have Internet access at home; 64% do not.

Contact by E-Mail

Of those with Internet access at home (n=108), 14% would want LRAPA to contact them by e-mail to tell them about programs. 86% would not want such contact.

SURVEY OF OAKRIDGE RESIDENTS
FOR L.R.A.P.A.
March, 2005

PURPOSE OF THE STUDY

The purpose of this study is to assist LRAPA in measuring awareness and effectiveness of the Oakridge Home Wood Heating Telephone Advisory Program.

METHODOLOGY

Advanced Marketing Research was hired to conduct the research project in order to obtain unbiased and statistically valid results.

Using questions proposed by LRAPA, Advanced Marketing Research designed a questionnaire instrument to be administered by telephone. Using a random list of residents living in Oakridge as a sampling frame, 301 interviews were completed. Telephone interviews were conducted between March 7 and March 13, 2005.

Proper data analysis techniques were employed by Advanced Marketing Research to avoid introducing unnecessary error and bias into the study.

QUOTAS OBSERVED

The gender and age quotas below were targeted in the data collection process.

Males	48% to 52%
Females	48% to 52%
Age 65+	24% to 28%

RESPONSE RATE

Of the 361 qualified respondents reached by telephone, 301 interviews were completed, for a response rate of 83%. The overall breakdown of numbers dialed is as follows:

Refusals	60
Disconnects	39
Wrong Numbers	0
Language Barrier	2
Spanish Language Barrier	2
Business Numbers	0
Fax	2
No Answer	177
Answering Machine	151
Busy Signal	17
Call Backs	4
No Qualified Respondent	6
Completed Interviews	301
Total Numbers Dialed	761

TESTS FOR DIFFERENCES BETWEEN PROPORTIONS

When looking at the data tables, differences between percentage amounts can be misleading, and statistical tests must be conducted to determine if the differences are statistically significant. The computer makes these calculations for us, and the results are occasional plus or minus signs at the bottom of certain cells. These indicate that those answers are more different from everybody else's answers than could be expected due to chance, given the sample sizes involved. Plus signs are used if the group picks that answer *more* often than everyone else; minus signs if it is *less* than everyone else. The number of plus or minus signs indicates the level of statistical significance. One means the 90% level, two the 95% level, and three the 99% level. For example, two plus signs would mean that you can be 95% sure that the people represented by that group really would pick that answer more often than the people represented by the rest of the sample. It should be noted that this test can only be done for banner columns that contain at least 30 people. Because of this requirement, it is possible that the test will be done for some banner columns on a table and not for others.

NOTES ON CHI SQUARE

The chi square value and its associated probability are printed beneath the first column in each banner heading. The probability (p=.xxx) indicates the probability that the heading and row variables are *not* related is .xxx. For example, a .05 probability of not being related means a 95 percent chance of being related.

BOUND ON ERROR

	SAMPLE SIZE		Bound on Error at
SEX	Frequency	Percent	95% Confidence Level
Male	150	50%	7.3%
Female	151	50%	7.3%
AGE			
18-34	32	11%	15.9%
35-44	42	14%	13.9%
45-54	79	26%	10.1%
55-64	76	25%	10.3%
65+	71	24%	10.7%
INCOME			
Under $15,000	65	22%	11.1%
$15,000-$24,999	99	33%	9.0%
$25,000-$34,999	50	17%	12.7%
$35,000 and Up	51	17%	12.6%
TOTAL	301	100%	5.0%*

* What this means is that we are 95% certain that the mean response of the entire population of Oakridge lies within (plus or minus) 5.0% of the survey response. Oakridge has 1200 households.

MINIMUM DIFFERENCE IN PERCENTAGE POINTS REQUIRED FOR STATISTICAL SIGNIFICANCE IN COMPARISON OF REPORTED PERCENTAGES FOR SUBGROUPS WITH 95% CONFIDENCE

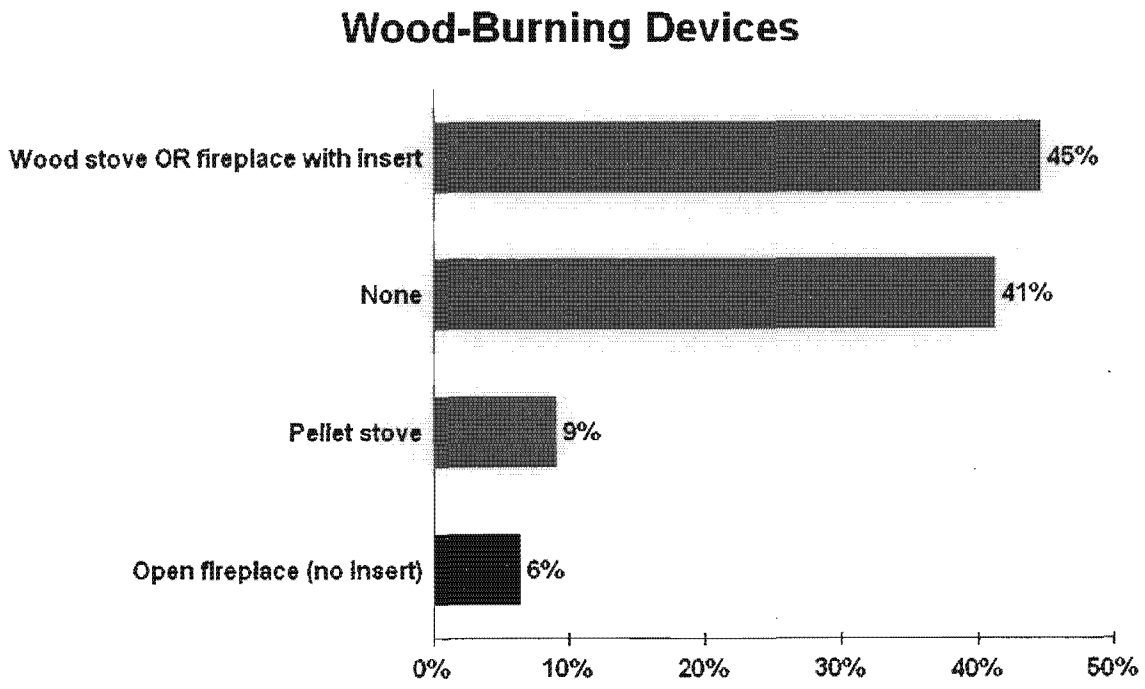
Subsample	50	100	150	200	250	300	350	400	450	500	600
50	20%	17%	16%	15%	15%	15%	15%	15%	15%	15%	15%
100		14%	13%	12%	12%	11%	11%	11%	11%	11%	11%
150			11%	11%	10%	10%	10%	9%	9%	9%	9%
200				10%	9%	9%	9%	8%	8%	8%	8%
250					9%	8%	8%	8%	8%	8%	7%
300						8%	8%	7%	7%	7%	7%
350							7%	7%	7%	7%	6%
400								7%	7%	7%	6%
450									7%	6%	6%
500										6%	6%
600											6%

Minimums are for reported percentages near 50%. When much smaller or much larger percentages are reported, a slightly smaller minimum is required.

ANALYSIS OF DATA

WOOD-BURNING DEVICES (Q4)

45% of Oakridge residents have a wood stove or fireplace with insert. 9% have a pellet stove. 6% have an open fireplace. 41% have no wood-burning devices.



Demographic Differences

Those who have lived in the Oakridge area for over five years, those earning over $35,000, those not living within city limits, home owners, and those living in single family dwellings are more likely than others to have a wood stove or fireplace with insert.

Males and those living in single family dwellings are more likely than others to have a pellet stove. Seniors, those not living within city limits, and those in single family dwellings are more likely than others to have an open fireplace.

Those earning under $25,000, those inside city limits, renters, and those living in mobile homes are more likely than others to have *no* wood-burning devices.

WOOD CONSUMPTION (Q5, Q9, Q10)

Of those with pellet stoves (n=26), 12% do not burn any pellets, 34% burn two to ten bags of pellets per winter, 31% burn 30 to 50 bags, and 23% burn 60 to 170 bags of pellets.

Of those with an open fireplace (n=19), 37% do not burn wood in their open fireplace, 16% burn less than a cord, 37% burn one to two cords, and 11% burn three to five cords of wood per winter.

Of those with a wood stove or fireplace with insert (n=134), 9% do not burn wood in it, 8% burn less than a cord, 43% burn one to two cords, and 41% burn over two cords per winter.

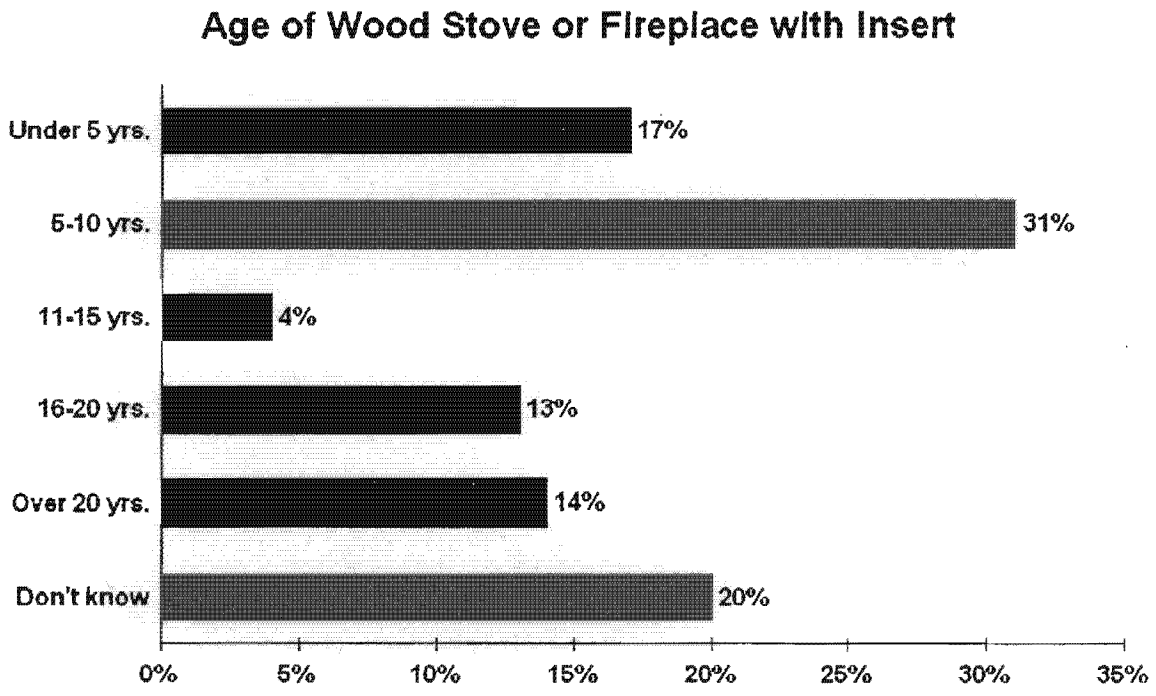
n=26 PELLET STOVES	
0 Bags	12%
2 – 5 Bags	15%
6 – 10 Bags	19%
30 – 50 Bags	31%
60 – 125 Bags	15%
160 – 170 Bags	8%

n=19 OPEN FIREPLACE	
0 Cords	37%
Under 1 Cord	16%
1 – 2 Cords	37%
3 – 5 Cords	11%

n=134 WOOD STOVE	
0 Cords	9%
Under 1 Cord	8%
1 – 2 Cords	43%
2.5 – 5 Cords	39%
6 – 8 Cords	2%

AGE OF WOOD STOVE (Q6)

17% of the wood stoves or fireplaces with inserts are less than five years old. 31% are five to ten years old. 31% are over ten years old. 20% of those with a wood stove or fireplace with insert do not know the age of the device.

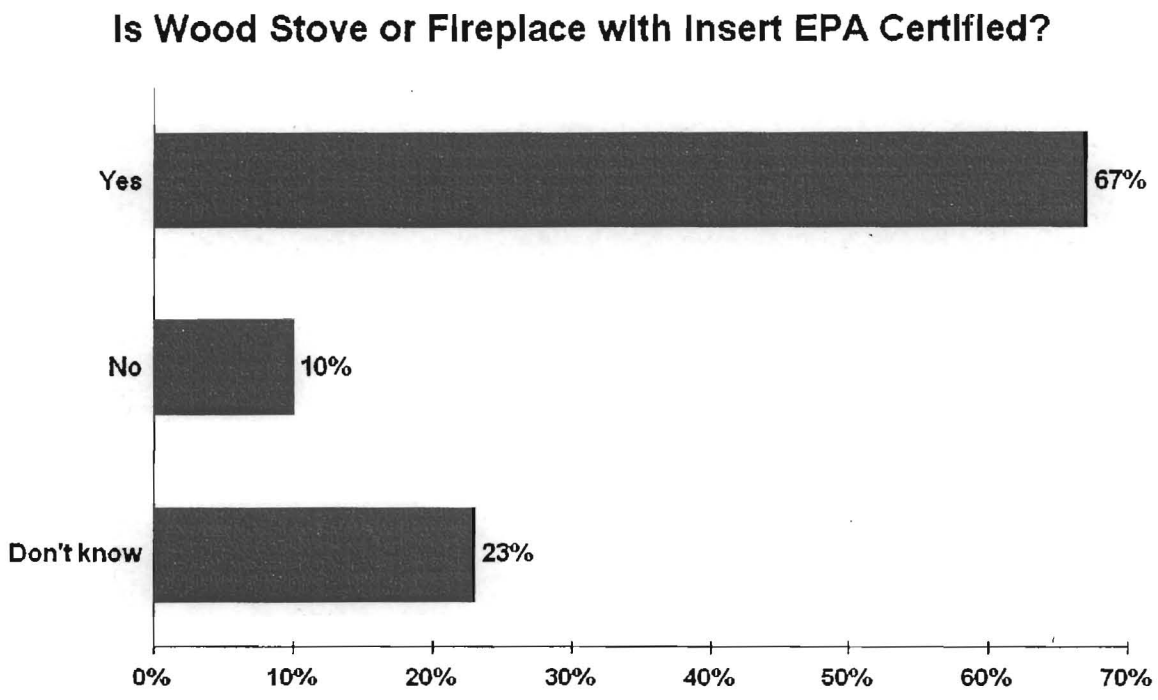


Demographic Differences

45 to 54 year-olds are more likely than others to have a wood stove that is under five years old.

EPA CERTIFIED STOVES (Q7)

67% believe that their wood stove or fireplace with insert is EPA certified as "clean burning." 10% say their stove in *not* EPA certified. 23% are unsure if their stove is certified.

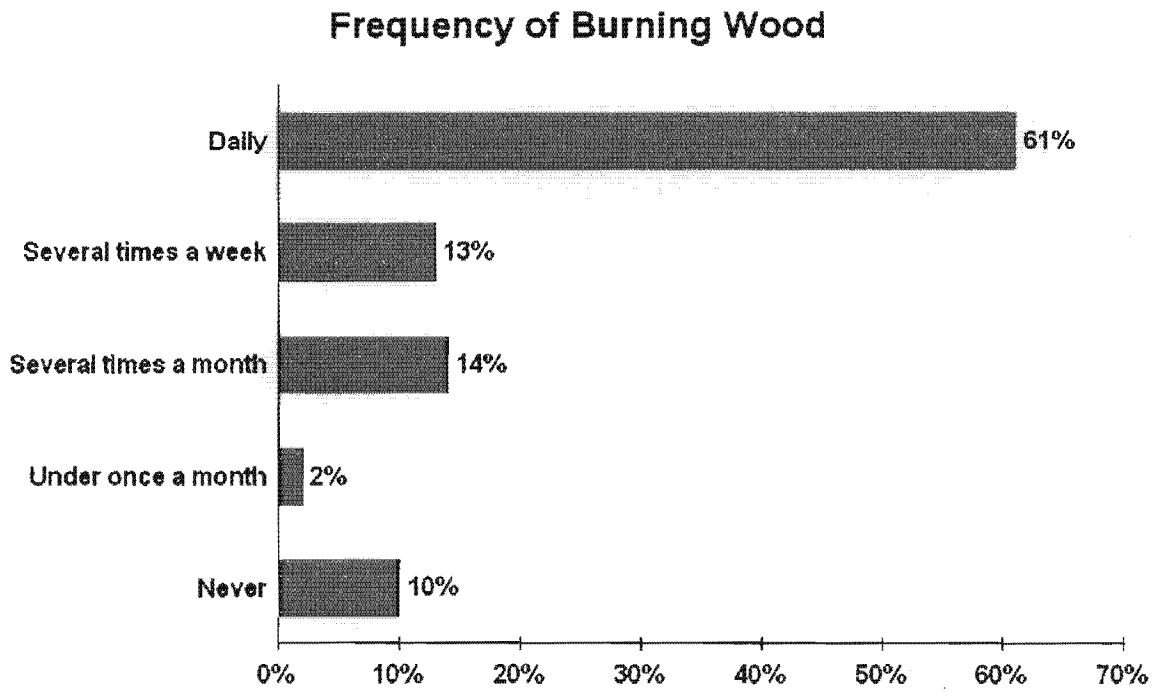


Demographic Differences

Males are more likely than females to say their wood stove is *not* EPA certified.

FREQUENCY OF BURNING WOOD (Q8)

Of those with a wood stove, fireplace with insert, or open fireplace (n=152), 61% burn wood daily in the winter months. 13% burn several times a week, 14% burn several times a month, and 2% burn less often than once a month. 10% never burn wood in these devices.

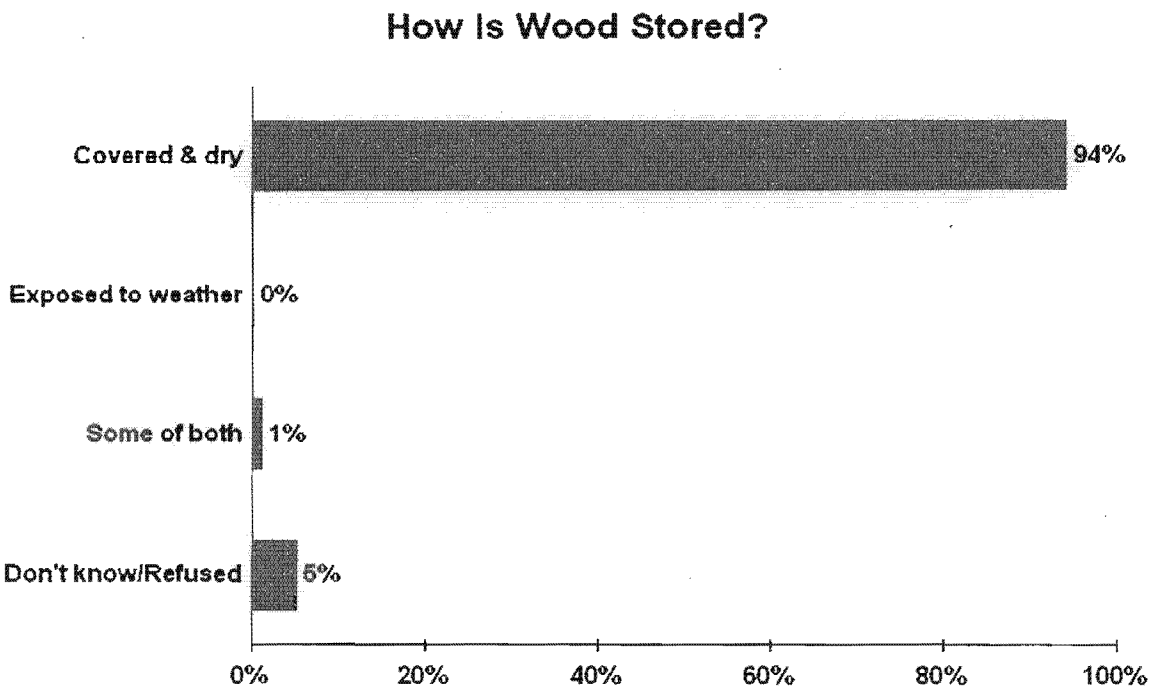


Demographic Differences

Seniors are more likely than others to *never* burn wood in these devices.

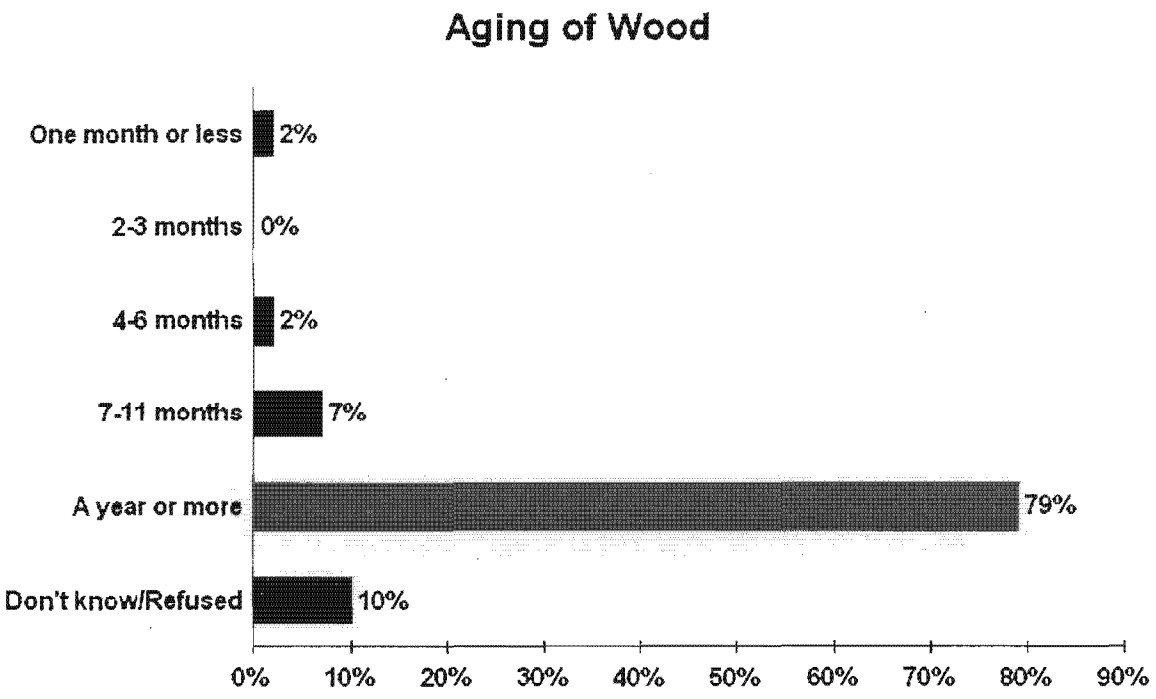
HOW IS WOOD STORED? (Q11)

The vast majority of wood (94%) is stored covered and dry.



AGING OF WOOD (Q12)

79% of those burning wood use wood that has aged for a year or more. 7% use wood that has aged for seven to eleven months. 4% use wood that has aged for six months or less. 10% are unsure how long their wood has aged when they burn it.

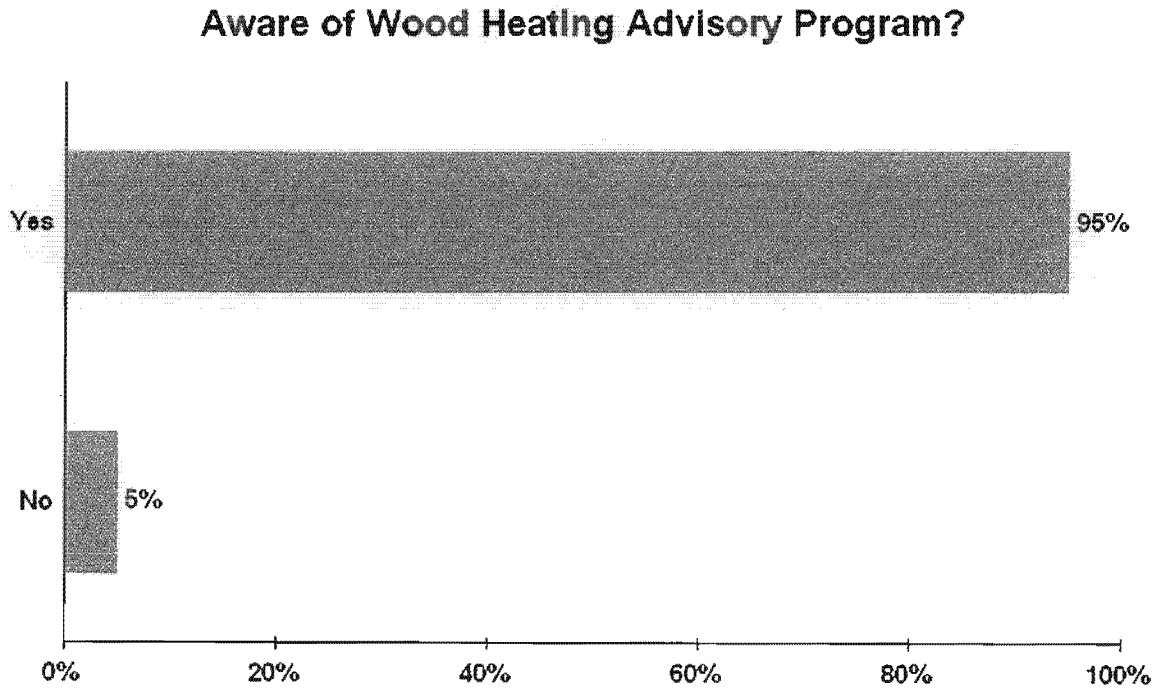


SOURCES OF HEAT (Q13)

For 30% of those who burn wood (not including pellets), their wood-burning device is the only heat source for their residence. 70% have an alternate source of heat.

AWARENESS OF WOOD HEATING ADVISORY PROGRAM (Q14)

95% of Oakridge residents are aware of the Home Wood Heating Advisory Program with its red, yellow, and green advisory system. 5% are unaware of the program.



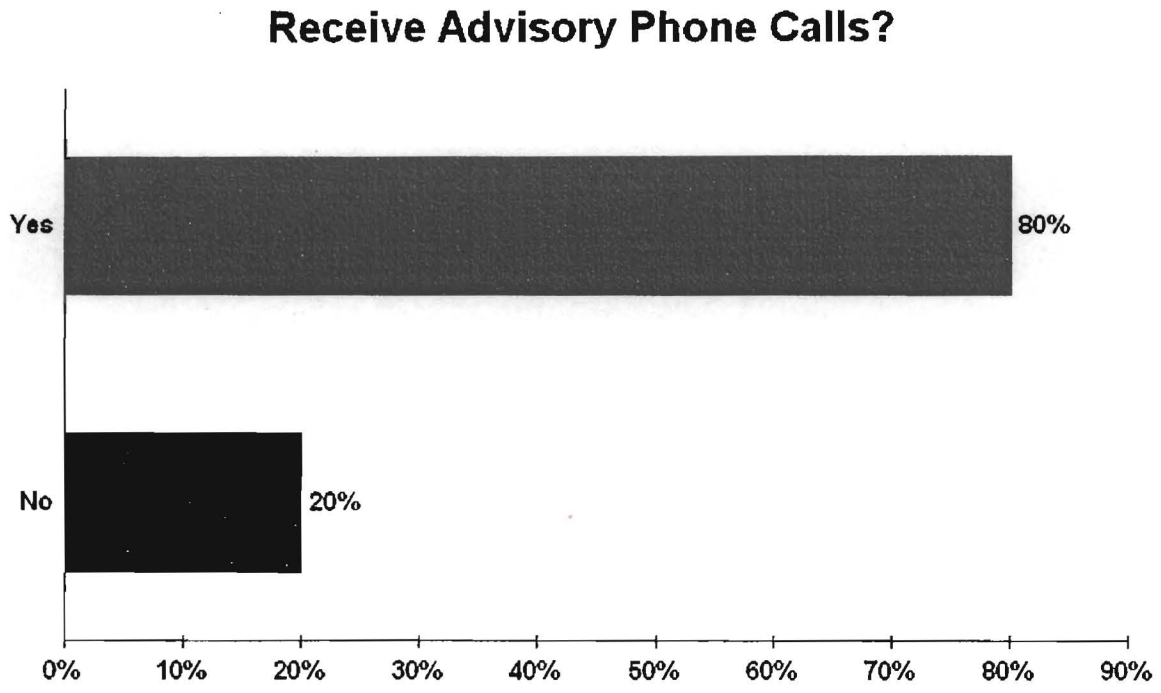
Demographic Differences

Those living in the area for five years or less are more likely than others to be unaware of the program. Those with a wood stove or fireplace with insert are more likely than others to be aware of the program.

ADVISORY PHONE CALLS (Q15, Q16)

80% of Oakridge residents receive occasional phone calls notifying them of whether or not they should burn wood based on air quality in their community. 20% do not receive such phone calls.

Of those not receiving calls (n=59), 63% don't know why; they have never been called. 10% say they don't know why; the calls just stopped. 22% asked to be removed from the list.



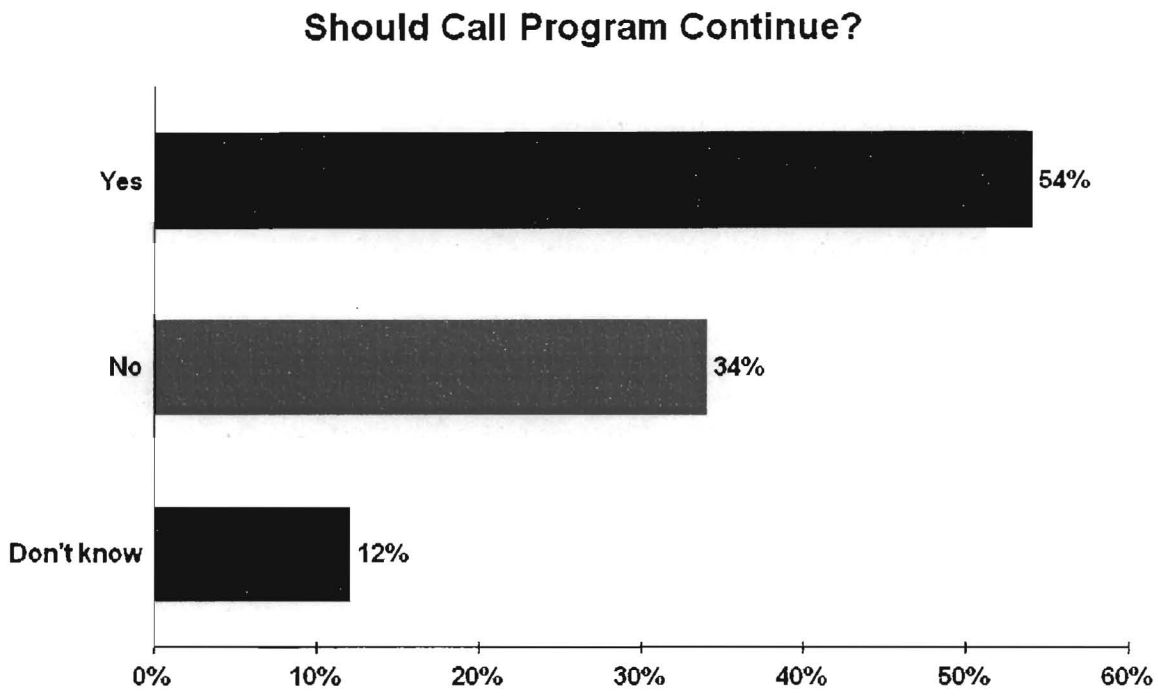
Demographic Differences

Residents of over five years, and those with wood stoves are more likely than others to receive advisory phone calls.

SHOULD THE CALL PROGRAM CONTINUE? (Q18)

54% of Oakridge residents feel that the notification call program is a useful program that should continue. 34% do not feel it should continue. 12% are unsure.

Those who do not feel the program is useful (n=138) gave the following reasons: "We don't burn wood" (25%), "the timing or frequency of the calls is poor or annoying" (22%), "the calls are ineffective; some have to burn to keep warm" (17%), "it's a waste of money" (11%), "the information is on other media" (8%), and "it is obvious when we shouldn't burn" (8%). (For responses less than 8%, see Table 19. For verbatim comments, see Table 19V.)



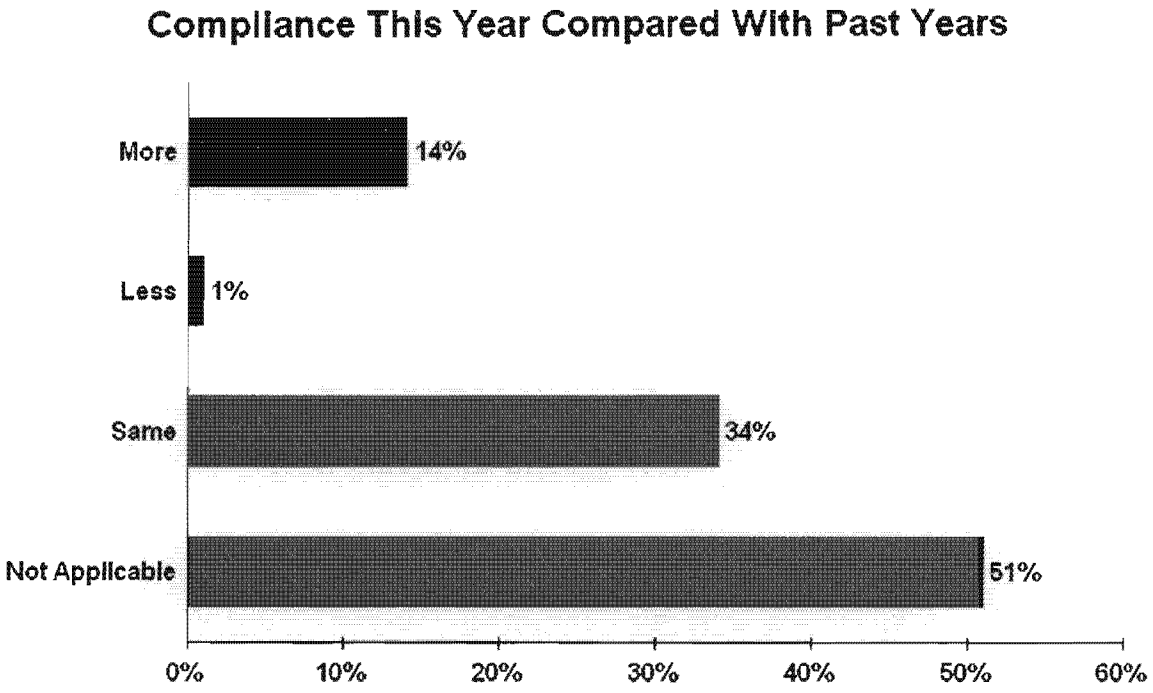
Demographic Differences

35 to 44 year-olds and mobile home dwellers are more likely than others to feel the program should continue. 55 to 64 year-olds and those earning $15,000 to $24,999 are more likely than others to feel the program should *not* continue. 45 to 54 year-olds and those living outside city limits are more likely than others to say "don't know."

Those with no Internet at home are more likely than others to say "we don't burn wood." Those with Internet at home are more likely than others to say "it is ineffective; some have to burn to keep warm," and "it is obvious when we shouldn't burn." Those with wood stoves are more likely than others to say "it is a waste of money." Females are more likely than males to say "it is on other media."

FOLLOWING THE ADVISORY (Q20)

Of those who receive advisory calls (n=241), 14% said that this year they followed the wood burning advisory more often than in past years. 1% said they followed the advisory less often than in past years. 34% reported no change in following the advisory. 51% said "not applicable;" they either didn't live in the area in past years, they didn't burn wood then, or they don't burn wood now.

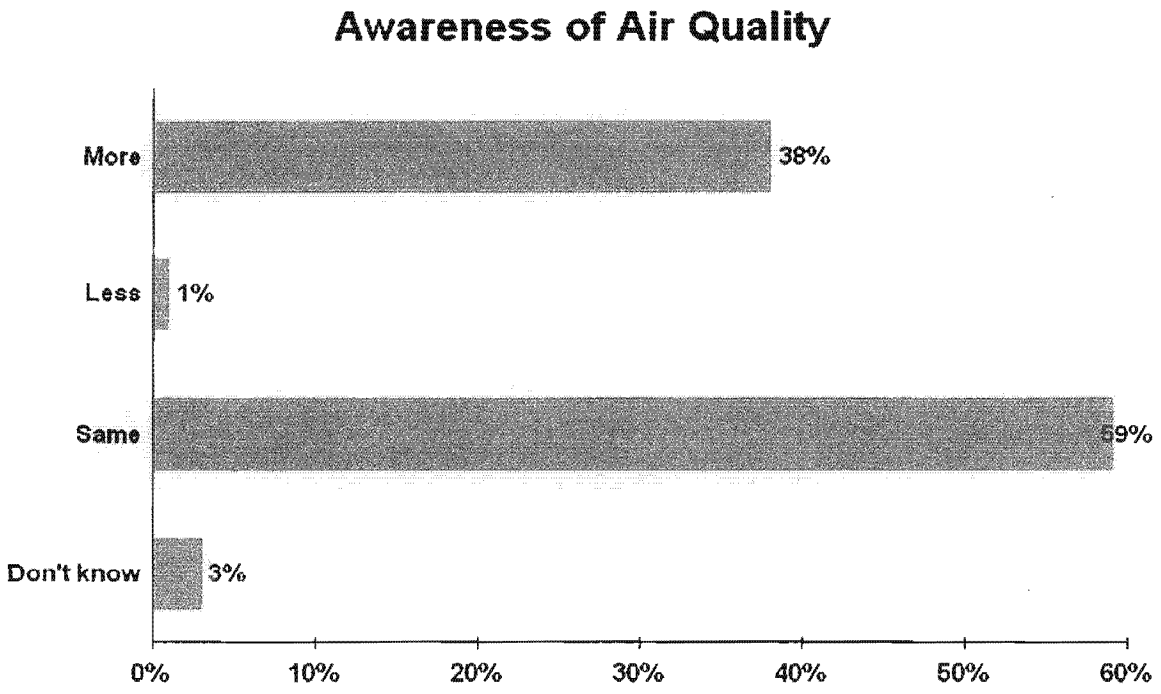


Demographic Differences

Those earning over $35,000, and those with wood stoves are more likely than others to say they are following the advisory more often than in past years. Those living in the area five years or less, those earning $15,000 to $24,999, those living inside city limits, renters, and those with no wood-burning devices are more likely than others to say "not applicable."

AWARENESS OF AIR QUALITY (Q21)

Of those who receive advisory calls (n=241), 38% feel that the telephone advisory program has made them more aware of air quality in Oakridge. 1% feel that they are less aware of air quality. 59% feel there is no difference in their awareness. 3% are unsure.



Demographic Differences

45 to 54 year-olds are more likely than others to feel they are more aware of air quality due to the telephone advisory program. Those 55 and over, and home owners are more likely than others to say there is no difference in their level of awareness.

INTERNET ACCESS AT HOME (Q22)

36% of Oakridge residents have Internet access at home; 64% do not.

Demographic Differences

35 to 54 year-olds and those earning over $35,000 are more likely than others to have Internet access at home. Seniors and those earning under $15,000 are less likely than others to have Internet access at home.

CONTACT BY E-MAIL (Q23)

Of those with Internet access at home (n=108), 14% would want LRAPA to contact them by e-mail to tell them about programs. 86% would not want such contact.

Demographic Differences

Those living in the area five year or less are more likely than others to want LRAPA to contact them by e-mail to tell them about programs.