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**DEPARTMENT OF ENVIRONMENTAL QUALITY** **www.deq.idaho.gov**

# 2008 Air Quality Monitoring Data Summary

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The 2008 Air Quality Monitoring Data Summary is available for viewing or downloading on the internet at:

**http://www.deq.state.id.us/air/**

Links to additional documents for download are also available at the Web site.

# Introduction

This annual report is issued by the Idaho Department of Environmental Quality (DEQ) to inform the public of air quality throughout Idaho. The purpose of this report is to summarize regional ambient air quality while presenting air monitoring results for six criteria air pollutants. The U.S. Environmental Protection Agency (EPA) sets national ambient air quality standards (NAAQS) for these pollutants. These criteria air pollutants are:

- Particulate Matter ($PM_{10}$ ≤10 micrometers, $PM_{2.5}$ ≤ 2.5 micrometers in diameter)
- Carbon Monoxide
- Sulfur Dioxide
- Nitrogen Dioxide
- Ozone
- Lead

In Idaho, monitoring for the criteria pollutants occurs primarily in areas of high population where the potential for human exposure is greatest. Particulate matter is currently the most common criteria pollutant of concern in Idaho because particulate sources are widespread throughout the state. Common sources include windblown dust, re-entrained road dust, smoke (residential, agricultural, and forest fires), industrial emissions, and motor vehicle emissions.

The $PM_{10}$ standard has been in effect since 1987 and historically has been the particulate size of concern. However, $PM_{2.5}$, or fine particulate matter, has been monitored in Idaho since 1998 and has become a pollutant of concern. Numerous studies have associated fine particulate matter with a variety of respiratory and cardiovascular problems, ranging from aggravated asthma, to irregular heartbeats, heart attacks, and early death in people with heart or lung disease. The $PM_{2.5}$ and $PM_{10}$ NAAQS were revised by EPA effective December 17, 2006. Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual $PM_{10}$ standard of 50 $\mu g/m^3$ while retaining the short-term 24-hr standard of 150 $\mu g/m^3$. The 24 hour standard for $PM_{2.5}$ was lowered from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ to provide increased protection against health effects associated with short-term exposure (including premature mortality and increased hospital admissions and emergency room visits).

Another historical pollutant of concern in Idaho is carbon monoxide (CO). The primary source of CO is incomplete fossil fuel combustion. CO concentrations have the potential to be high in the urbanized areas where automobile traffic is heavy and cars frequently idle at stoplights. The Boise area (Northern Ada County) was the only CO nonattainment area in the state. When the State Implementation Plan (SIP) and Maintenance Plan were accepted by EPA December 27, 2002, it was reclassified as a maintenance area. No violations of the 1- or 8-hour CO NAAQS have occurred since 1991.

Sulfur dioxide ($SO_2$) and nitrogen dioxide ($NO_2$) sources are few and localized because these pollutants come primarily from large industrial sources (transportation sources also contribute to $NO_2$). There is little heavy industry in Idaho and elevated $SO_2$ and $NO_2$ concentrations in ambient air are typically not found. However, due to potential concerns of some localized sources, DEQ has monitored for one or both of these pollutants in Boise, Pocatello, Moyie Springs, Mountain Home, Coeur d'Alene and Soda Springs. In the past 10 years of targeted monitoring, DEQ has not measured significant concentrations of these pollutants at these monitoring sites.

The fifth criteria pollutant monitored by DEQ is ozone. Ozone ($O_3$) has been monitored in the Treasure Valley since 2002 and in Coeur d'Alene since 2005. Ozone is created when combustion by-products (volatile organic compounds, VOC) near the ground react with nitrogen oxides and other compounds to create photochemical smog. These reactions are stimulated on days of intense sunlight and warm temperatures. Ozone has become a pollutant of concern since many summertime days are classified as moderate for ozone on the Air Quality Index (AQI). EPA lowered the 8-hour ozone standard May 27, 2008 from 0.08 ppm to 0.075 ppm. This new standard poses a greater risk of non-attainment for all airsheds, but particularly the Treasure Valley airshed. EPA recently announced it is reconsidering the ozone standard and is expected to release new proposed NAAQS ozone standards in December 2009. Final decision on any changes to the ozone standard is expected by August 2010.

Lead (Pb) is the sixth criteria pollutant and is not currently being monitored by DEQ. Lead (Pb) was monitored in the Shoshone County town of Kellogg, near the Bunker Hill superfund site, because lead was a by-product of the smelting process that occurred in the area for decades. Although a significant problem in the 1970s and early 1980s, airborne Pb concentrations at this monitoring site were very low through the 1990s. DEQ discontinued monitoring for lead in 2002. EPA recently reviewed the lead NAAQS and on November 12, 2008 and lowered the standard significantly to 0.15 ug/$m^3$. The new standard provides different monitoring requirements based on whether there are sources that emit significant volumes of lead. Source-oriented monitoring is required for states that have sources of lead that emit or have the potential to emit more than 1.0 tons per year (tpy). Non-source oriented monitoring is required for urban areas greater than 500,000 population. The monitoring provisions of the 2008 Pb NAAQS revision are currently under reconsideration by EPA (final decision due April 2010). It is possible that the source emissions threshold triggering near-source monitoring will be lowered to 0.5 tpy and that the population oriented requirements will be at the NCore multi-pollutant monitoring stations. If so, DEQ will be required to initiate Pb monitoring at the NCore site in Meridian by January 1, 2011.

DEQ monitored for toxic air pollutants in the Treasure Valley from 2003 to the beginning of 2005 to determine if concentrations are at levels that could have adverse health affects. The Community Air Toxics project also measured toxic air pollutants in 2007. These health effects include, but are not limited to, increased cancer risk and respiratory, cardiovascular, and neurological effects. While DEQ has discontinued air toxics monitoring, the data proved valuable toward reconciling EPA's National Air Toxics Assessment (NATA) program to verify prediction models. The NATA models predict cancer and non-cancer risk values across Idaho's airsheds using emissions estimates of certain air toxic compounds. The data has also been crucial for DEQ's development of air toxics models. As resources become available Idaho may resume air toxic monitoring in the future.

While Idaho generally enjoys good air quality, in many ways our airsheds are faced with new challenges. Some of these challenges are related to long-term economic and population growth, particularly in terms of vehicles on roadways and growth in new construction. Each day, DEQ measures the concentration of certain air pollutants throughout the state. DEQ may issue local burn restrictions when concentrations of these air pollutants reach or exceed the health-based standards or limits established by local ordinance, state law or regulation. Concerned citizens may tune in to the news on

their local radio or television station to find out if a burn ban has been issued, or access DEQ's Internet web site at www.deq.state.id.us/air/index.cfm. DEQ issues a news bulletin to local news media, law enforcement, and fire officials each time a burn ban is imposed. Each year there are a number of voluntary and sometimes mandatory bans issued due to deteriorated local air quality conditions.

Real-time air monitoring data are available on the Internet at www.tcsn.net/family/Idaho/index.html. We encourage you to visit our Web site at http://www.deq.state.id.us/ to find more extensive air quality data, educational materials, and discussions of current topics.

We are expanding and refining our Internet site to better serve the residents of Idaho. Improvements are expected to provide the public with better access to real-time monitoring data as well as re-organize publications and other information regarding air quality. We want your feedback on our air quality data and program. Please submit your comments via email to Bruce Louks; Monitoring, Modeling, & Emissions Inventory Manager, at Bruce.Louks@deq.idaho.gov or call at 208-373-0294.

## Air Quality Standards

The federal Clean Air Act (CAA) requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The standards are designed to primarily protect the general public, including sensitive populations such as asthmatics, children, and the elderly. They are also intended to safeguard public welfare by reducing effects such as decreased visibility and damage to animals, crops, vegetation, and buildings. EPA has established standards for six criteria pollutants. The list below contains seven pollutants, which include two size ranges of particulate matter.

The state of Idaho adheres to these standards. For more information, EPA air quality standards and supporting rationale are available at http://epa.gov/air/criteria.html.

### Table 1: Air Quality Standards for Criteria Pollutants

| Pollutant | Standard | Level |
|---|---|---|
| Ozone | The 3-year average of the 4th highest daily maximum rolling 8-hour average concentration cannot exceed the level measured at each monitor within an area over each year. The standard was lowered May 27, 2008 from 0.08 ppm and is currently under review and may change again | 0.075 ppm |
| Particulate Matter (10 micrometers) | The 3-year annual average of the weighted annual mean concentration at each monitor within an area must not exceed the level. Revoked December 17, 2006. | Revoked |
| | The 24-hour average cannot exceed the level more than once per year | 154 µg/m$^3$ |
| Particulate Matter (2.5 micrometers) | The 3-year annual average of the weighted annual mean concentrations cannot exceed the level. The standard was lowered December 17, 2006. | 15.4 µg/m$^3$ |
| | The 3-year average of the 98th percentile (based on the number of samples taken) of the daily concentrations must not exceed the level. The standard was lowered December 17, 2006 | 35.4 µg/m$^3$ |
| Carbon Monoxide | The 1-hour average cannot exceed the level more than once per year | 35.4 ppm |
| | The 8-hour average cannot exceed the level more than once per year | 9.4 ppm |
| Sulfur Dioxide | Annual arithmetic mean of 1-hour averages cannot exceed the level | 0.03 ppm |
| | 24-hour average cannot exceed the level more than once per year | 0.14 ppm |
| | The 3-hour average cannot exceed the level more than once per year | 0.50 ppm |
| Lead | The rolling three (3) month average (12 averages periods per year) cannot exceed the level. The standard was lowered November 12, 2008 | 0.15 µg/m$^3$ |
| Nitrogen Dioxide | The annual mean of 1-hour averages cannot exceed the level | 0.053 ppm |

Note: Daily concentration is the 24-hour average, measured from midnight to midnight.

In some instances, comparison of numbers in Table 1 with sources listed above may appear to be slightly off (for example, the carbon monoxide 8-hour standard 9.4 ppm listed in the table versus 9 ppm on the EPA Web site). These slight differences are due to a rounding convention adopted by EPA and the number of significant figures required for reporting. The numbers shown on the table above are those used to determine if an area is in compliance with the respective NAAQS, and are reflected in the graphs on the following pages.

The NAAQS for each pollutant may have different averaging periods (for example, hourly and 8-hour averages). These different forms of the standard are created and enforced to address varied health impacts that happen as a result of a shorter, high-level exposure versus longer, low-level exposures. These differences are addressed pollutant-by-pollutant in the following sections, and additional information is on the EPA Web site. A distinction exists between "exceeding" and "violating" a standard; the two are not equivalent. This distinction is due to the nature of the standards. In most instances it is allowable for an area to exceed the standard a few times to allow for possible unusual meteorological circumstances. For example, a carbon monoxide 8-hour average of 15 ppm clearly exceeds the standard; however, it does not violate the standard if it is the only exceedance that year (the standard allows for one exceedance).

The EPA standards typically apply to an 'area', which may be defined in different ways. Data are often presented for individual monitoring stations in the following sections because this provides more insight into regional differences in Idaho's ambient air quality. The summaries that follow show how Idaho's airsheds compared to the standards discussed above for the year 2008 and in many instances also incorporate the AQI and other measures of air quality where appropriate. The AQI color code shading is shown to aid interpretation of air quality, but does not imply whether or not standards were actually met for each pollutant. An airshed must satisfy the conditions in the above table to ensure compliance with the NAAQS.

# Monitoring Network

The Idaho monitoring network is a composite of meteorological and pollutant-specific monitoring equipment. DEQ operates most of the monitors while several tribes operate monitors on tribal lands. Data from the network are typically sent directly to engineers and scientists through a telemetry network.

Table 2 on the next page presents a summary of the monitoring stations used and parameters monitored during 2008. Some parameters were monitored for only part of the year.

Figure 1 below shows a map of monitoring stations that were active in 2008. Monitoring stations are mainly located in high population areas; however, DEQ does monitor air quality in some rural areas. Some sites are selected to focus on the emissions of a single pollutant or group of sources (for example, near a high traffic volume or residential wood burning area). Monitor siting and monitoring objectives are discussed in the pollutant-specific sections of this report.

Criteria pollutants are measured using methods approved by EPA to assess Idaho's compliance with National Ambient Air Quality Standards (NAAQS). In addition, some pollutants of particular interest are measured using more than one method. These additional methods help engineers and scientists to better understand the presence and behavior of these pollutants. Table 3 lists the methods used for the various pollutants. It is noteworthy that the tapered element oscillating microbalance (TEOM) method (for particulate matter) is a continuous monitoring method. A TEOM measures mass concentrations at pre-set time intervals (e.g. hourly). The TEOM can also be accessed through telemetry for instantaneous PM concentrations. TEOMs enable real-time data interpretation and are discussed further in the particulate matter section of this report. Additional information on measurement methods is available at EPA's Web site: http://www.epa.gov/ttn/amtic/.

In addition to the criteria air pollutants described in this report, air toxics were monitored for two years at a Nampa site from 2003 to 2005 and at five other sites in 2007. If resources become available DEQ may resume air toxics monitoring some time in the future. For details on air toxics and chemical toxicity, visit the EPA web site at www.epa.gov/ttn/atw/index.html.

## Particulate Monitoring

Coarse particulate ($PM_{10}$) and fine particulate ($PM_{2.5}$) are measured using a variety of methods in Idaho. EPA considers the federal reference method (FRM) to be the most accurate way to determine $PM_{10}$ and $PM_{2.5}$ concentrations. This method involves pulling in air (at a given flow rate) and trapping particles of a certain size ($PM_{10}$ or $PM_{2.5}$) on a pre-weighed filter. The filter is then weighed again and the resulting mass is divided by volume of air sampled (determined from flow rate and amount of time) to provide concentration. Particles on the filter can be later chemically analyzed for more information about the sources of particulate matter. Unfortunately, the FRM does not provide continuous or timely information. EPA considers the TEOM continuous method equivalent to the FRM (Federal Equivalent Method, or FEM) for $PM_{10}$. DEQ uses a specific variation of the TEOM, TEOM-FDMS, at the Pinehurst monitoring site. This variation is considered an equivalent method for $PM_{2.5}$ but others are not. DEQ uses the TEOM continuous method to provide more time-resolved data (i.e. hourly averages).

## Table 2: Monitoring Network for 2008

| Name | Location | $PM_{10}$ FRM | $PM_{10}$ TEOM | $PM_{2.5}$ FRM | $PM_{2.5}$ TEOM | $O_3$ | $SO_2$ | $NO_x$ | CO | Met | $PM_{2.5}$ CSM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Boise | Boise, various locations | | ● | ● | ● | ● | | | ● | ● | |
| Coeur d'Alene | 930 N 15th , Lakes Middle School | | | | ● | | | | | | |
| Franklin | Franklin, Idaho | | | ● | | | | | | | |
| Grangeville | USFS Compound, East Grangeville | | | | ● | | | | | ● | |
| Idaho Falls | North Holms & Pop Kroll, Idaho Falls | | | | ● | | | | | | |
| Lancaster | Lancaster Road near Coeur d'Alene | | | | | ● | | ● | | ● | |
| Lewiston | Sunset Park, Lewiston | | | | ● | | | | | ● | |
| McCall | 500 North Mission, McCall | | | | ● | | | | | | |
| Meridian | St. Luke's | | | | ● | ● | | | | ● | ● |
| Moscow | 1025 Plant Sciences Road | | | | ● | | | | | ● | |
| Nampa | Nampa, various locations | | ● | ● | ● | | | | | | |
| P4/Monsanto | Soda Springs | | | | | | ● | | | | |
| Pinehurst | 106 Church Street, Pinehurst | | ● | ● | ● | | | | | ● | |
| Pocatello | Pocatello, various locations | ● | ● | | ● | | ● | | | ● | |
| Salmon | Salmon, various locations | | | ● | ● | | | | | ● | |
| Sandpoint | Sandpoint, various locations | | ● | | ● | | | | | ● | |
| St. Maries | St. Maries | | | ● | ● | | | | | | |
| Twin Falls | Smith's Food Store, Twin Falls | | | | ● | | | | | | |
| Wendell | Wendell, Gooding County | | | | | | | | | ● | |

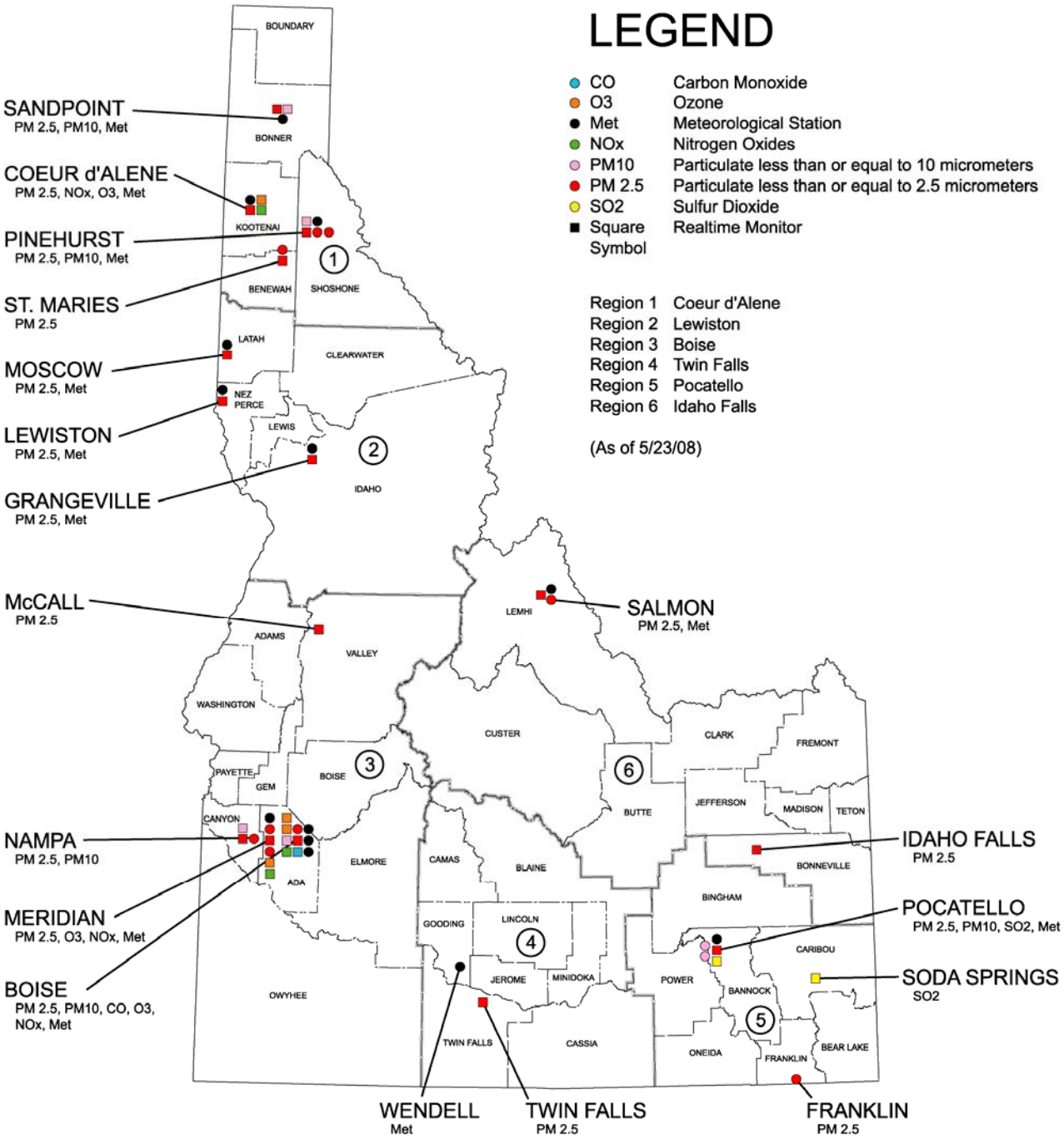
Notes:

| | | | |
|---|---|---|---|
| $PM_{10}$ FRM | Particulate Matter 10 micrometers (Federal Reference Method - FRM) | $PM_{10}$ TEOM | Particulate Matter 10 micrometers (TEOM continuous) (Federal Equivalent Method – FEM) |
| $PM_{2.5}$ FRM | Particulate Matter 2.5 micrometers (Federal Reference Monitor - FRM) | $PM_{2.5}$ TEOM | Particulate Matter 2.5 micrometers (TEOM continuous) |
| $O_3$ | Ozone (Seasonal - May through September) | $SO_2$ | Sulfur Dioxide |
| $NO_x$ | Nitrogen Oxide (Seasonal – May through September) | CO | Carbon Monoxide |
| Met | Meteorological Measurements, various | $PM_{2.5}$ CSM | Chemical Speciation Monitor |
| ● | Wendell Met tower was shut down in 2008 and moved to a new site in Kimberly. The Kimberly site will be noted on the 2009 Data summary report. | | |

## Table 3: Monitoring Methods Used in 2008 in Idaho

| Pollutant Code | Measurement | Method | Units |
|---|---|---|---|
| CO | Carbon Monoxide | Gas Nondispersive Infrared Radiation | Parts per Million |
| $NO_x$ | Nitrogen Oxides ($NO_x$) | Chemiluminescence | Parts per Million |
| $O_3$ | Ozone | UV Absorption | Parts per Million |
| $PM_{10}$ FRM | $PM_{10}$ Reference | Reference - Hi Vol Andersen/ GMW 1200 | Micrograms per Cubic Meter |
| $PM_{10}$ TEOM | $PM_{10}$ TEOM | R&P Mass Transducer | Micrograms per Cubic Meter |
| $PM_{2.5}$ FRM | $PM_{2.5}$ Reference | Reference—R&P Partisol 2025 | Micrograms per Cubic Meter |
| $PM_{2.5}$ TEOM | $PM_{2.5}$ TEOM | R&P Mass Transducer | Micrograms per Cubic Meter |
| $SO_2$ | Sulfur Dioxide | UV Fluorescence | Parts per Million |

Figure 1 – 2008 Idaho Ambient Air Monitoring Network



# Monitoring Results

## Ozone

Ozone is typically a summertime air pollution problem which primarily forms when pollutants from internal combustion engines and industrial sources (paints, solvents, gas vapors) react with sunlight. These pollutants are called ozone precursors and include VOCs and $NO_X$. Ozone can also be directly emitted by pollutant sources. Levels of ozone are usually highest in the afternoon because of the intense sunlight, warm temperatures, and the time required for ozone to form. These levels are highly affected by weather. DEQ monitored ozone from May through September in 2008, as this is the time period specified by EPA requirements and the most likely time that high ozone levels will be observed.

Ozone is considered beneficial in the upper atmosphere because it helps to protect the earth from the sun's rays; however, ozone formed at ground level is unhealthy. Elevated concentrations of ground-level ozone can cause reduced lung function, respiratory irritation, and can aggravate asthma. Ozone has also been linked to immune system effects (www.epa.gov/ttn/oarpg/naaqsfin/o3health.html). The damage ozone causes to the lungs typically heals within a few days, but repeated or prolonged exposure may cause permanent damage. People with respiratory conditions should limit outdoor exertion if ozone levels are high. Even healthy individuals may experience respiratory symptoms on a high-ozone day. Ground-level ozone can also damage agricultural crops and forests, interfering with their ability to photosynthesize and grow.

Precursor chemicals that react with sunlight to produce ozone are generated primarily in large metropolitan areas. Because summers in Idaho are normally hot and dry, ozone levels typically begin to rise in the late morning and then peak in the late afternoon and early evening. This phenomenon follows very closely with the time of day that the sun is the highest in the sky and temperatures are the hottest.

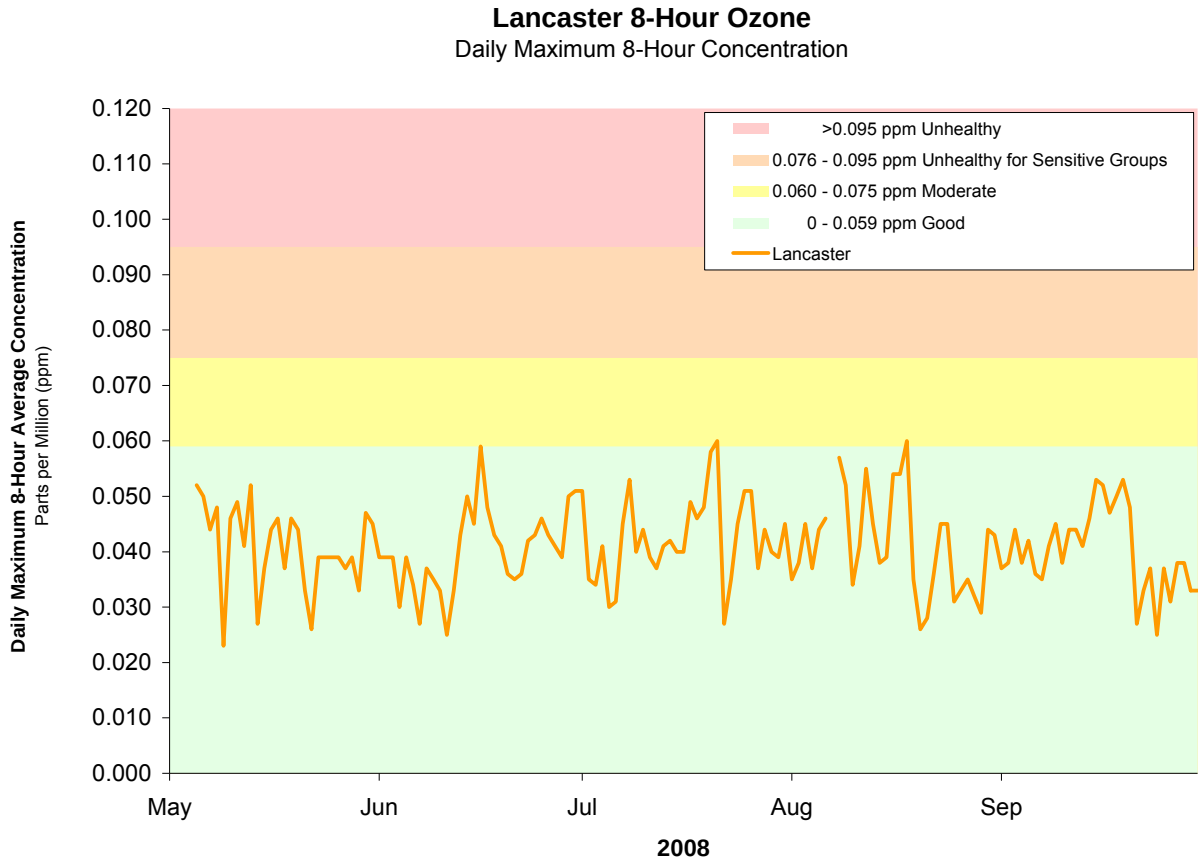
The ozone standard is defined such that the three highest ozone concentrations in any particular year can exceed the level of the standard while the area still maintains an "attainment" classification. However, if the three-year averages of the fourth-highest concentrations exceed the level of the standard the area is classified as "nonattainment." Starting in 2008, the three-year average (2006-2008) of the fourth-highest eight-hour concentration will violate the NAAQS if it exceeds 0.075 ppm (0.076 ppm or higher).

Since 2002 DEQ has monitored ozone at Whitney Elementary School (Boise), Middleton, Tilli Road (between Boise and Mountain Home), Lancaster Road (near Coeur d'Alene), Idaho Transportation Department (Boise), and St. Luke's (Meridian). Graphs presented in Figures 2 - 9 show trends in ozone levels at the monitoring stations in operation during 2008. For each station, the first graph presents daily maximum eight (8) hour average data for the months of May through September. The shading on each graph corresponds to the AQI categories. It should be noted that AQI categories of orange and above indicate NAAQS excursions. Breaks in the graphs are due to data being discarded as invalid. Invalidation of data occurs when an instrument is taken off-line for routine maintenance or there is some sort of malfunction. Only valid data is shown on the graphs. The second graph presents the 4 highest concentrations observed during the year. The "blue triangle" presents the rolling three (3) year average. The three year average of the 4$^{th}$ highest concentration is the value used to assess compliance with the NAAQS.

Figure 10 shows a summary of the ozone monitoring data against the previous and the new eight (8) hour federal standard. It shows that the state has remained at or below the previous ozone standard since monitoring began. It also shows that the Treasure Valley is very close to violating the new standard.

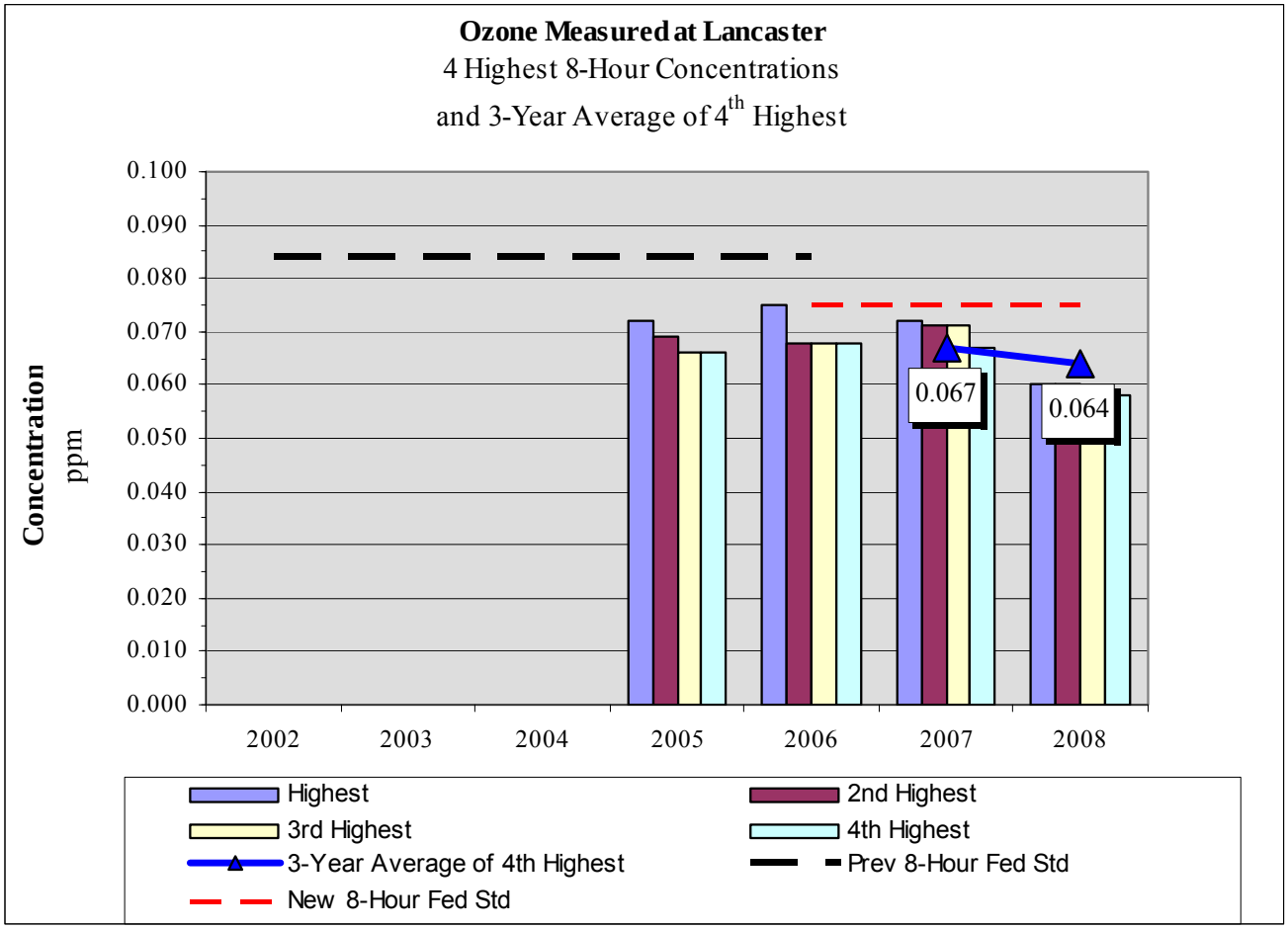
For additional information on ozone, visit www.epa.gov/air/ozonepollution/. There is also additional information on ozone in question/answer format in the definitions section of this document.

## Figure 2 – Lancaster Eight (8) Hour Ozone Maximum Concentration

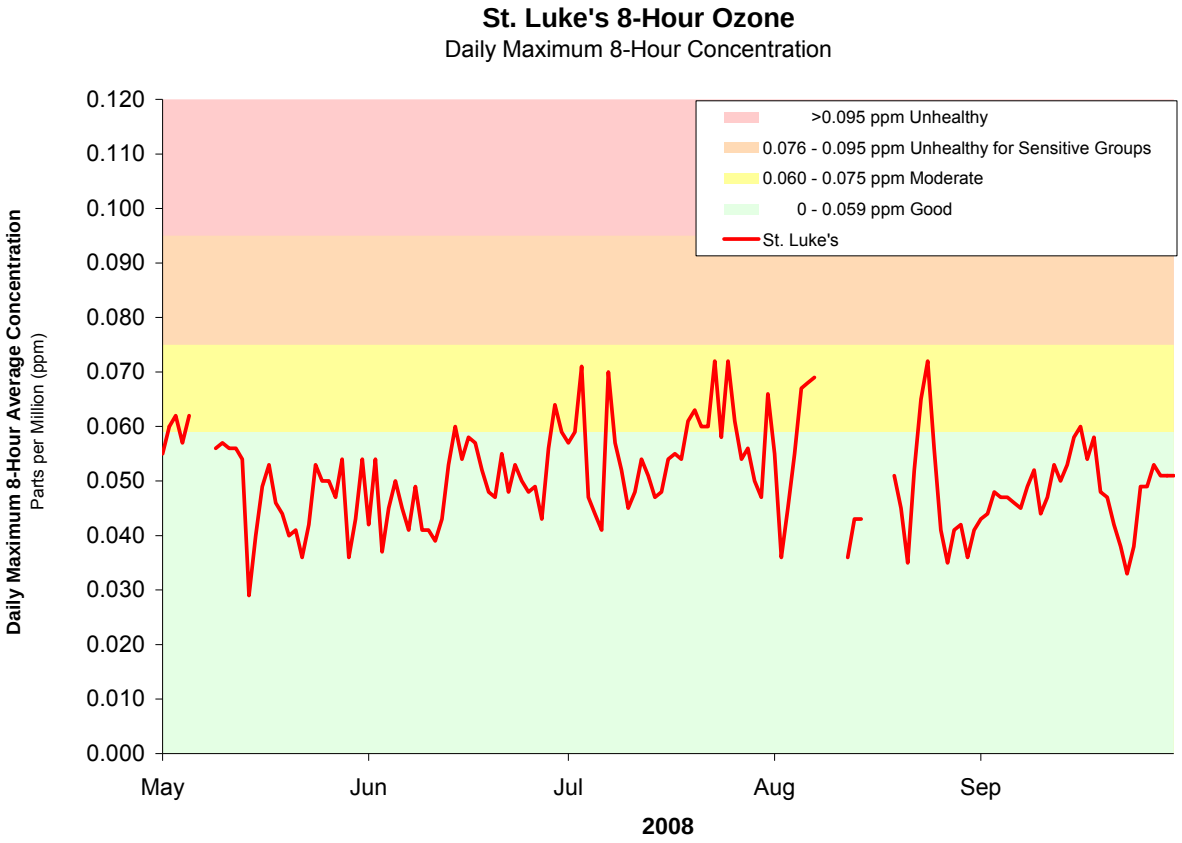



* Gaps in the charted data reflect times when valid data was not collected either due to instrument malfunction, quality assurance failure or equipment maintenance.

Figure 3 – Lancaster Highest Eight (8) Hour Ozone Concentrations and Three (3) year average of 4th highest concentration

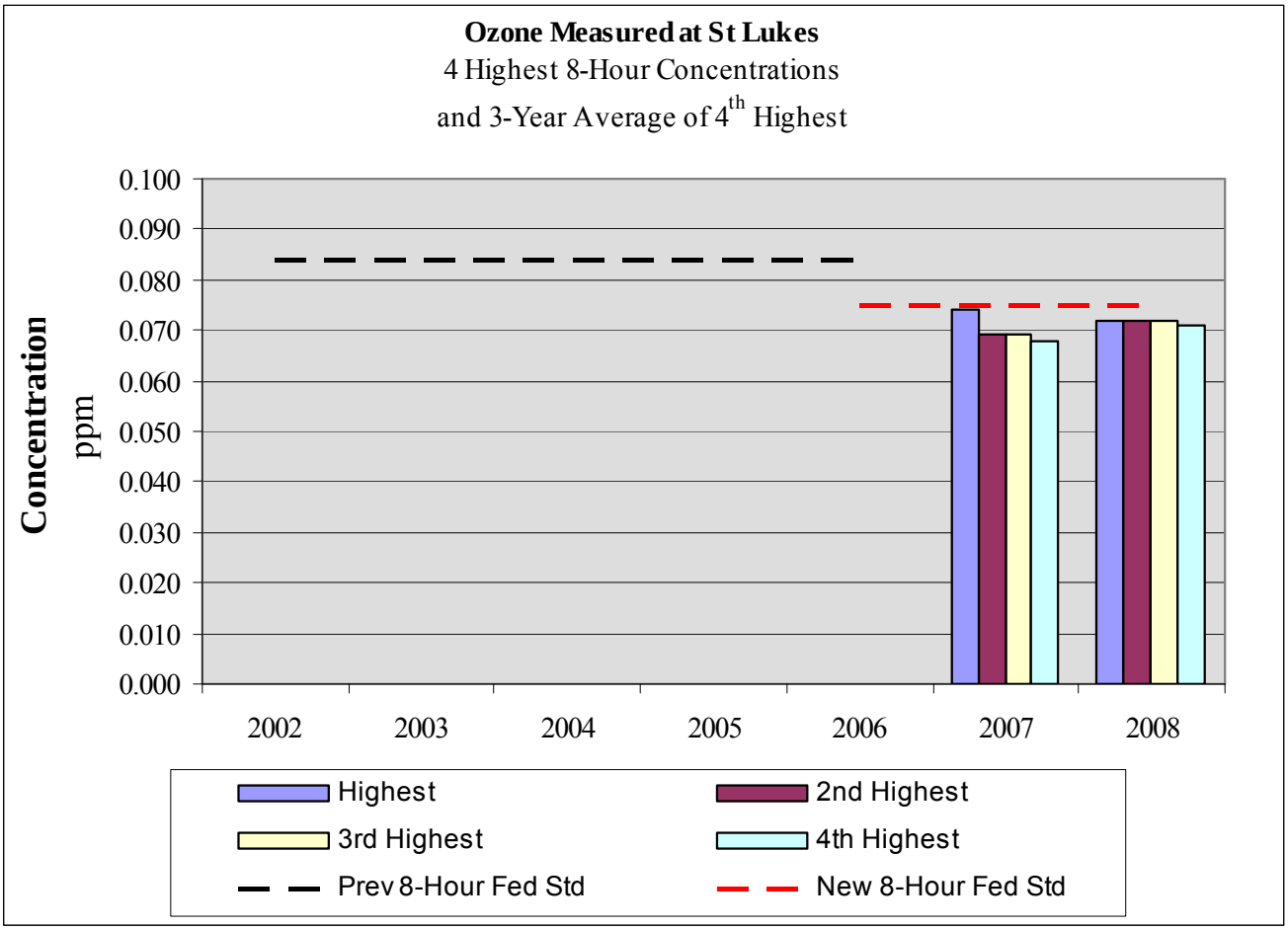


## Figure 4 – St. Luke's Eight (8) Hour Ozone Maximum Concentration



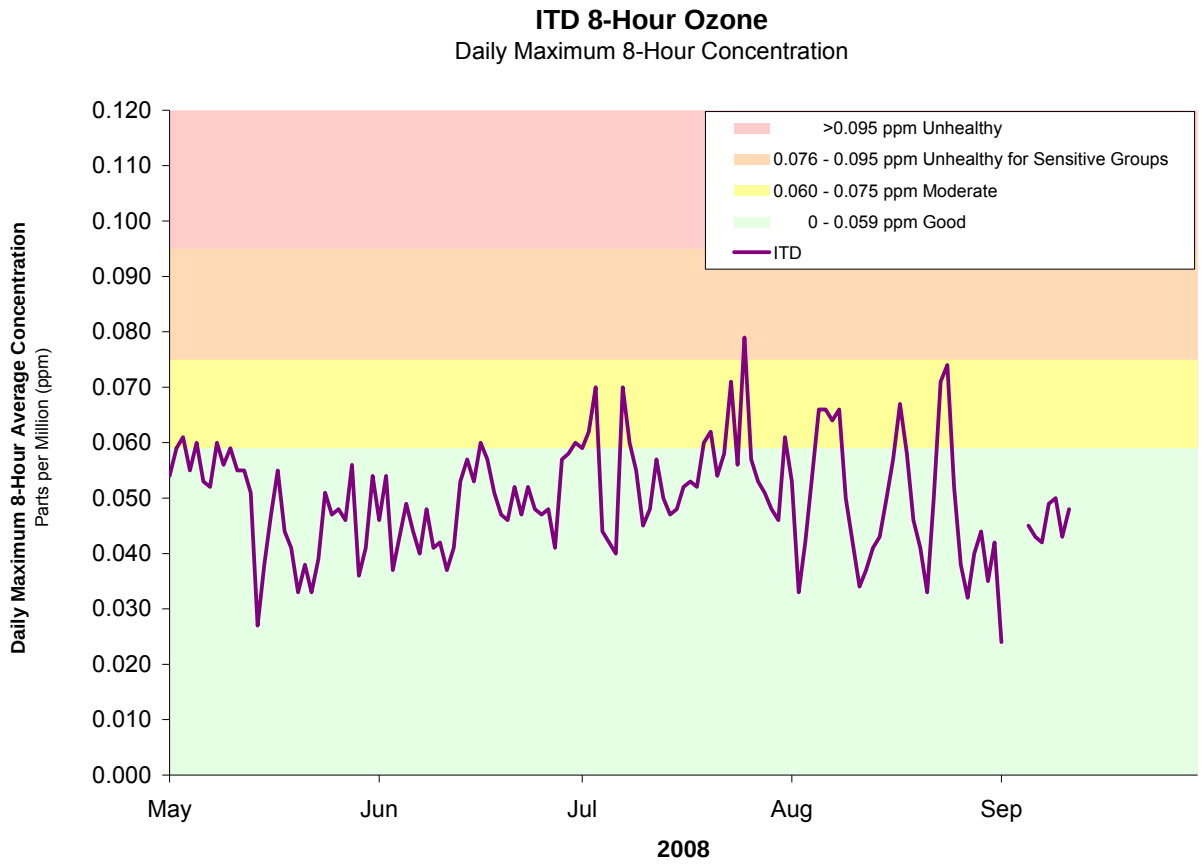

* Gaps in the charted data reflect times when valid data was not collected either due to instrument malfunction, quality assurance failure or equipment maintenance.

Figure 5 – St. Luke's Highest Eight (8) Hour Ozone Concentrations and Three (3) year average of 4th highest concentration




* Note – Three (3) year average is not available for St. Luke's

# Figure 6 – Idaho Transportation Department (ITD) Eight (8) Hour Ozone Maximum Concentration




* Gaps in the charted data reflect times when valid data was not collected either due to instrument malfunction, quality assurance failure or equipment maintenance.

Figure 7 – Idaho Transportation Department (ITD) Highest Eight (8) Hour Ozone Concentrations and Three (3) year average of 4th highest concentration

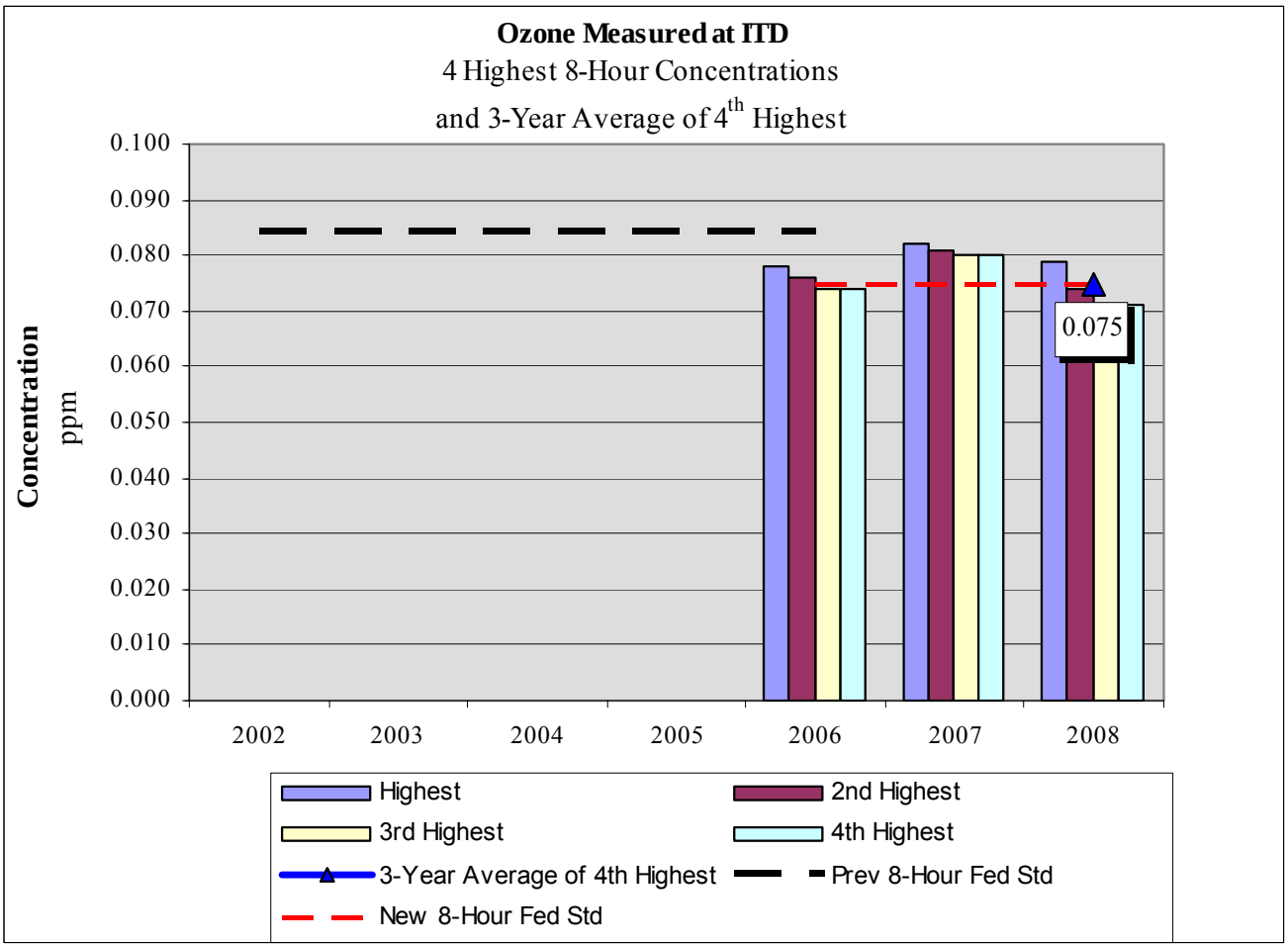


Figure 8 – Whitney Eight (8) Hour Ozone Maximum Concentration

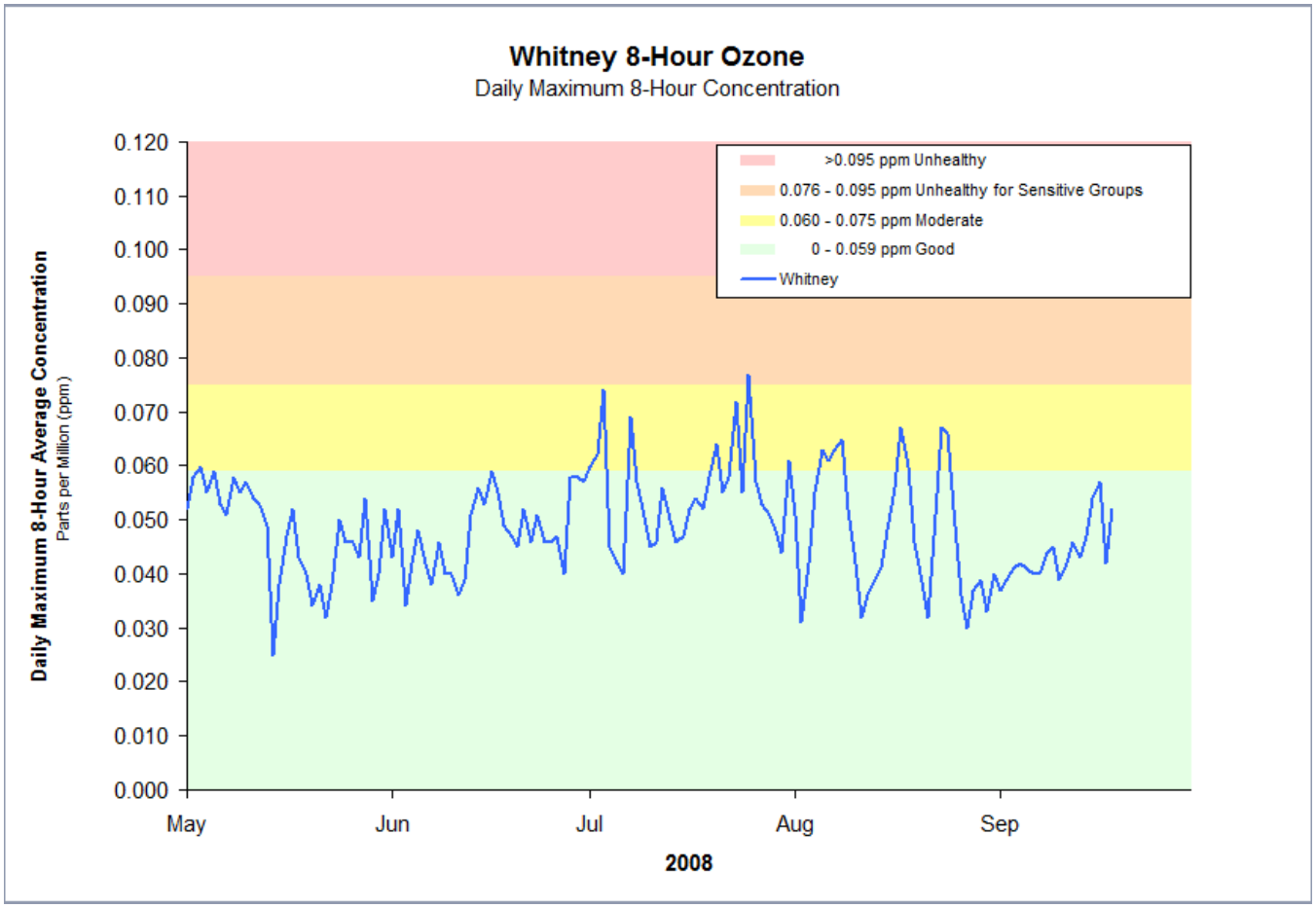
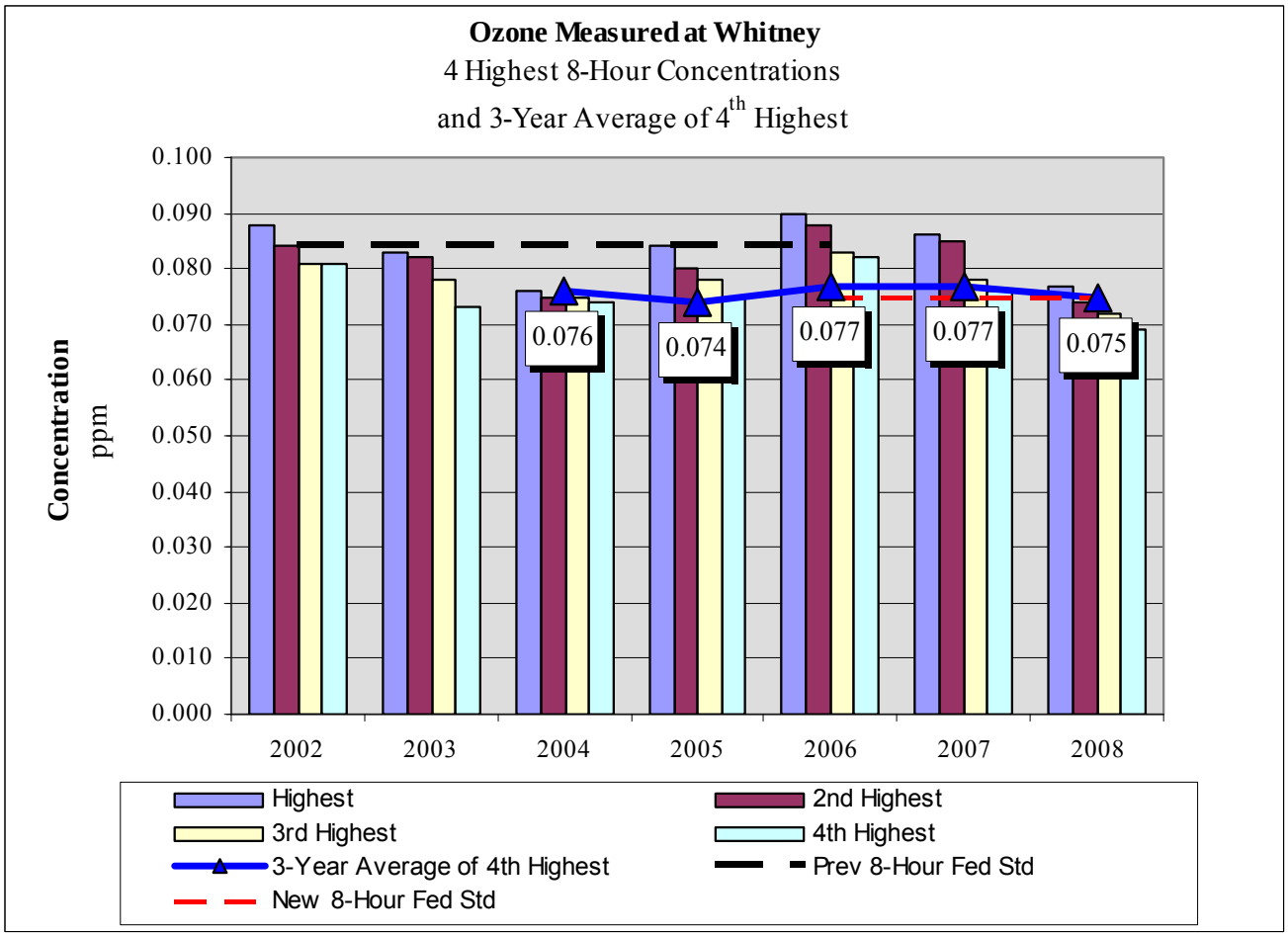
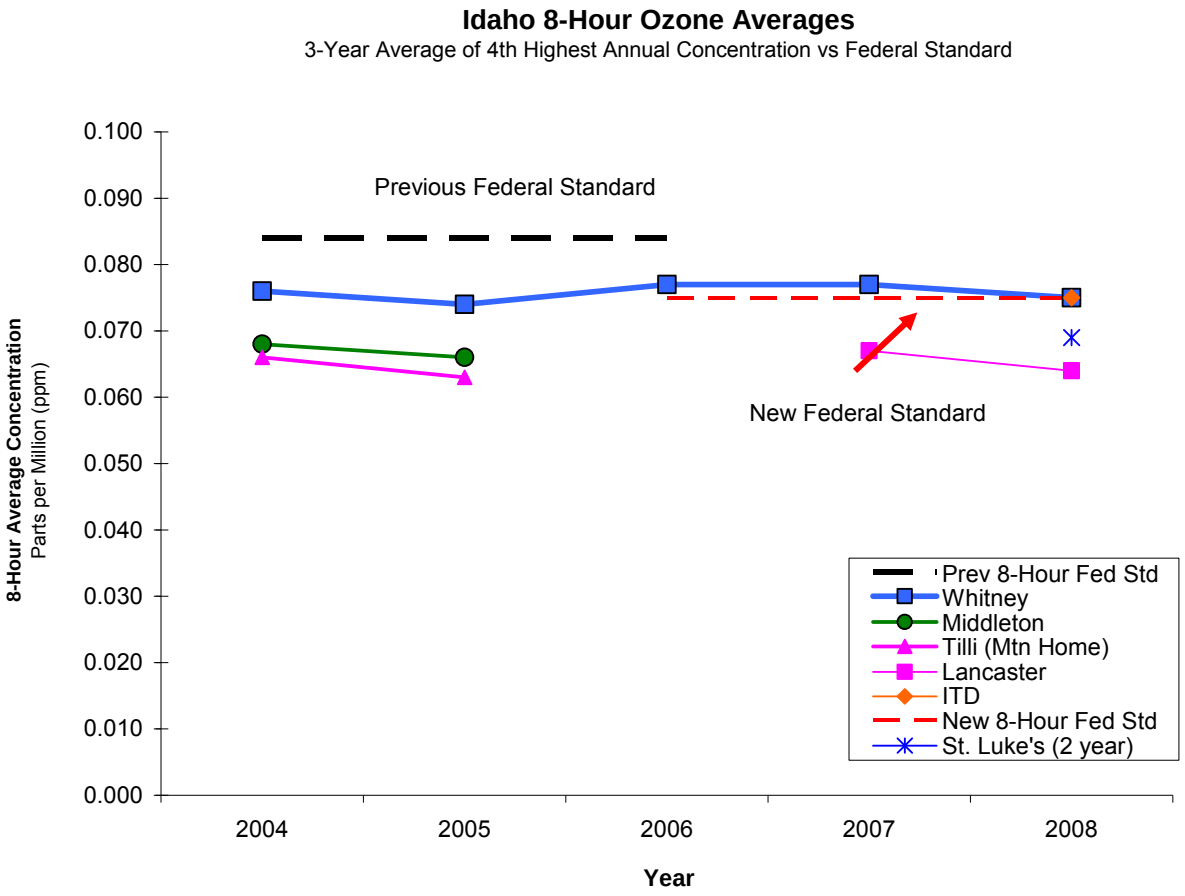


Figure 9 – Whitney Highest Eight (8) Hour Ozone Concentrations and Three (3) year average of 4th highest concentration



## Figure 10 – Idaho three (3) year average of 4th Highest Eight (8) Hour Ozone Concentrations




* Note – In 2008 both the ITD and Whitney monitoring stations demonstrated a three (3) year average 4th highest concentration point of 0.075 ppm.

## Particulate Matter (10 micrometers)

Particulate matter (PM) includes both solid matter and liquid droplets suspended in the air. Particles smaller than 2.5 micrometers in diameter are called "fine" particles, or $PM_{2.5}$. Particles between 2.5 and 10 micrometers in diameter are called "coarse" particles. $PM_{10}$ includes both fine and coarse particles. Coarse particles typically come from crushing or grinding operations and dust from roads. $PM_{10}$ can aggravate respiratory conditions such as asthma. People with respiratory conditions should avoid outdoor exertion if $PM_{10}$ levels are high.

The federal annual $PM_{10}$ standard was revoked effective December 17, 2006 due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. The 24-hour standard was not changed. EPA may choose to replace the $PM_{10}$ standard in the future with a $PM_{10-2.5}$ ($PM_{coarse}$) standard, ranging from diameters 2.5-10 micrometers. Boise and Pocatello have both previously violated federal $PM_{10}$ standards. These areas are in Sandpoint and Pinehurst. Pocatello and Northern Ada County were formerly nonattainment areas but are now considered to be maintenance areas for $PM_{10}$.

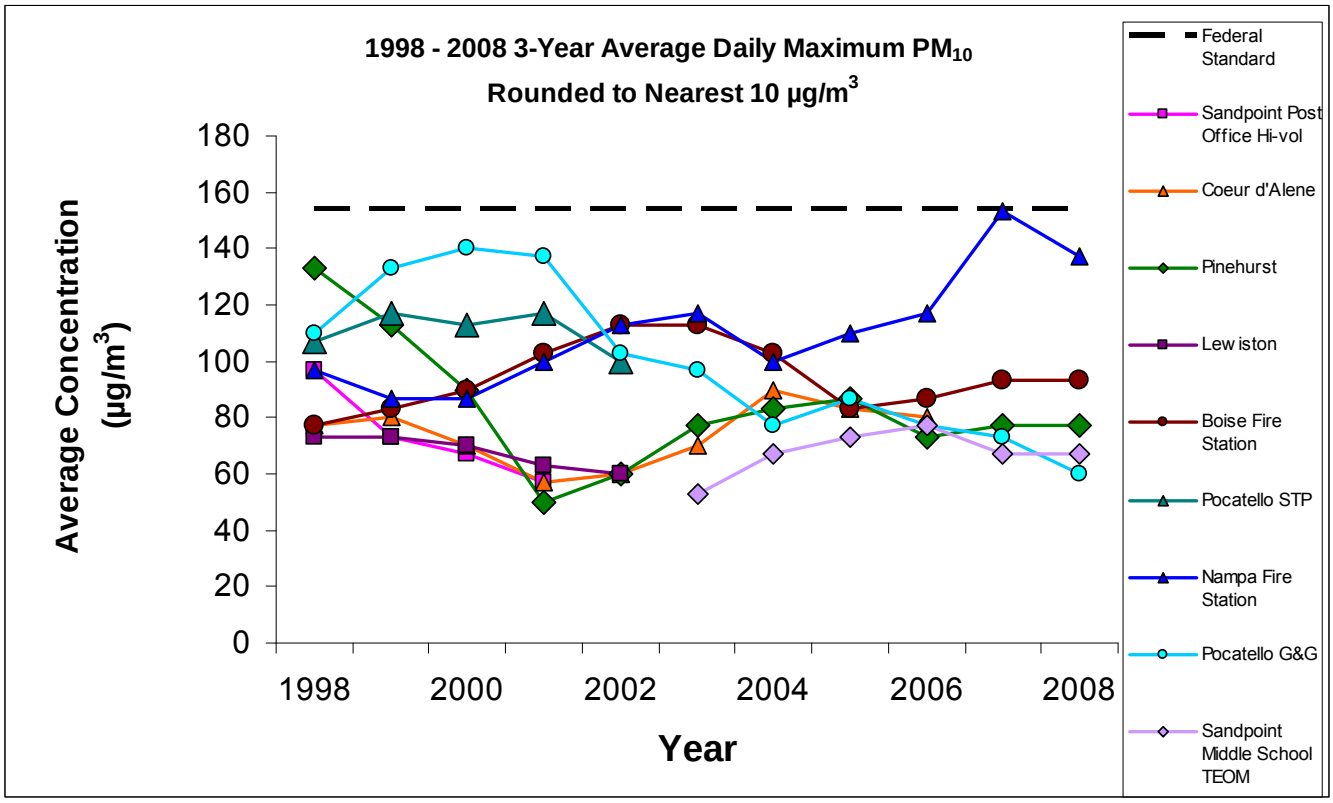
Idaho monitors $PM_{10}$ using both reference and continuous equivalent methods. The $PM_{10}$ TEOM is a federal equivalent method. TEOM data is also used to determine compliance to the $PM_{10}$ NAAQS. Reference and equivalent method results are shown in the following graphs. TEOM data is also used to determine the daily AQI and to inform the public of air quality values in near real-time via DEQ Web pages.

Figure 11 demonstrates that Idaho's airsheds, where monitoring is occurring, were in compliance for the daily NAAQS for $PM_{10}$ in 2008. Pocatello G&G was measured using the filter-based federal reference method (FRM) while Boise Mountain View School, Sandpoint, Pinehurst, the Boise Fire Station, and Nampa were measured with TEOMs, the federal equivalent method (FEM). The graph shows the rolling three (3) year average (year 2008 represents the average of 2006, 2007, 2008) of $PM_{10}$ concentrations at individual monitoring stations. It is clear that all concentrations are below the NAAQS.

Maximum daily values (24-hour average) confirm that Idaho has generally shown a decrease since 1996, although the Boise, Nampa, and Pinehurst sites are showing an increase over the last few years. Statistical summaries of reference and continuous method $PM_{10}$ concentrations are provided in tables in the Appendix. The maximum $PM_{10}$ measured in 2008 at the Nampa monitor exceeded the 24-hour NAAQS standard. However, the 24-hour $PM_{10}$ NAAQS is only considered violated if there are more than three exceedances during the consecutive three (3) year period. For example, we could experience two (2) exceedances in year 1, none in year 2, and one (1) in year 3 and not violate the NAAQS.

For additional information on $PM_{10}$, visit www.epa.gov/oar/particlepollution/. More information on $PM_{10}$ is also presented in question/answer format in the definitions section of this document.

# Figure 11 –Three (3) Year Average of Daily Maximum $PM_{10}$



## Particulate Matter (2.5 micrometers)

Particles 2.5 micrometers in diameter or less are called "fine" particles, or $PM_{2.5}$. DEQ considers $PM_{2.5}$ to be one of the major air pollution concerns affecting a number of airsheds in Idaho. $PM_{2.5}$ generally comes from wood burning, agricultural burning and other area sources, as well as industrial boilers, vehicle exhaust including cars, diesel trucks, and buses. Fine particulate can also be formed secondarily in the atmosphere by chemical reactions of pollutant gases.

Exposure to $PM_{2.5}$ can have serious health effects. Fine particles are most closely associated with increased respiratory disease, decreased lung function, and even premature death. Children, older adults, and people with some illnesses are more sensitive and more likely to develop heart or lung problems associated with $PM_{2.5}$. People with respiratory or heart disease, older adults, and children should avoid outdoor exertion if $PM_{2.5}$ levels are high. $PM_{2.5}$ also significantly affects visibility.

$PM_{2.5}$ is primarily measured using two different methods in Idaho, the federal reference method and the Tapered Element Oscillating Method (TEOM). The federal reference method is the method approved by EPA to determine $PM_{2.5}$ NAAQS compliance. This method involves pulling air through a size selective inlet and a pre-weighed filter at a given flow rate, thus trapping particles of a certain size (in this case $PM_{2.5}$) on the pre-weighed filter. The filter is then weighed again and the net weight is divided by volume of sampled air (determined from flow rate and amount of time) to provide the concentration. Unfortunately, the reference method does not provide continuous or timely information. Thus, Idaho uses the TEOM method to provide more time-relevant data. The TEOM method uses measurement of mass to determine particulate matter present. A third method of $PM_{2.5}$ measurement is used during agricultural burning season; the Nephelometer. These transportable instruments help DEQ estimate $PM_{2.5}$ concentrations during these activities.

EPA provides federal reference method (FRM) and federal equivalent method (FEM) designation to monitoring methods that meet certain requirements. This allows them to be recognized by EPA as appropriate for NAAQS compliance determinations. The graphs in this section use data collected primarily from FRM's. The continuous data are from TEOMs which are not designated FRM or FEM. The continuous methods are compared to the reference method values for a one year period and calculations are made to determine the degree of difference from the reference method. The differences are then applied to the current continuous values in an attempt to make them "reference method-like." Data gathered by the TEOM or Nephelometer method(s) cannot be used for NAAQS compliance determinations because they do not meet EPA equivalency requirements. States can request approval to use non-FRM / non-FEM monitors for NAAQS compliance through the "Approved Regional Method" process. DEQ has not begun this process.

Figures 12a and 12b show the 2008 three-year average of the 98$^{th}$ percentile 24-hour (daily) averages at Idaho monitoring stations against the federal standard. The annual averages for 2001-2008 all fell well below the previous standard of 65 $\mu g/m^3$. For 2008, the graph shows the three year average for Pinehurst very near the new NAAQS of 35 $\mu g/m^3$. All of the $PM_{2.5}$ monitors except Franklin meet the daily NAAQS using the federal reference method. All of Idaho was designated attainment/unclassifiable for

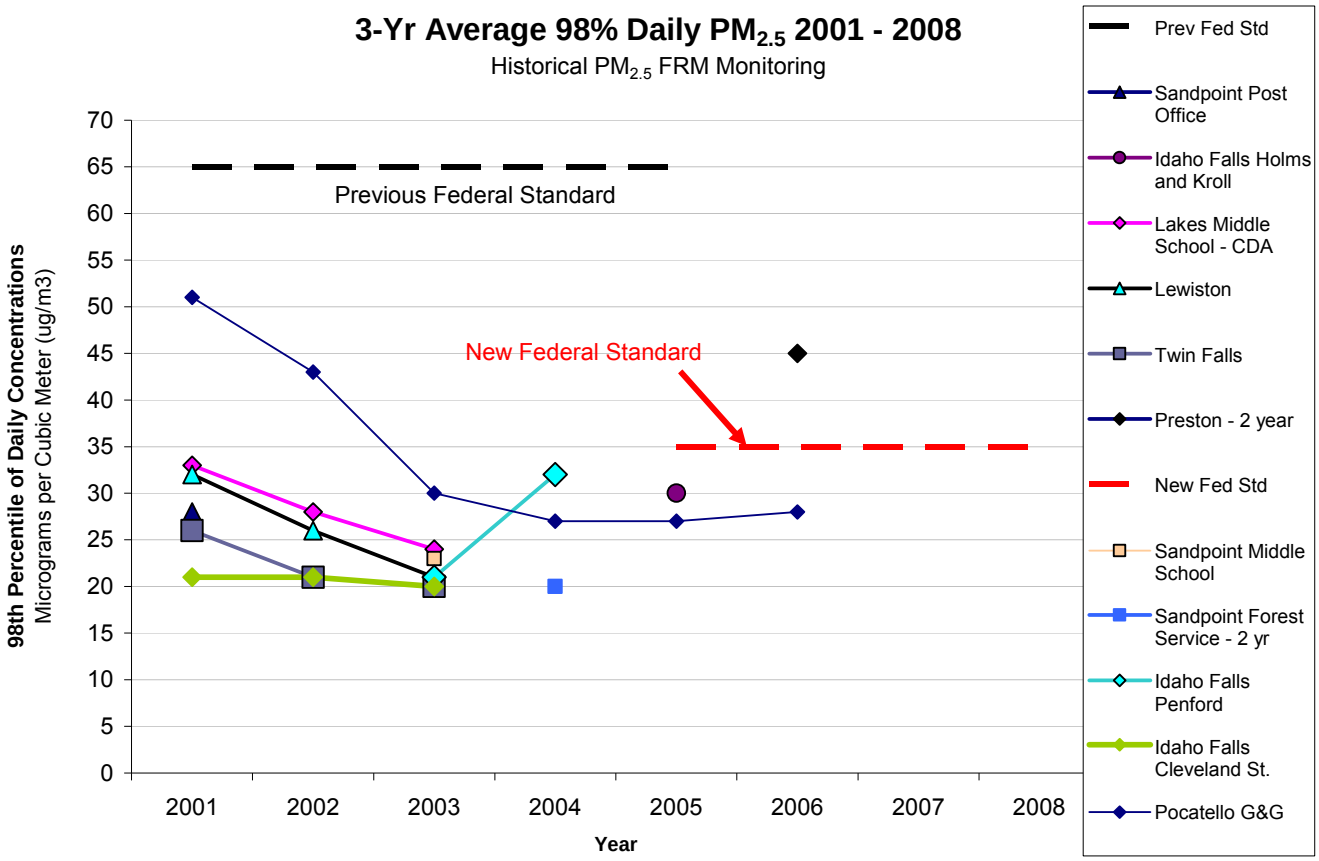
$PM_{2.5}$ in 2008 with the exception of Franklin. Franklin was designated non-attainment along with Logan, Utah (Cache Valley) because they share the same airshed and Metropolitan Statistical Area (MSA).

Figures 13a and 13b show the three-year average of the annual averages at each monitoring station against the federal standard. It is easily seen that the annual standard of 15.4 $\mu g/m^3$ was not exceeded at any of the monitoring stations.

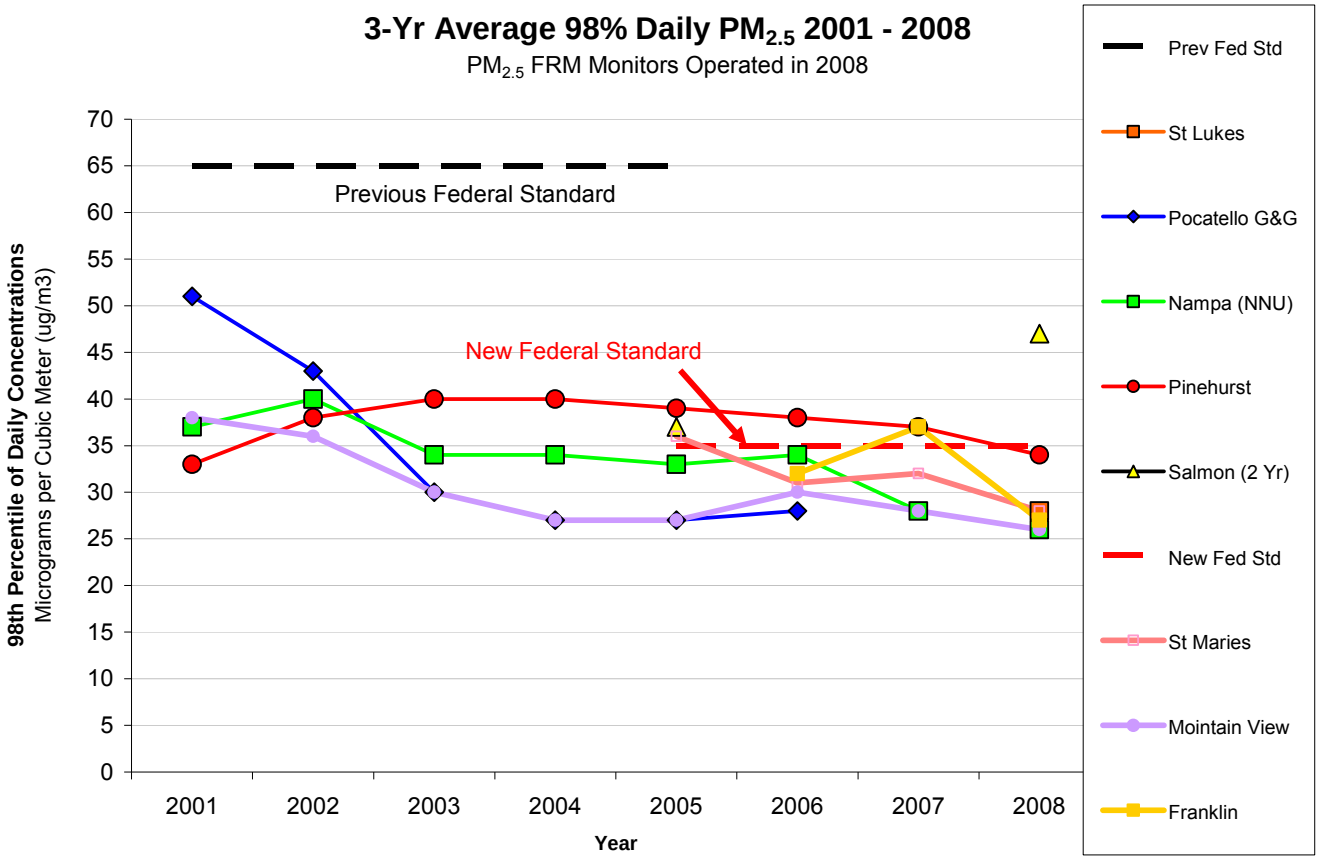
Figures 14 – 25 show daily $PM_{2.5}$ concentrations measured at Idaho sites during 2008 using the TEOM continuous analyzers against a backdrop of AQI breakpoints. The highest 1 hour concentration of $PM_{2.5}$ measured with the TEOMS in 2008 was 64.1 $\mu g/m^3$, measured at Pinehurst 1/11/2008 during a winter stagnation period. A few of the graphs show some blank periods with no concentrations. These are times when a TEOM was not functioning due to mechanical malfunctions or maintenance.

For additional information on particulate matter, visit www.epa.gov/oar/particlepollution/. Information on $PM_{2.5}$ is also presented in a question/answer format in the definitions section of this document.

# Figure 12a – Three (3) Year Average 98th Percentile Daily $PM_{2.5}$ (Historical Monitoring)

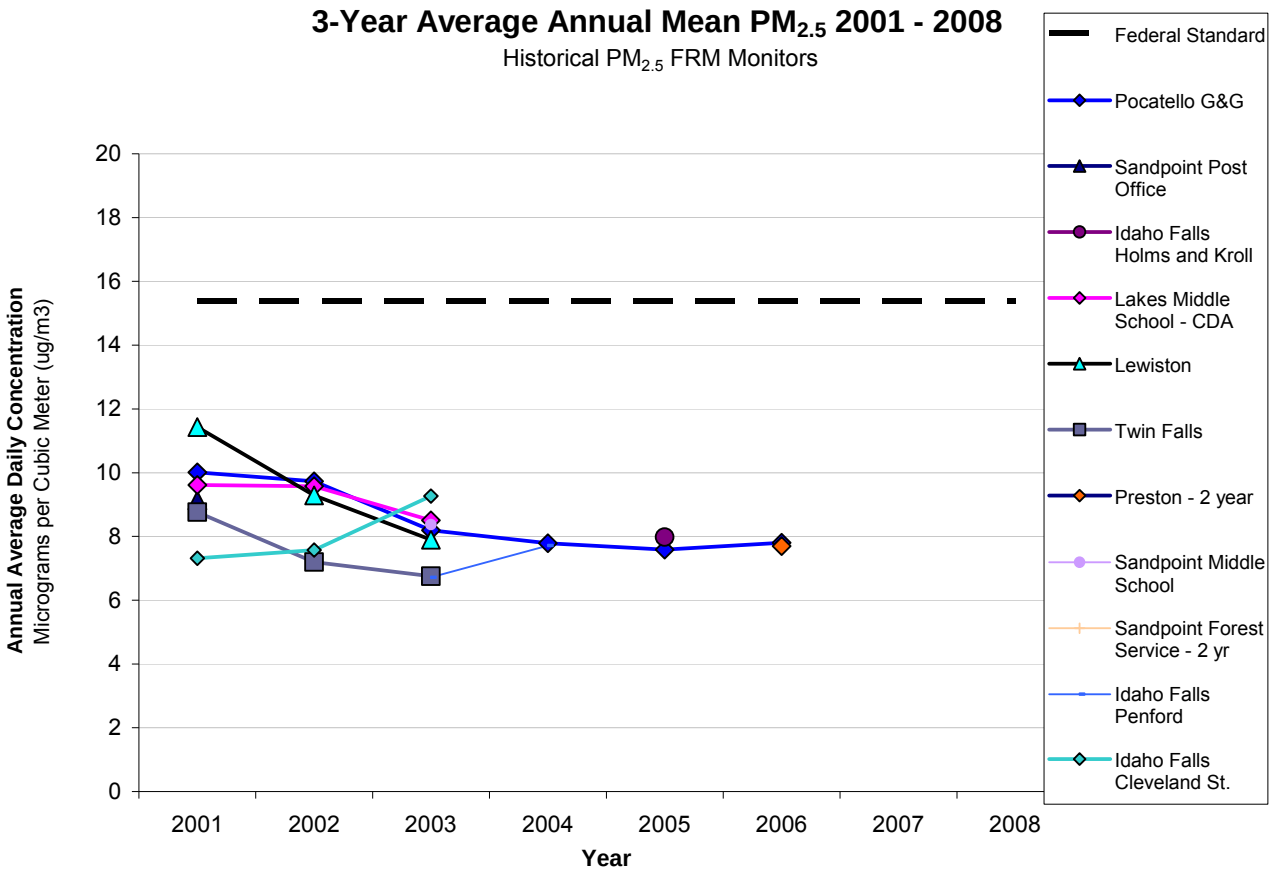


# Figure 12b – Three (3) Year Average 98th Percentile Daily $PM_{2.5}$ (Monitors operated in 2008)



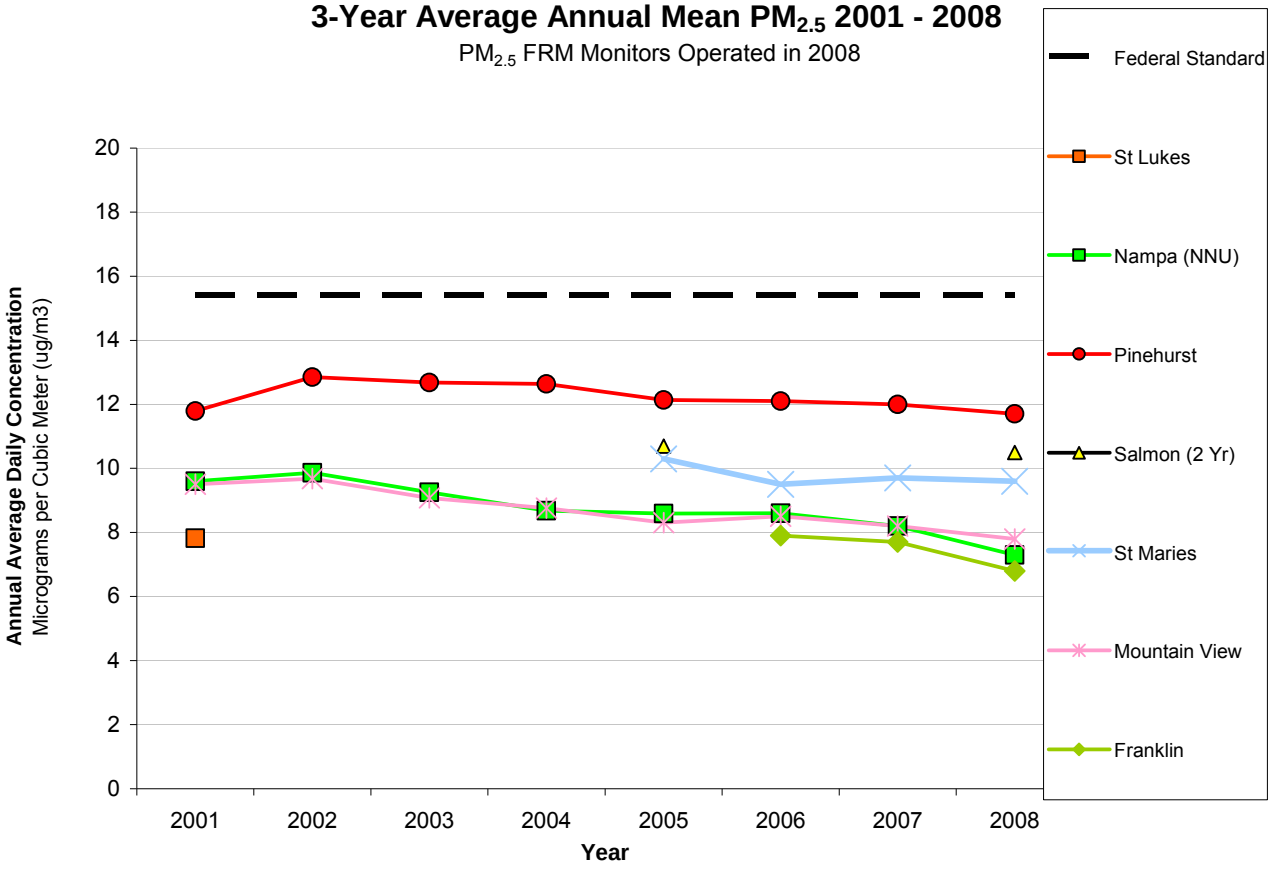

Salmon is included for reference even though there is not yet three years of data to average. The Salmon average includes an exceptional event (unwanted wildfire) in 2007 that DEQ has flagged per EPA's exceptional events policy. If EPA agrees, the flagged data will be removed from the data and a new average calculated to determine NAAQS compliance.

## Figure 13a – $PM_{2.5}$ 3-Year Average Annual Mean (Historical Monitors)

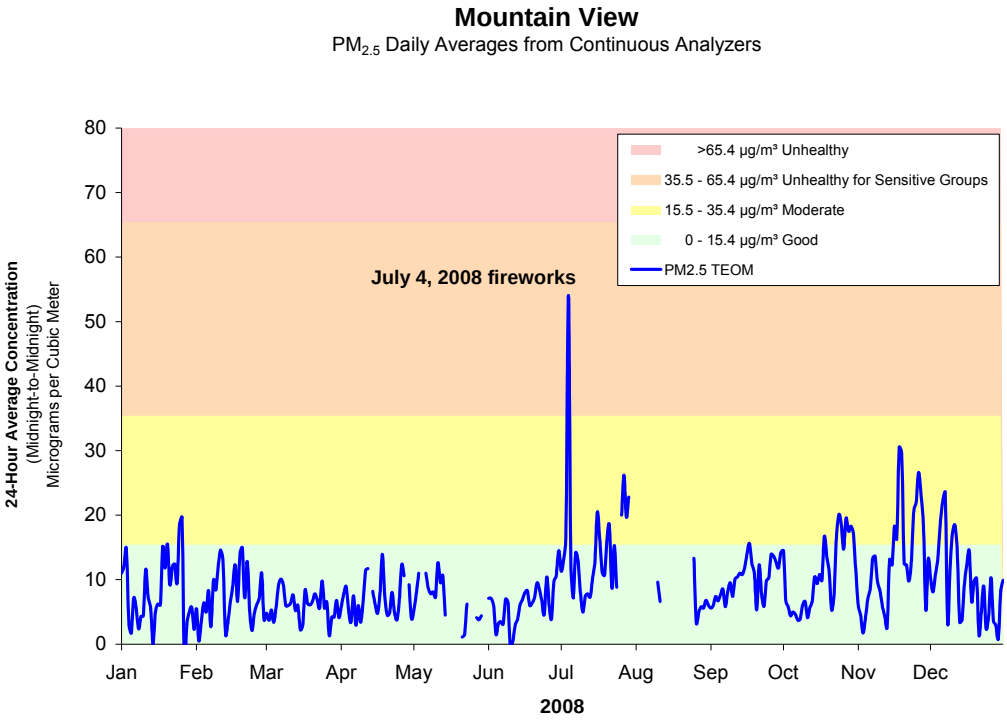



Salmon is included for reference even though there is not yet three years of data to average. The Salmon average includes an exceptional event (unwanted wildfire) in 2007 that DEQ has flagged per EPA's exceptional events policy. If EPA agrees, the flagged data will be removed from the data and a new average calculated to determine NAAQS compliance.

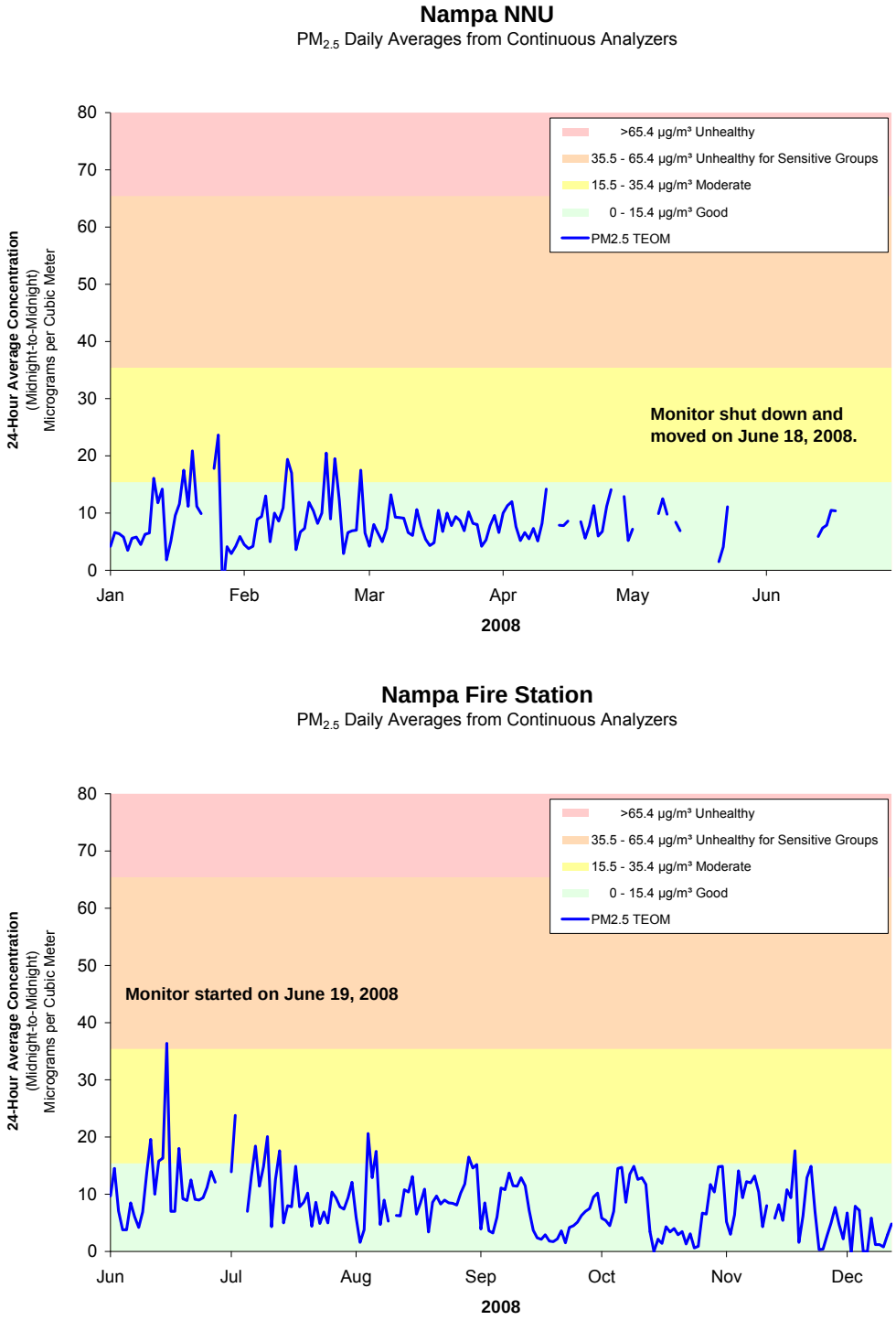
Figure 13b – $PM_{2.5}$ 3-Year Average Annual Mean (Monitors operated in 2008)



# Figure 14 – Boise $PM_{2.5}$ Daily Averages from Continuous Analyzer



# Figure 15 – Nampa $PM_{2.5}$ Daily Averages from Continuous Analyzer




* - Monitor moved from NNU to Nampa Fire Station June 19, 2008

Figure 16 – Coeur d'Alene $PM_{2.5}$ Daily Averages from Continuous Analyzer

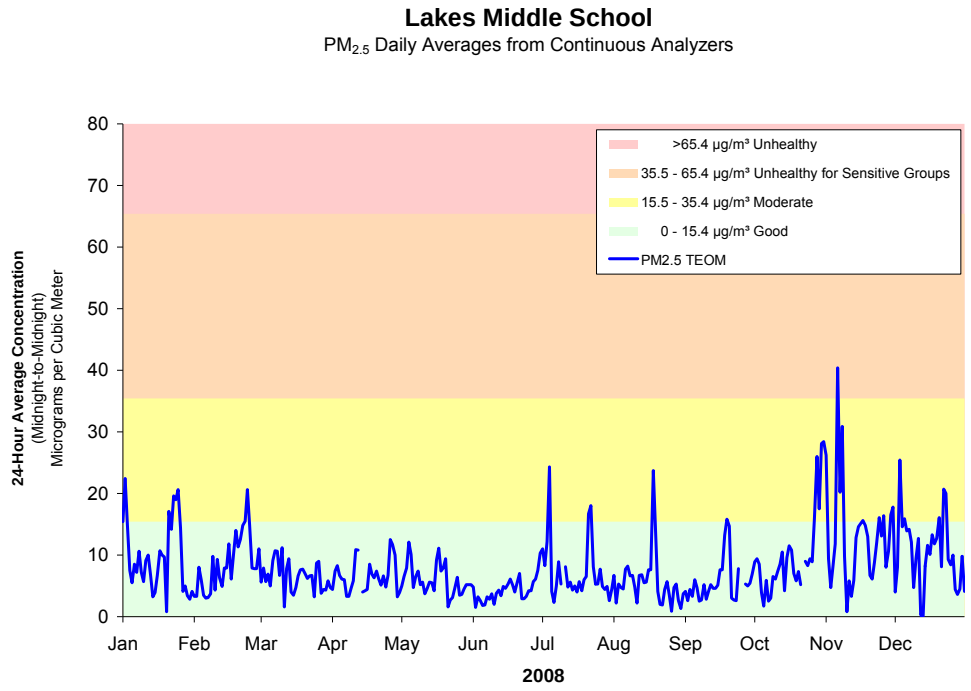
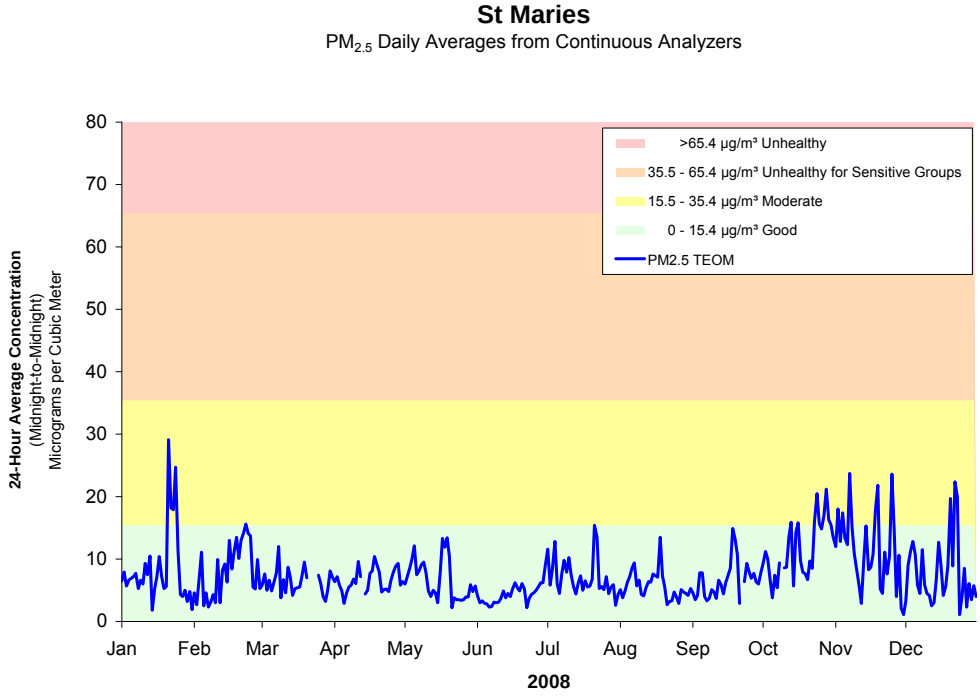
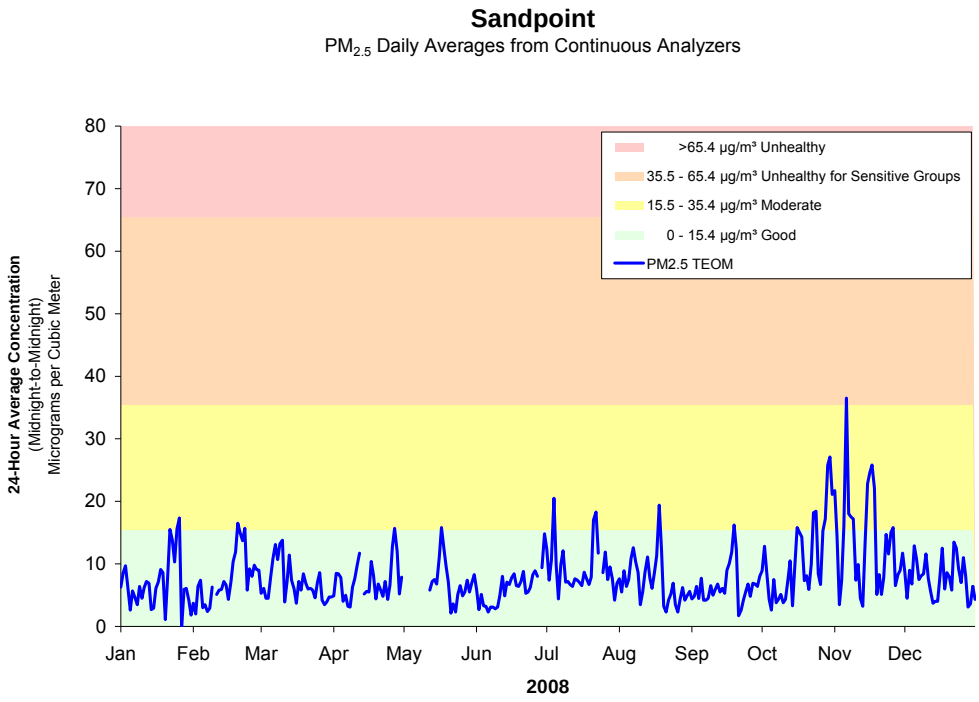


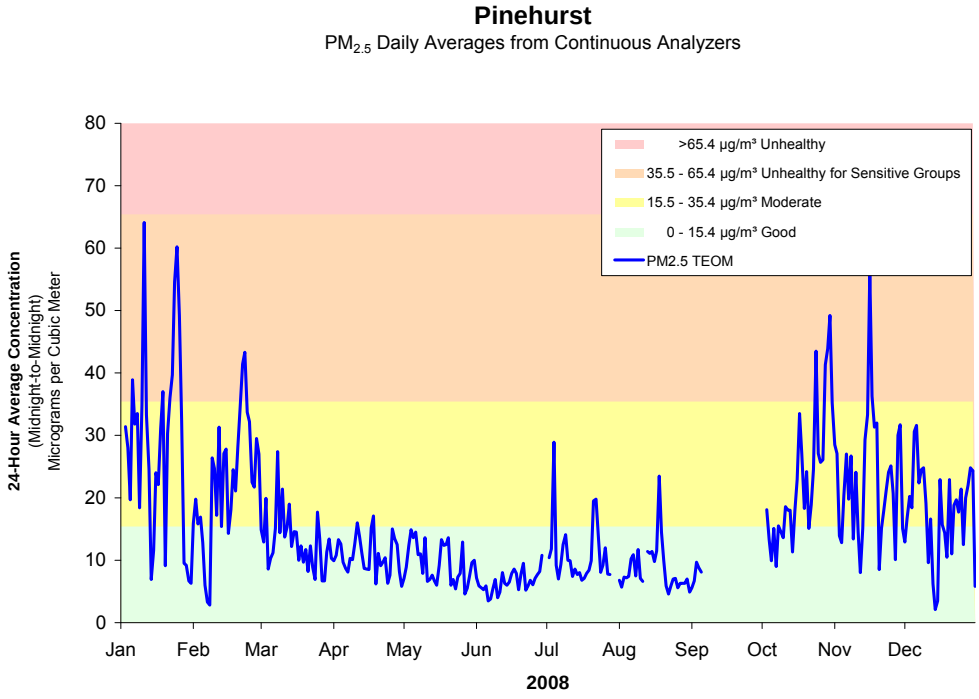

Figure 17 – St. Maries $PM_{2.5}$ Daily Averages from Continuous Analyzer



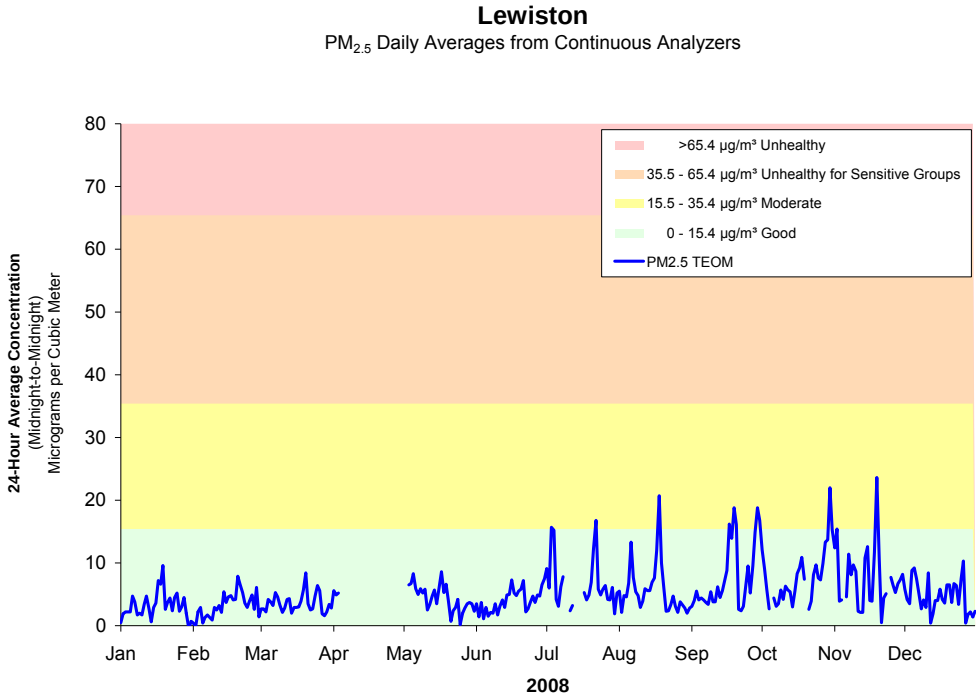
## Figure 18 – Sandpoint $PM_{2.5}$ Daily Averages from Continuous Analyzer



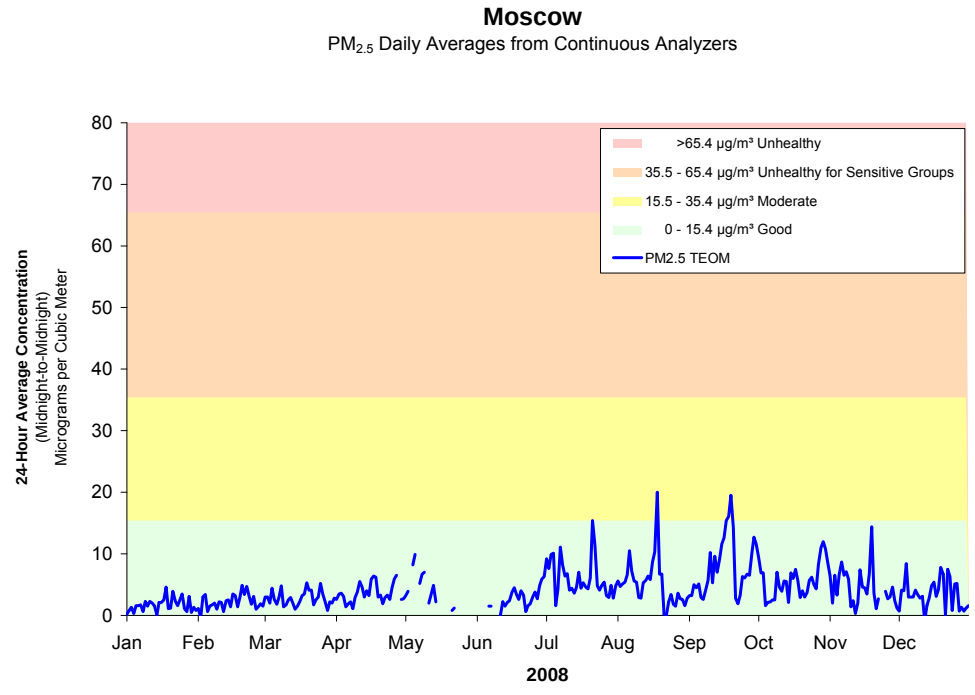

## Figure 19 – Pinehurst $PM_{2.5}$ Daily Averages from Continuous Analyzer



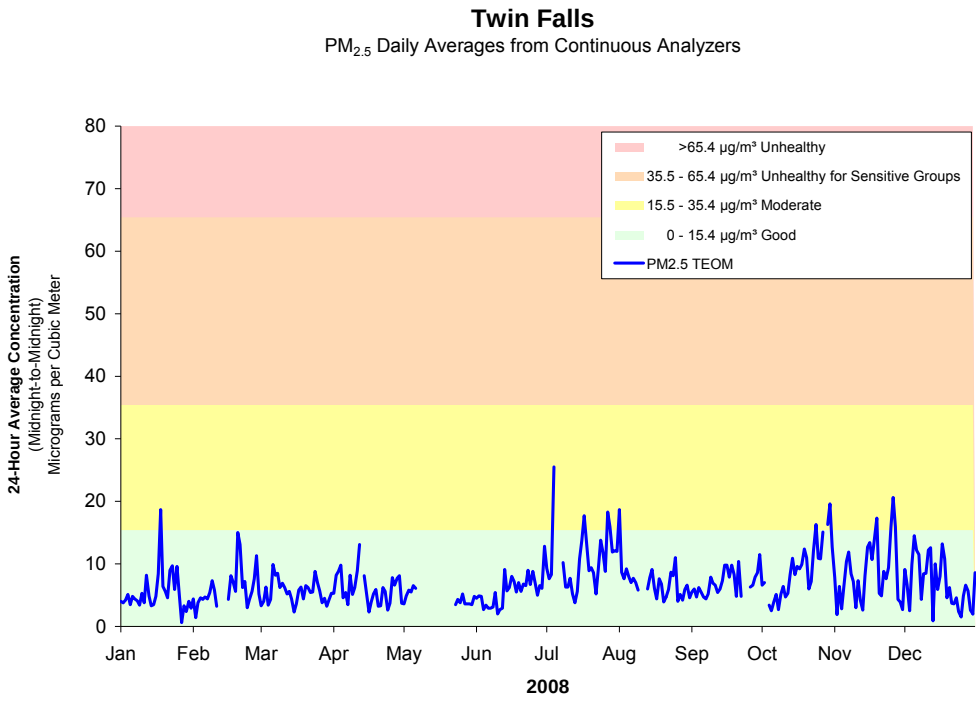
## Figure 20 – Lewiston $PM_{2.5}$ Daily Averages from Continuous Analyzer



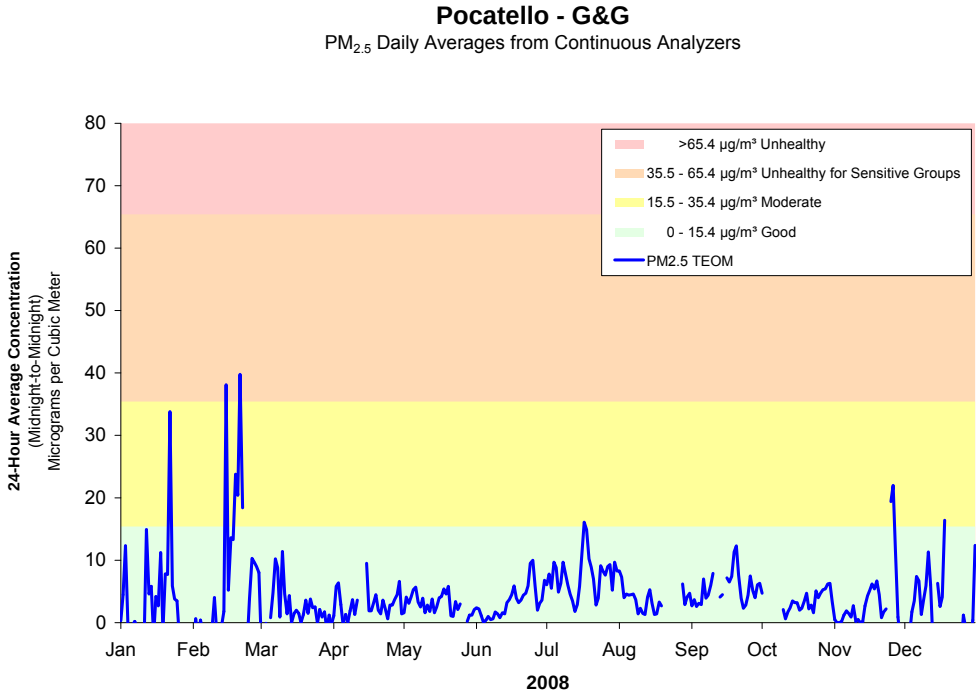

## Figure 21 – Moscow $PM_{2.5}$ Daily Averages from Continuous Analyzer



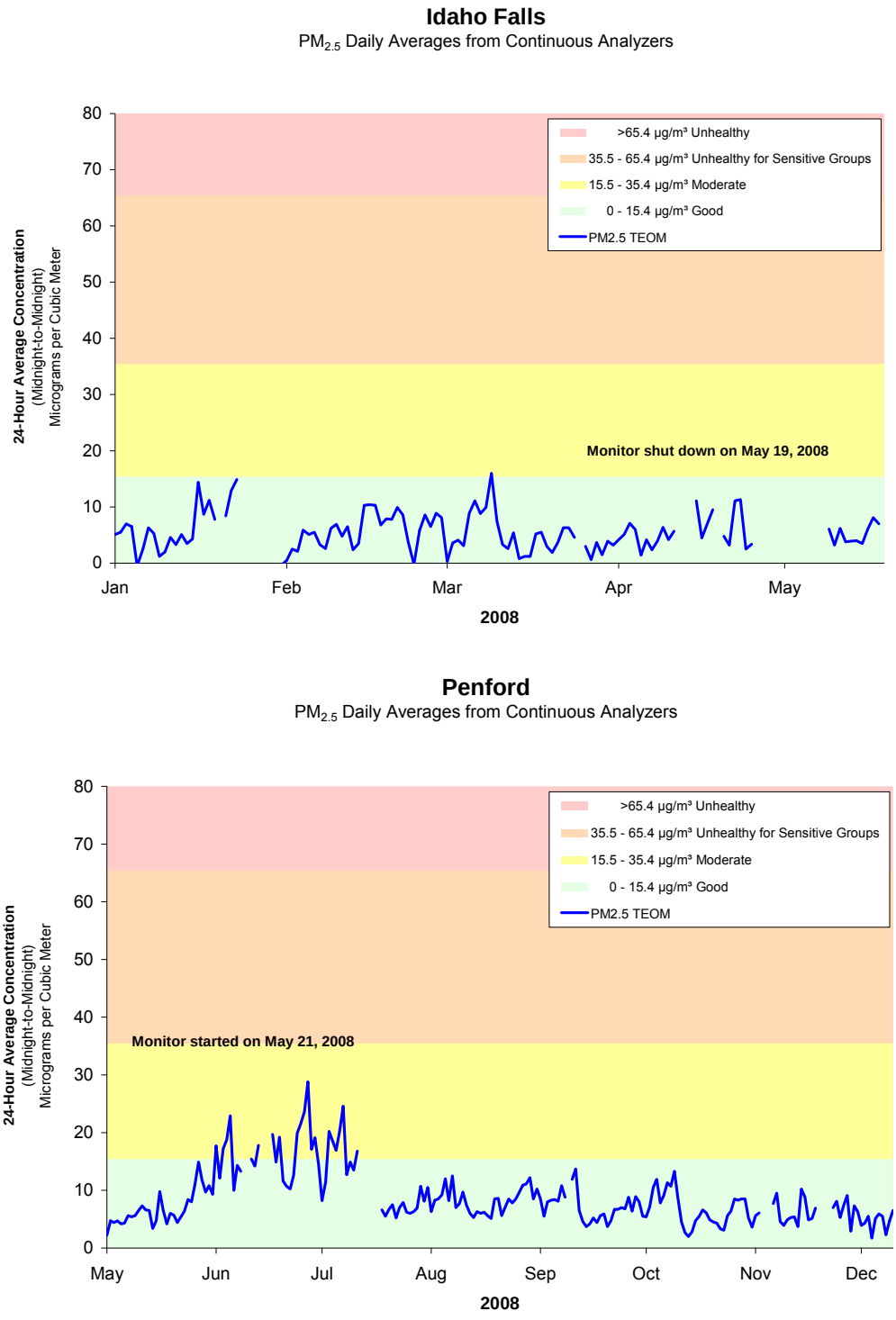
## Figure 22 – Twin Falls $PM_{2.5}$ Daily Averages from Continuous Analyzer




## Figure 23– Pocatello $PM_{2.5}$ Daily Averages from Continuous Analyzer

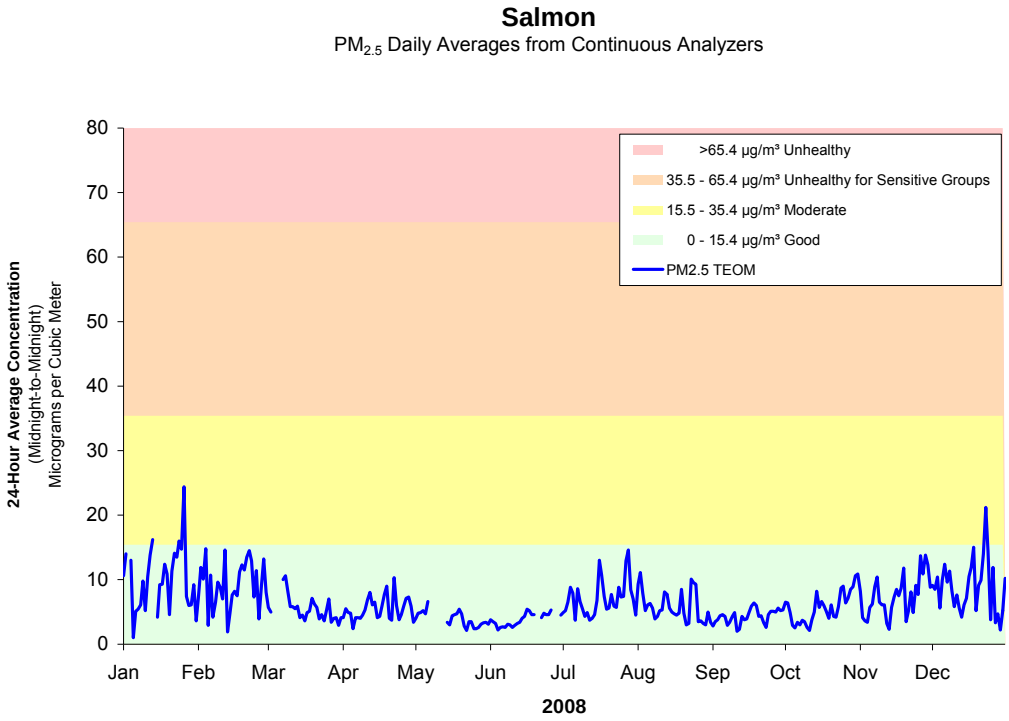


# Figure 24 – Idaho Falls $PM_{2.5}$ Daily Averages from Continuous Analyzer




* - Monitor moved from Idaho Falls Sanitation Dept. to Penford May 21, 2008

# Figure 25 – Salmon $PM_{2.5}$ Daily Averages from Continuous Analyzer



## Carbon Monoxide

Carbon Monoxide (CO) is an odorless, colorless gas that can enter the bloodstream through the lungs and reduce the amount of oxygen that reaches organs and tissues. Carbon monoxide forms when the carbon in fuels doesn't burn completely. The majority of CO comes from vehicle exhaust. In cities, 85-95% of all CO emissions may come from motor vehicle exhaust.

Elevated levels of CO in the ambient air can occur in urban canyon areas with heavy traffic congestion. The highest levels of CO in the outside air typically occur during the colder months of the year when temperature inversions are more frequent. People with cardiovascular disease or respiratory problems might experience chest pain and increased cardiovascular symptoms, particularly while exercising, if CO levels are high. High levels of CO can affect alertness and vision even in healthy individuals.

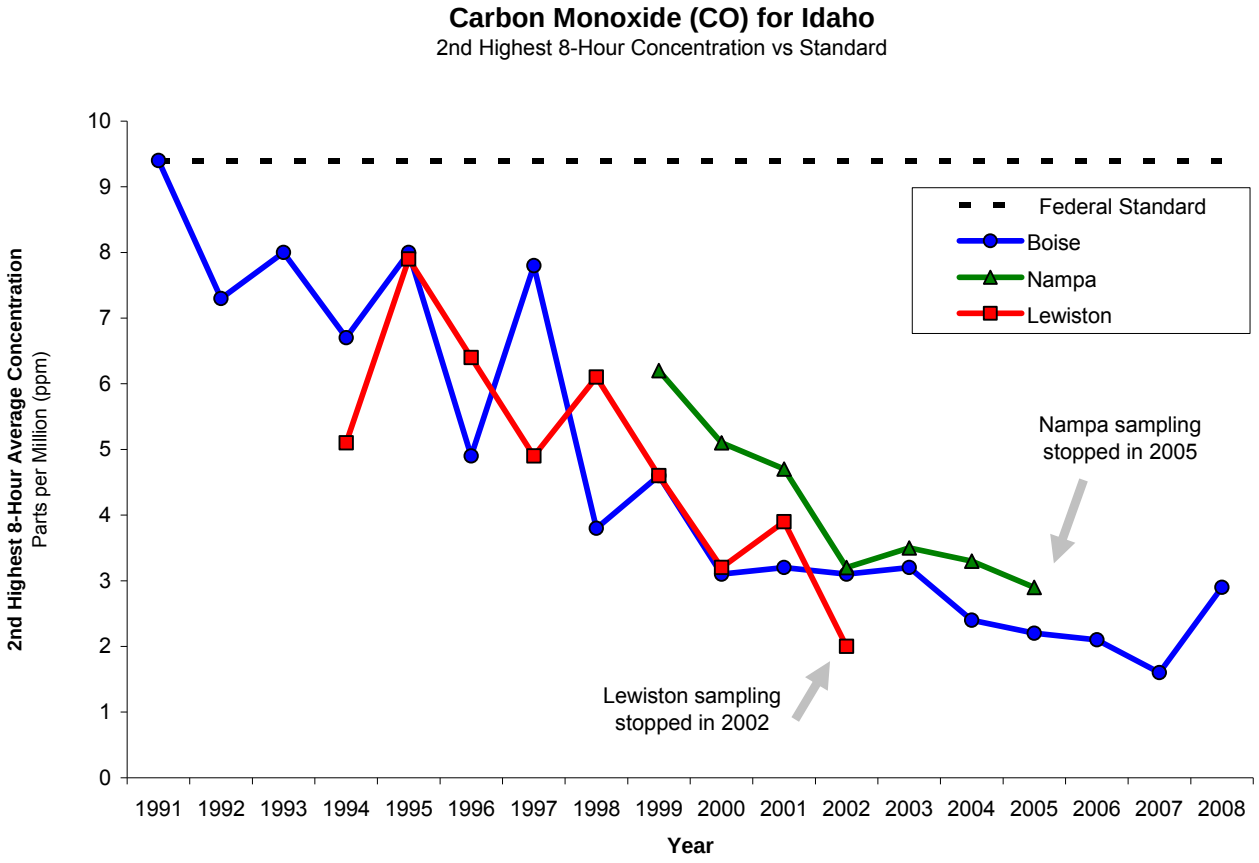
CO monitoring stations are generally located in urban canyon areas with heavy traffic congestion. These include central business areas, roadsides, and shopping malls. Idaho currently monitors CO in Boise as a condition of the Northern Ada County CO Maintenance Plan. Beginning in 2009, "trace" CO monitoring will occur at the NCore site in Meridian. "Trace" monitoring provides the ability to determine whether variations in observed concentrations below 1.0 ppm are due to actual changes in atmospheric concentration or due to poor sensitivity of older instruments at those low levels.

Figure 26 shows the second highest eight-hour concentrations at Idaho's monitoring sites versus the NAAQS from 2001 through 2008. The second-highest concentration is displayed on these graphs because, under the federal rule, the eight-hour standard can not be exceeded more than once per year (thus, choosing the second highest). These graphs confirm the general downward trend for ambient CO concentrations from the early 1990s to present. There were no eight-hour concentrations measured at any sites that exceeded the NAAQS (9.4 ppm). The maximum eight-hour concentration for CO in 2008 was 2.9 ppm, well below the eight-hour standard. These data are provided in the Appendix.

The NAAQS also includes a 1-hour standard for CO of 35 ppm (can not be exceeded more than once in any year). Measured 1-hour concentrations in Idaho are historically much lower than the 35 ppm standard, and therefore 1-hour CO trends were not graphed. The maximum and second-highest measured 1-hour CO in 2008 are 8.0 and 7.3 ppm, respectively. Additional 1-hour average CO data are provided in the Appendix.

For additional information on CO, visit www.epa.gov/air/urbanair/co/index.html. CO information is also provided in question/answer format in the definitions section of this document.

# Figure 26 – Carbon Monoxide (CO) 2nd Highest 8-Hour Concentration



## Sulfur Dioxide

Sulfur dioxide ($SO_2$) is a colorless, reactive gas produced by burning fuels containing sulfur, such as coal and oil, and by industrial processes. Historically, the greatest sources of $SO_2$ were industrial facilities that derived their products from raw materials like metallic ore, coal, and crude oil, or that burned coal or oil to produce process heat (petroleum refineries, cement manufacturing, and metal processing facilities). Currently, on-road vehicles, marine craft, and diesel construction equipment also release significant $SO_2$ emissions to the air.

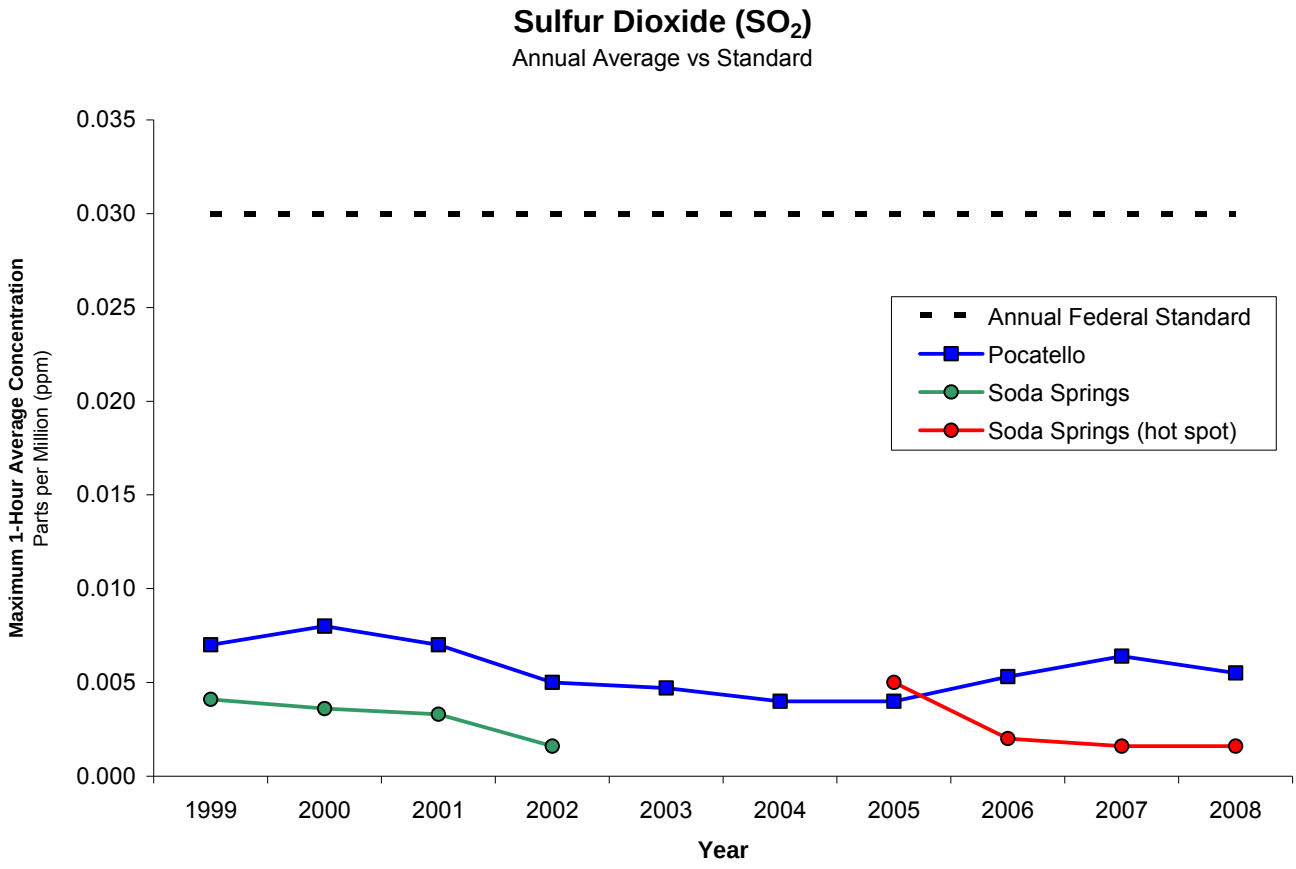
People with asthma who are active outdoors may experience bronchoconstriction, where symptoms include wheezing, shortness of breath, and tightening of the chest. People should limit outdoor exertion if $SO_2$ levels are high.

Figure 27 shows that Idaho is well below the annual standard for $SO_2$. The maximum measured $SO_2$ concentrations in 2008 were significantly below the federal standards as well. Figure 28 and Figure 29 show the maximum 24-hour and 3-hour concentrations, respectively, at Idaho's monitoring sites. The maximum 24-hour and 3-hour averages were 0.028 ppm and 0.091 ppm, respectively. Note that the Soda Springs monitor is at a different location than it was in 1999-2002. DEQ changed from population exposure monitoring to "hot spot" monitoring at Soda Springs. 'Hot spot' refers to monitoring that is designed to investigate pollution sources on a local scale. This allows for the assessment of impacts form discreet sources to ambient air, rather than emissions being monitored directly from a stack or chimney.

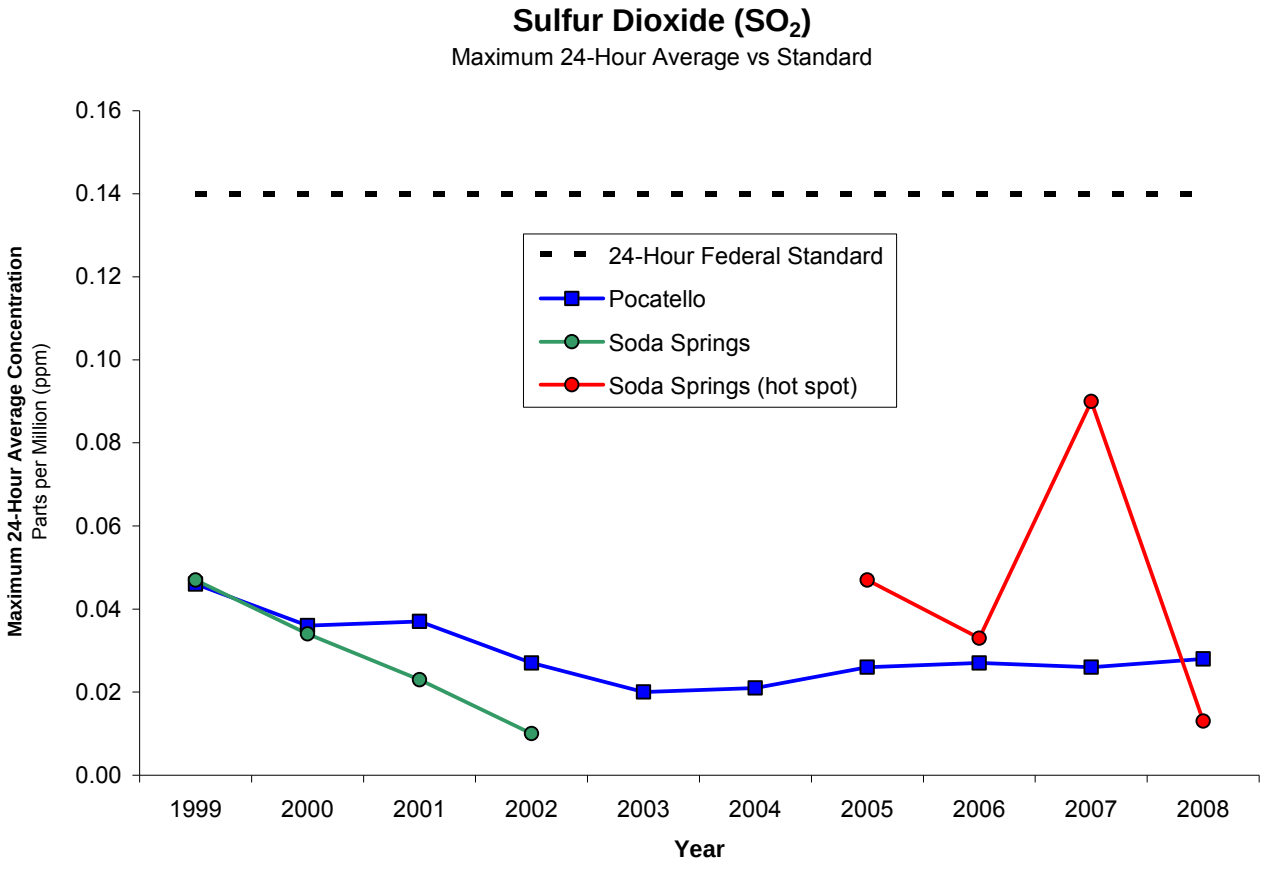
In 2009, DEQ will begin "trace" $SO_2$ monitoring at the NCore site in Meridian. "Trace" monitoring provides the ability to determine whether variations in observed concentrations below 0.05 ppm are due to actual changes in atmospheric concentration or due to poor sensitivity of older instruments at those low levels.

Additional $SO_2$ data are located in the Appendix, and information on $SO_2$ is available at www.epa.gov/air/urbanair/so2/index.html. $SO_2$ information is also provided in question/answer format in the definitions section of this document.

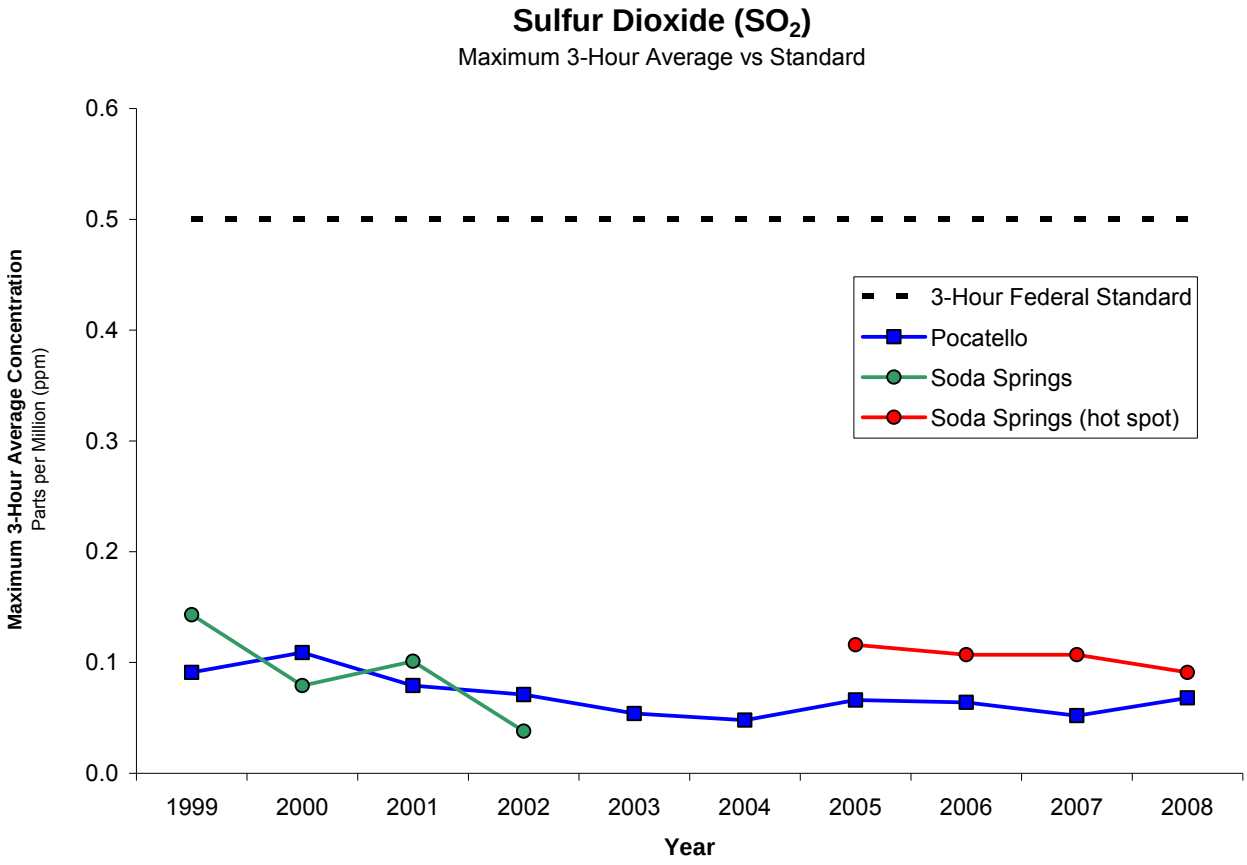
## Figure 27 –Sulfur Dioxide (SO2) Annual Average



## Figure 28 –Sulfur Dioxide ($SO_2$) Maximum 24-Hour Average



## Figure 29 –Sulfur Dioxide ($SO_2$) Maximum 3-Hour Average



## Lead

Lead is a highly toxic metal that was used for many years in household products, automobile fuel, and industrial chemicals. Airborne lead was associated primarily with automobile exhaust and lead smelters. The large reductions in lead emissions from motor vehicles have resulted in great reductions of ambient lead levels across the United States. Industrial processes, particularly primary and secondary lead smelters and battery manufacturers, are now responsible for most of the lead emissions.

People, animals, and fish are mainly exposed to lead by breathing and ingesting it in food, water, soil, or dust. Lead accumulates in the blood, bones, muscles, and fat. Infants and young children are especially sensitive to even low levels of lead. Lead can have health effects ranging from behavioral problems and learning disabilities to seizures and death.

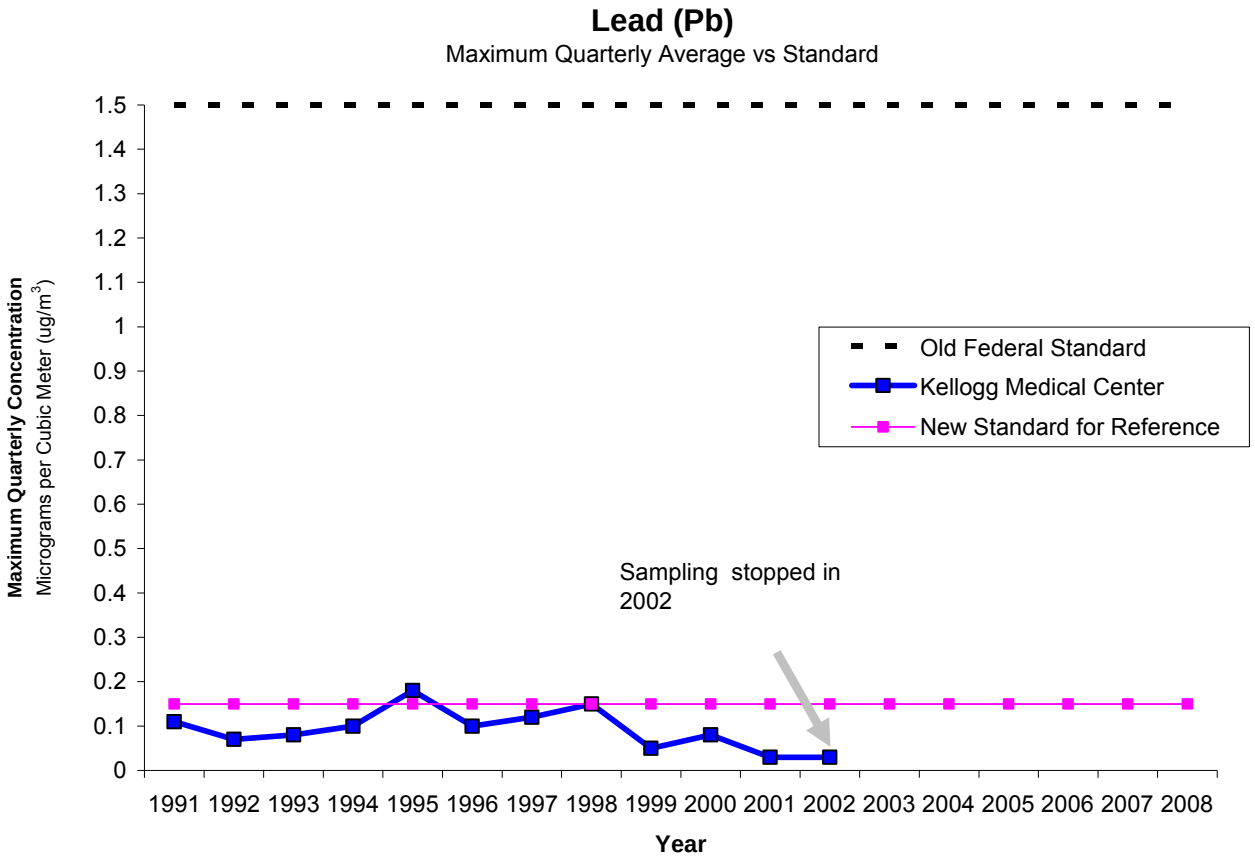
According to EPA, the primary sources of lead exposure are lead-based paint, lead-contaminated dust, and lead-contaminated residual soils. Refer to the EPA Web site www.epa.gov/ttnatw01/hlthef/lead.html for ways to limit your exposure to these lead sources.

Lead has not been monitored in Idaho since 2002. With the phase-out of lead in fuel and the closure of the Bunker Hill lead smelter in Kellogg, airborne lead was no longer considered a public health concern in Idaho. Figure 30 is included to show the historical monitoring of airborne lead in Kellogg.

On November 12, 2008 EPA substantially strengthened the national ambient air quality standards (NAAQS) for lead. EPA revised the level of the primary (health-based) standard from 1.5 micrograms per cubic meter (µg/m3) to 0.15 µg/m3 and revised the secondary (welfare-based) standard to be identical in all respects to the primary standard. In conjunction with strengthening the lead (Pb) NAAQS, the EPA promulgated new monitoring requirements. Monitoring is now required near Pb sources that may contribute to violations of the Pb NAAQS. "Source-oriented monitoring," as this is called, is required near any source that emits more than 1.0 tons per year beginning January 2010. Idaho does not have any sources of lead that trigger source-oriented monitoring. In December 2009, EPA announced a proposal to reduce the source-oriented monitoring emissions criteria to 0.5 tpy and require "non-source-oriented monitoring" at all NCore sites beginning January 2011. If this becomes final, Idaho will still not be required to conduct source-oriented monitoring.

For additional information on lead, visit www.epa.gov/air/lead/. Lead information is also available in a question/answer format in the definitions section of this document.

# Figure 30 – Lead Maximum Quarterly Average



## Nitrogen Dioxide

Nitrogen dioxide ($NO_2$) is a reddish brown, highly reactive gas that forms from the reaction of nitrogen oxide (NO) and oxygen in the atmosphere. The term "$NO_X$", which is frequently used, refers to both NO and $NO_2$. $NO_2$ will react with VOCs and can result in the formation of ozone. On-road vehicles like trucks and automobiles are the major sources of $NO_X$ in many airsheds. Industrial boilers and processes, home heaters, and gas stoves can also produce $NO_X$. $NO_2$ pollution is greatest during the cold weather seasons.

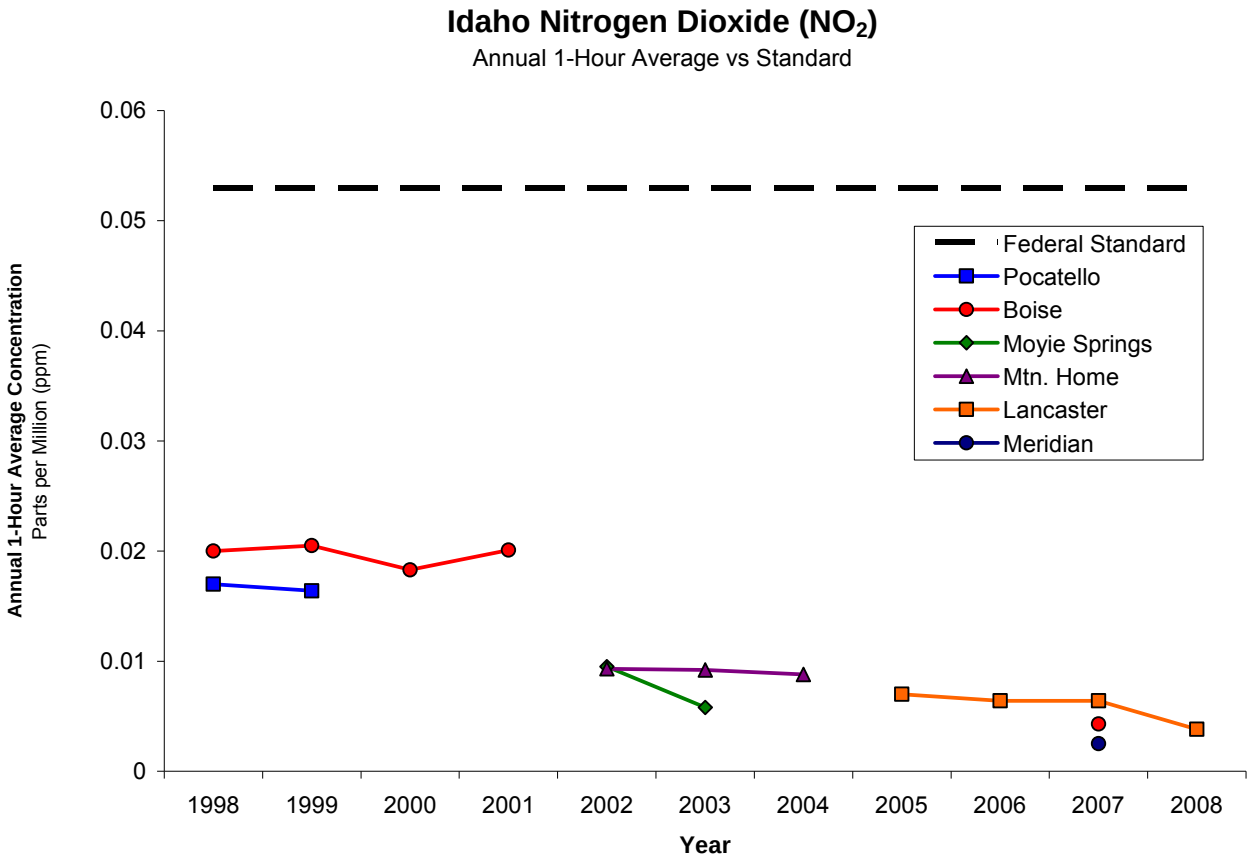
$NO_2$ can cause respiratory symptoms such as coughing, wheezing, and shortness of breath in people with respiratory diseases such as asthma. Long-term exposure can lead to respiratory infections.

Motor vehicle manufacturers have been required to reduce $NO_X$ emissions from cars and trucks since the 1970s. $NO_X$ is not considered a significant pollution problem in Idaho. In 2008, DEQ operated only one nitrogen dioxide monitor at Lancaster Road near Coeur d'Alene. The monitoring objective is primarily to assess ambient $NO_X$ concentrations for evaluating ozone formation processes during the ozone season.

The maximum 1-hour average of $NO_2$ measured in 2008 was 0.0038 ppm. The averages observed have consistently been well below the annual NAAQS, as shown in Figure 31 and in data in the Appendix. However, these averages cannot be used to assess NAAQS compliance since the monitors were not operated for the entire year. Beginning in 2009 DEQ will monitor $NO_2$ year-round at the NCore site in Meridian.

For additional information on $NO_2$, visit www.epa.gov/air/urbanair/nox/index.html.

## Figure 31 – Nitrogen Dioxide Annual 1-Hour Average



## Air Quality Index

The AQI is reported according to a 500-point scale for each of the major criteria air pollutants: ozone, particulate matter ($PM_{2.5}$ & $PM_{10}$), carbon monoxide, nitrogen dioxide, and sulfur dioxide. The "worst denominator" determines the ranking. For example, if an area has a carbon monoxide value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories. Each category has a corresponding color, shown below, for each category. For information on the concentration breakpoints for each pollutant, refer to Table 6.

**Table 4: US EPA AQI Breakpoint definitions**

| Levels of Health Concern | Numeric Value | Meaning |
|---|---|---|
| Good | 0-50 | Air quality is considered satisfactory, and air pollution poses little or no risk. |
| Moderate | 51-100 | Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution. |
| Unhealthy for Sensitive Groups | 101-150 | Members of sensitive groups may experience health effects. The general public is not likely to be affected. |
| Unhealthy | 151-200 | Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects. |
| Very Unhealthy | 201-300 | Health alert: everyone may experience more serious health effects. |
| Hazardous | 300-500 | Health warnings of emergency conditions. The entire population is more likely to be affected. |

The AQI is a national index, so the values and colors used to show local air quality and the associated level of health concern will be the same everywhere in the U.S.A. The number of "good" air quality days continues to dominate regionally in Idaho. However, there were brief periods when the air quality degraded into "moderate," "unhealthy for sensitive groups," "unhealthy," and "very unhealthy." Table 5 shows the AQI breakdown by percentage in each category for the year.

Figures 32a and 32b present the annual percentage of "good" days for several Idaho counties. The number of "good" days has remained relatively high over the last few years for each county. Current reduction in the number of "good" days cannot be directly compared with the numbers before 1999. In that year, $PM_{2.5}$ was added to the index and the "unhealthy" category was divided into "unhealthy" and "unhealthy for sensitive groups." In 2002 ozone monitoring was added to the AQI calculation in the Treasure Valley with ozone contributing to the number of moderate days in the following years. Ozone monitoring began at the Lancaster Road site near Coeur d'Alene in 2005. The AQI Graphs that follow (Figures 33 – 48) present the distribution of air quality for each individual county. The AQI data summaries for each county that support the graphs are located in Table 7 of the Appendix.

Figure 32a – Percentage of Days Air Quality Was Rated As “Good”

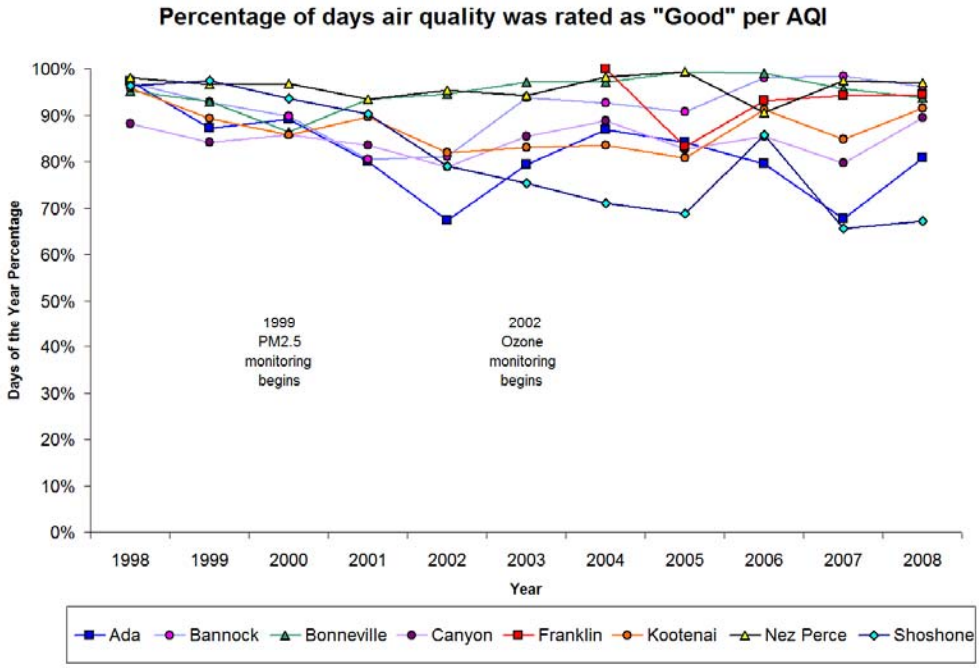
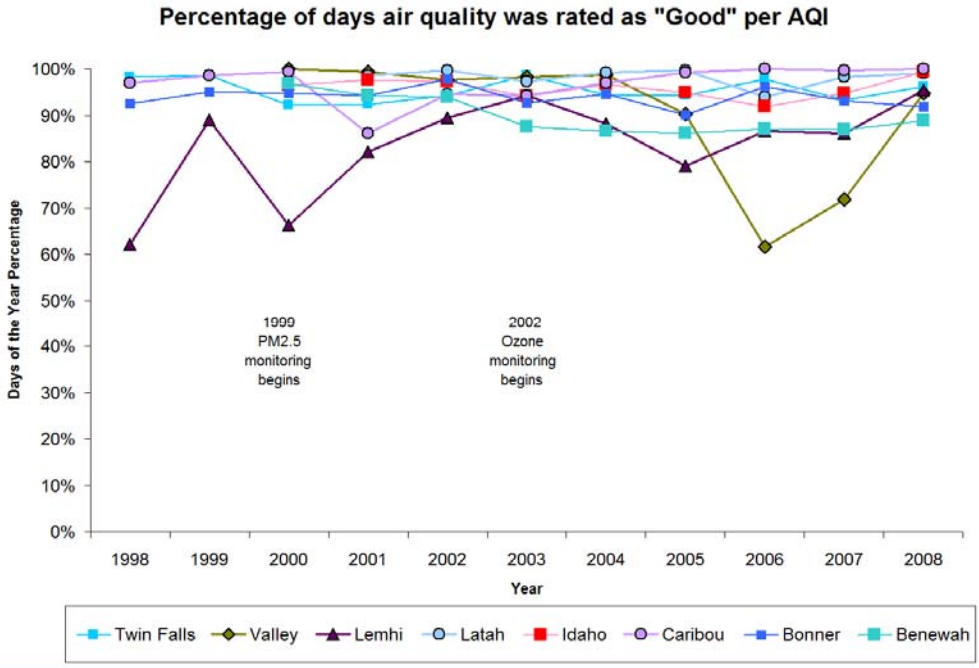
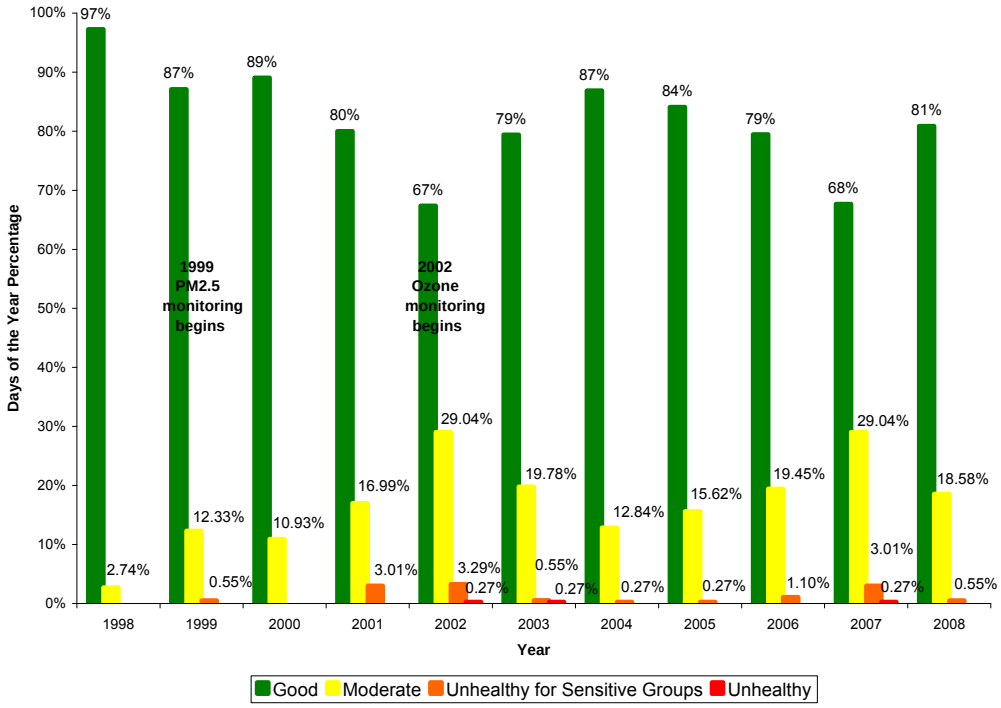


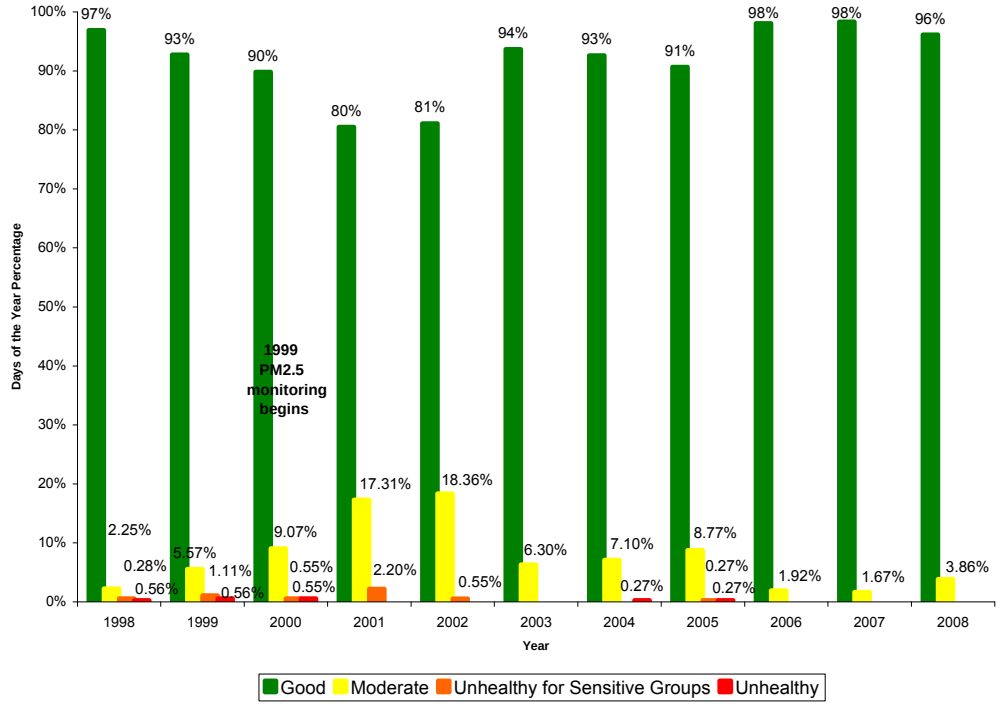

Figure 32b – Percentage of Days Air Quality Was Rated As “Good”



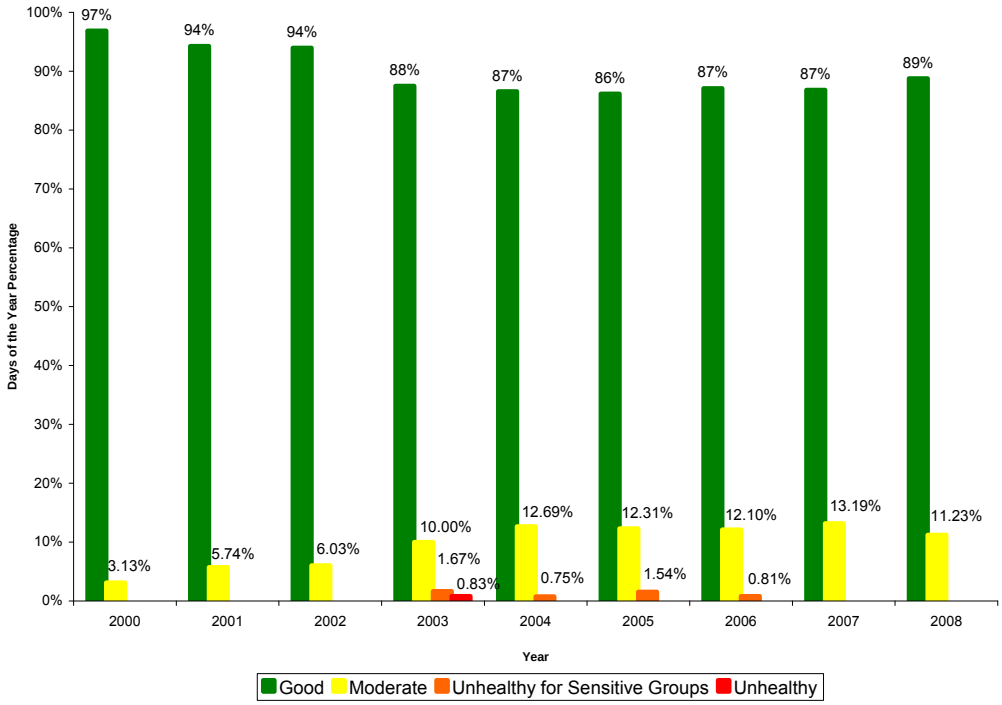
## Figure 33 – Air Quality for Ada County



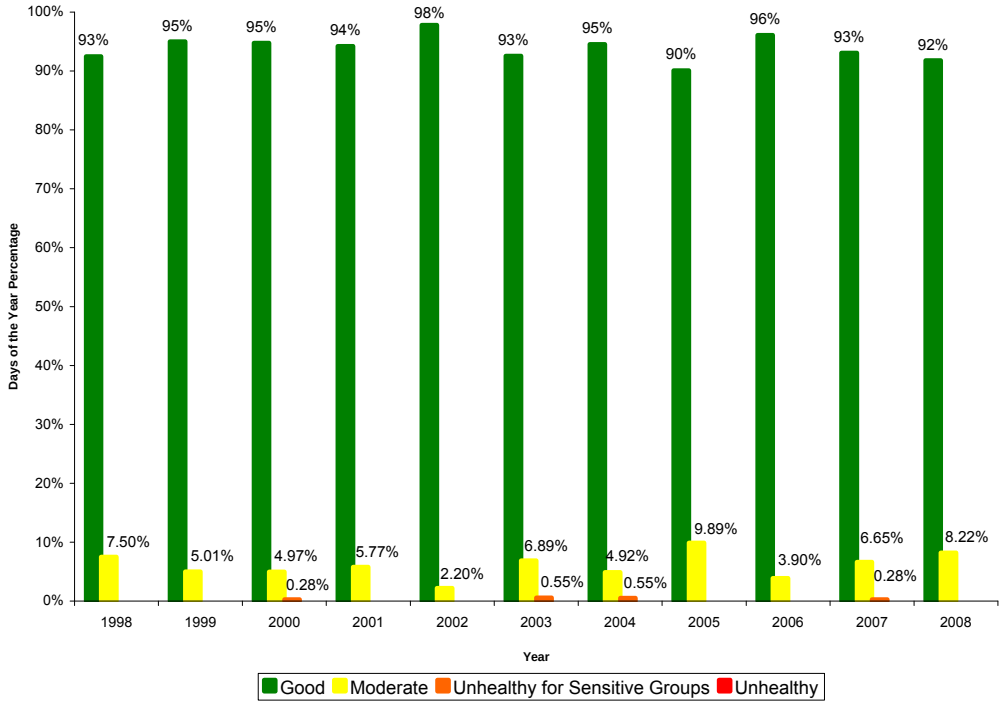

## Figure 34 – Air Quality for Bannock County



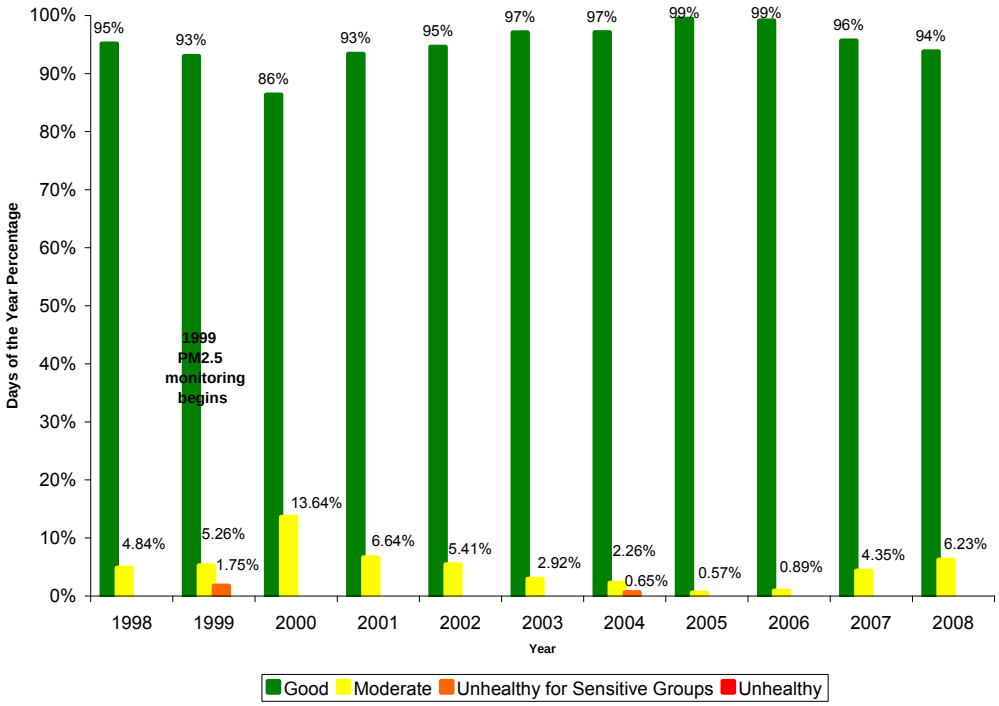
## Figure 35 – Air Quality for Benewah County



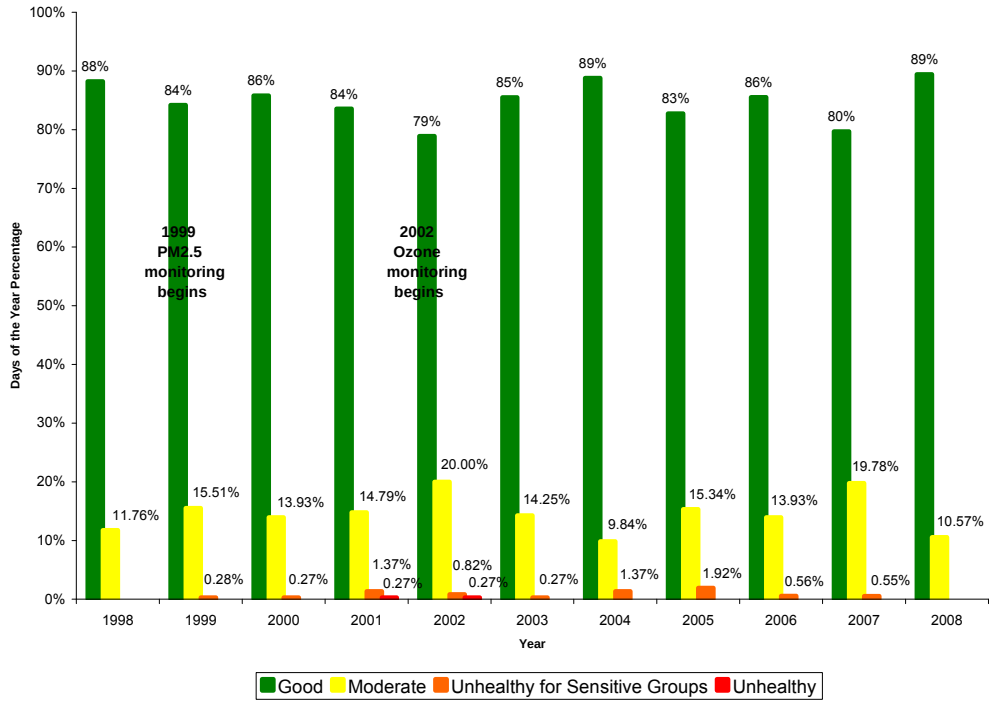

## Figure 36 – Air Quality for Bonner County



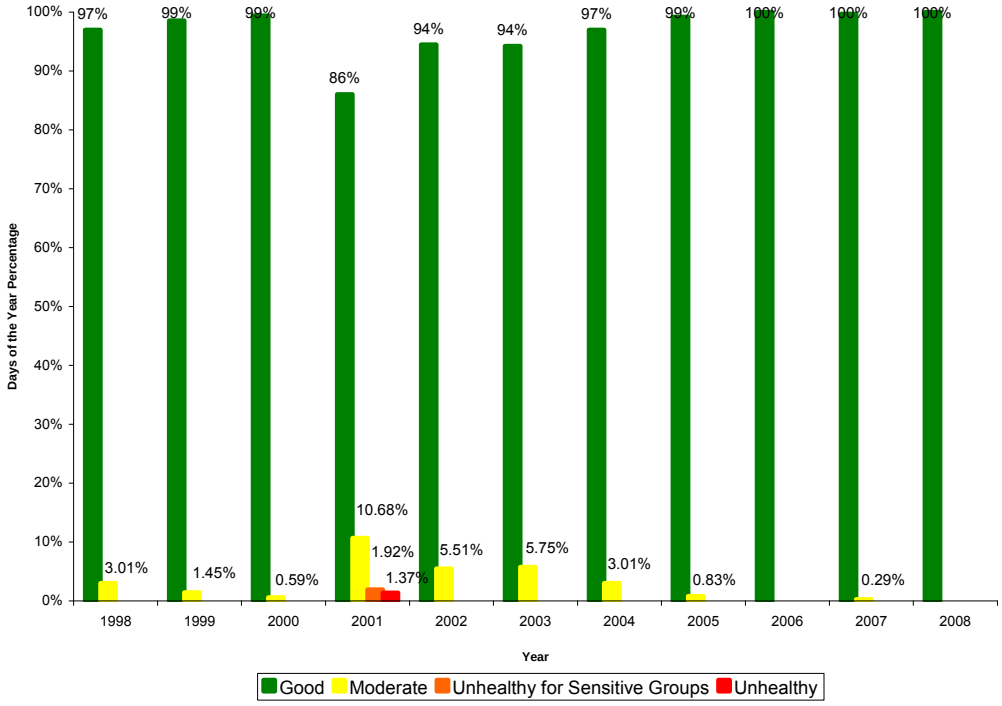
## Figure 37 – Air Quality for Bonneville County



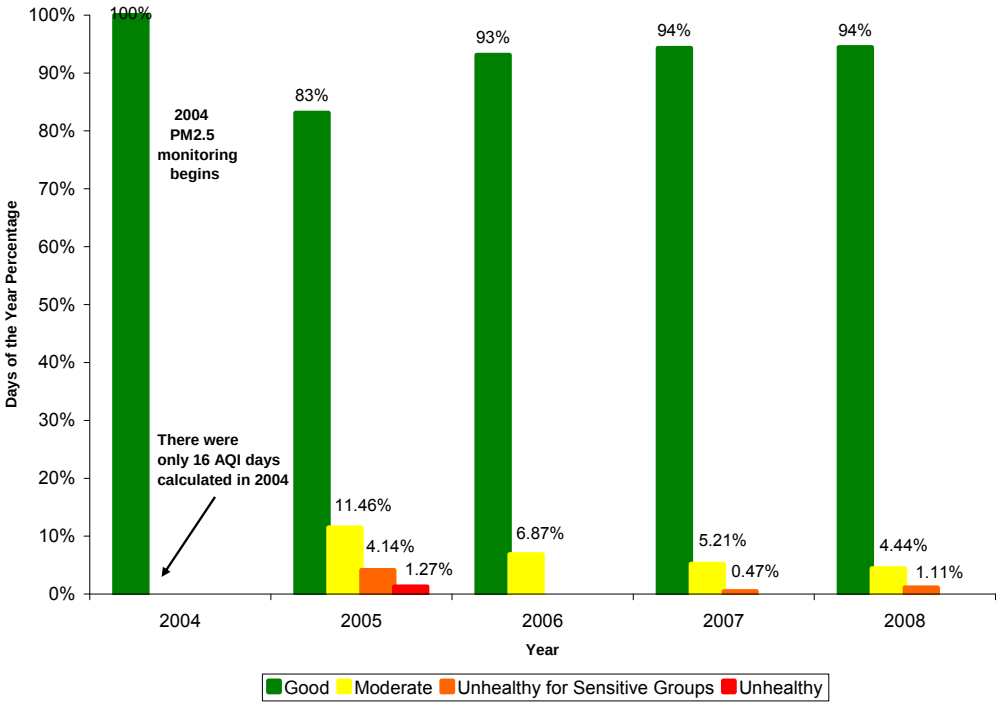

## Figure 38 – Air Quality for Canyon County



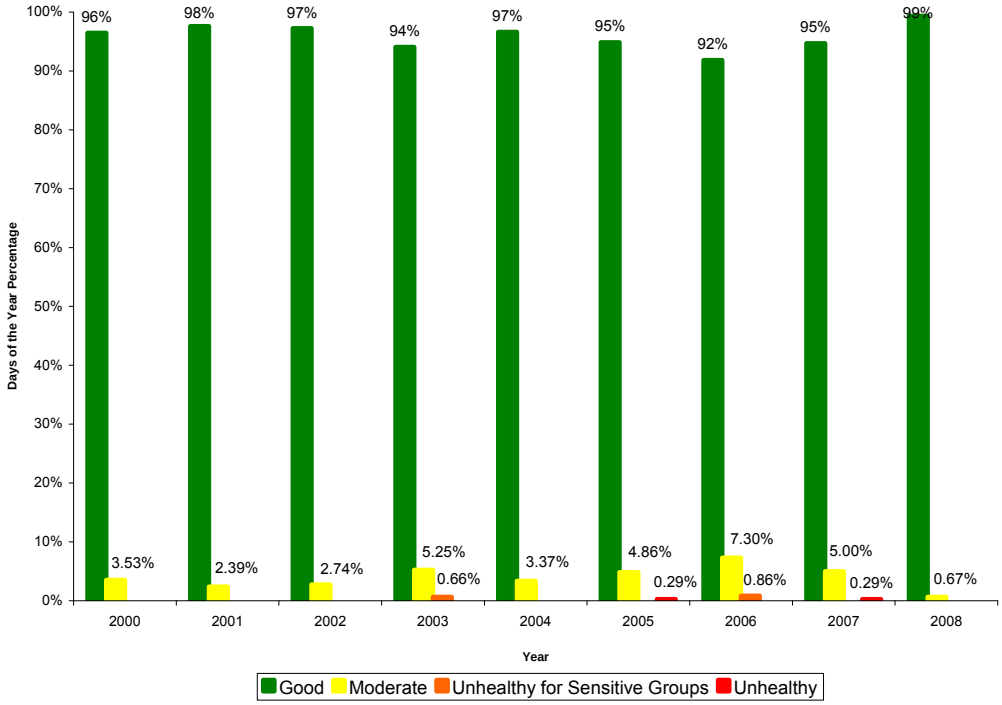
## Figure 39 – Air Quality for Caribou County



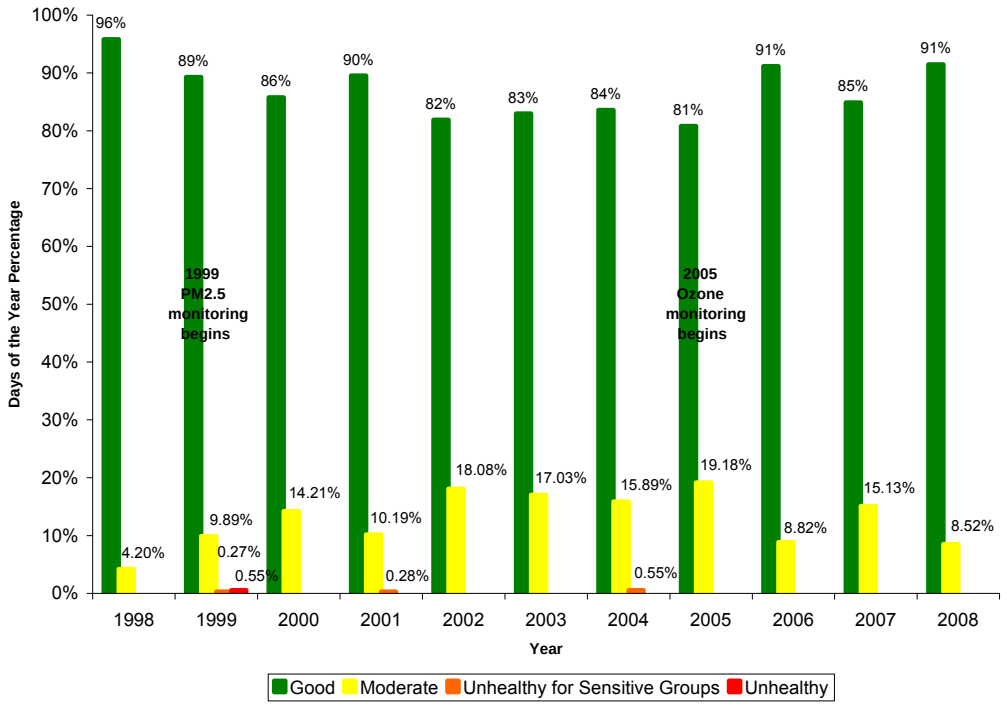

## Figure 40 – Air Quality for Franklin County



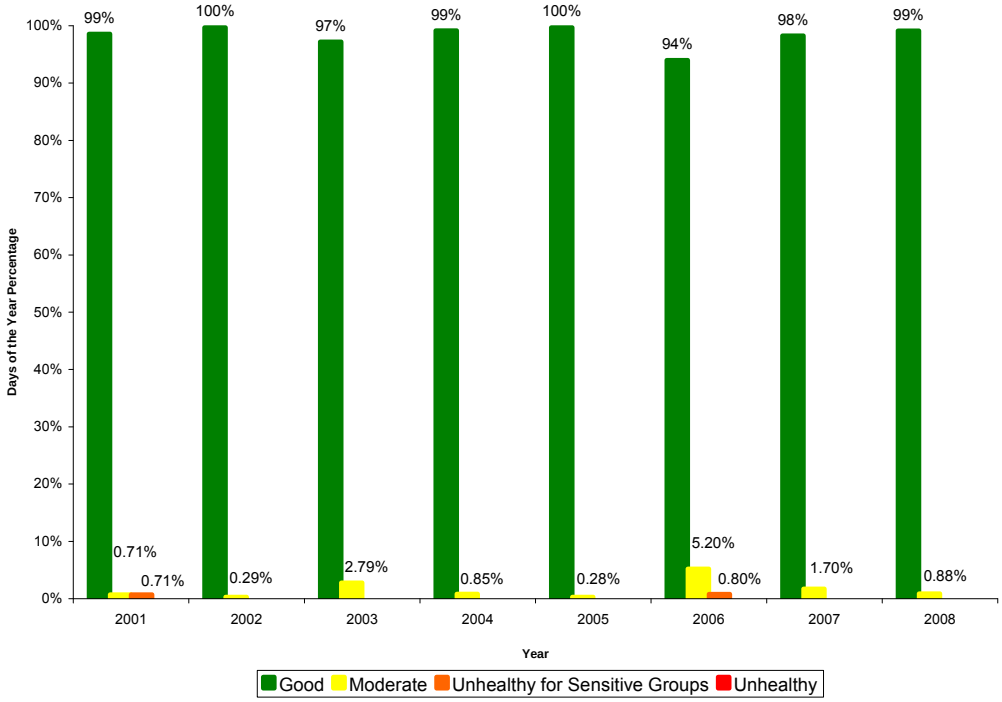
## Figure 41 – Air Quality for Idaho County



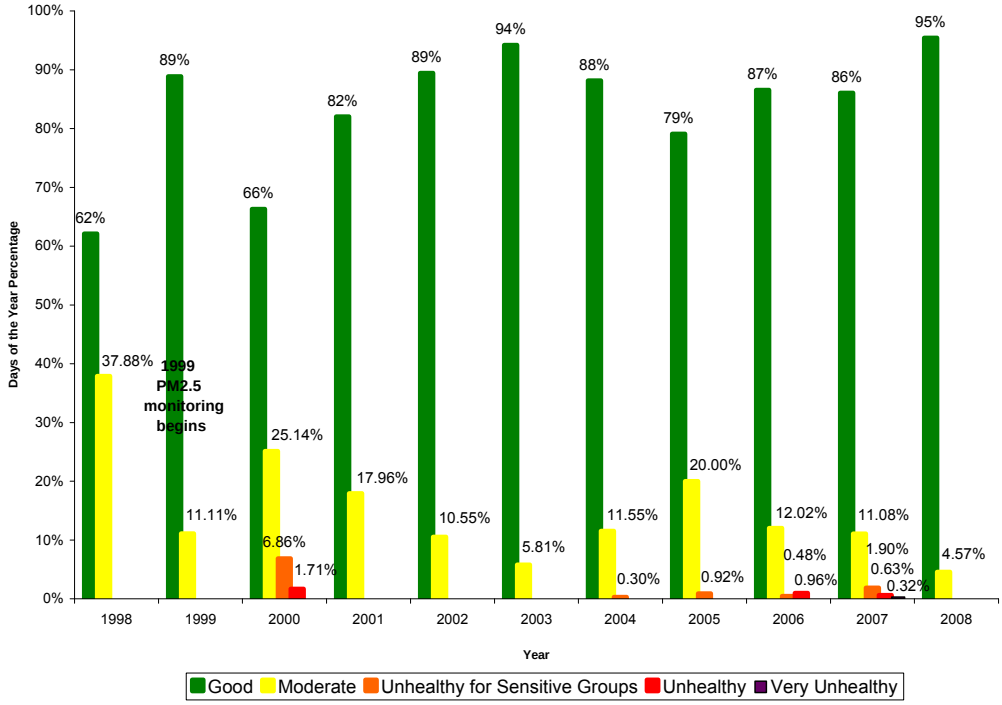

## Figure 42 – Air Quality for Kootenai County



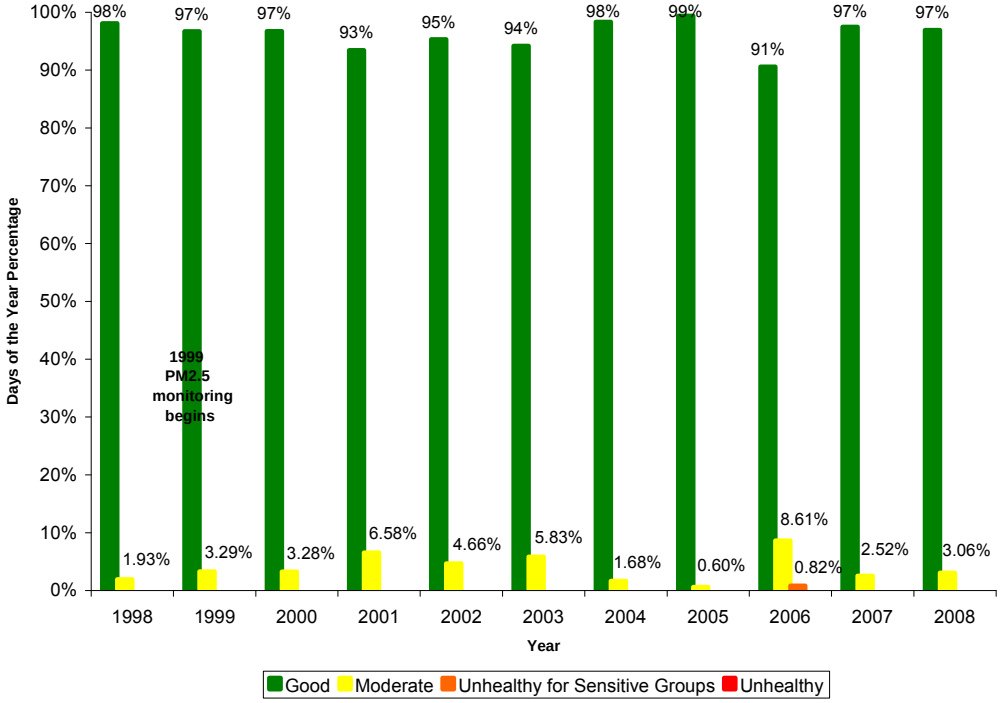
## Figure 43 – Air Quality for Latah County



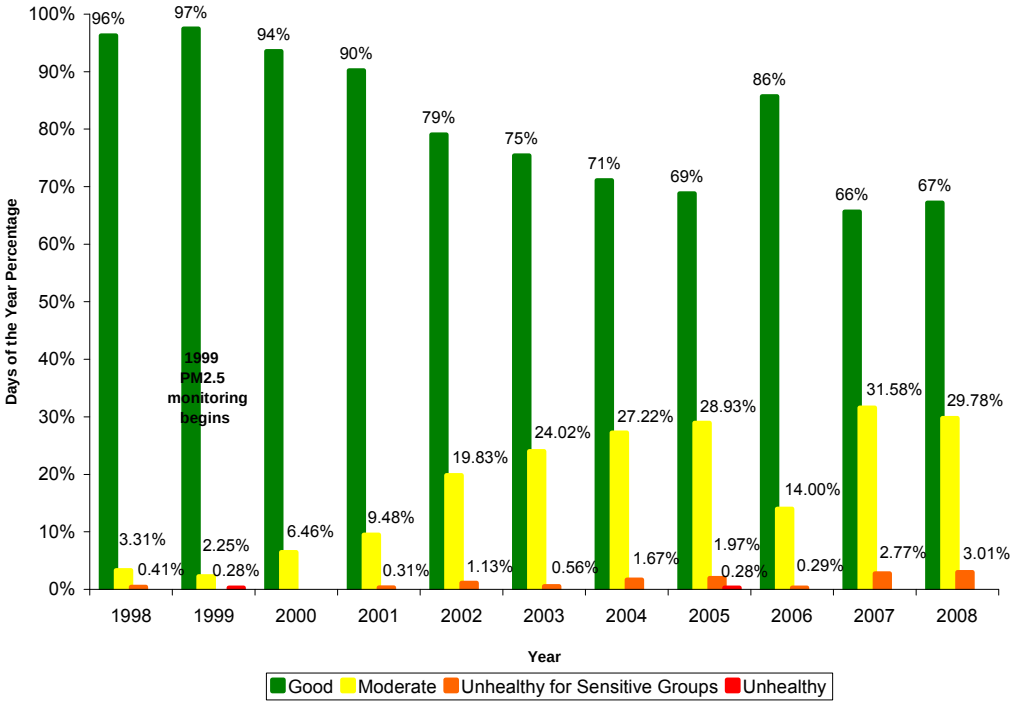

## Figure 44 – Air Quality for Lemhi County



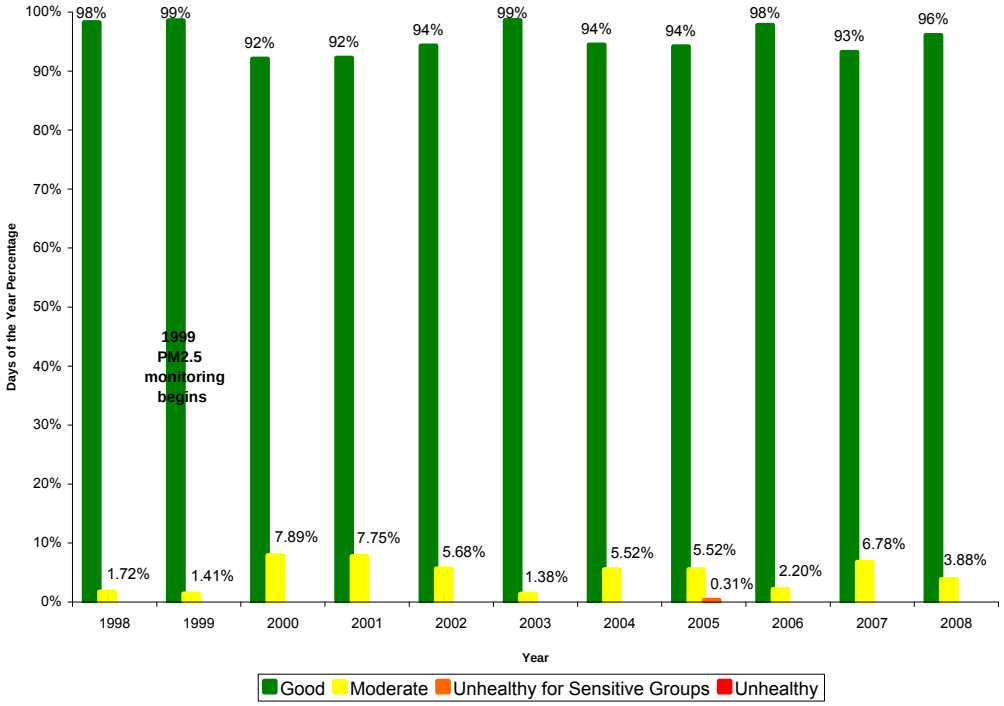
## Figure 45 – Air Quality for Nez Perce County



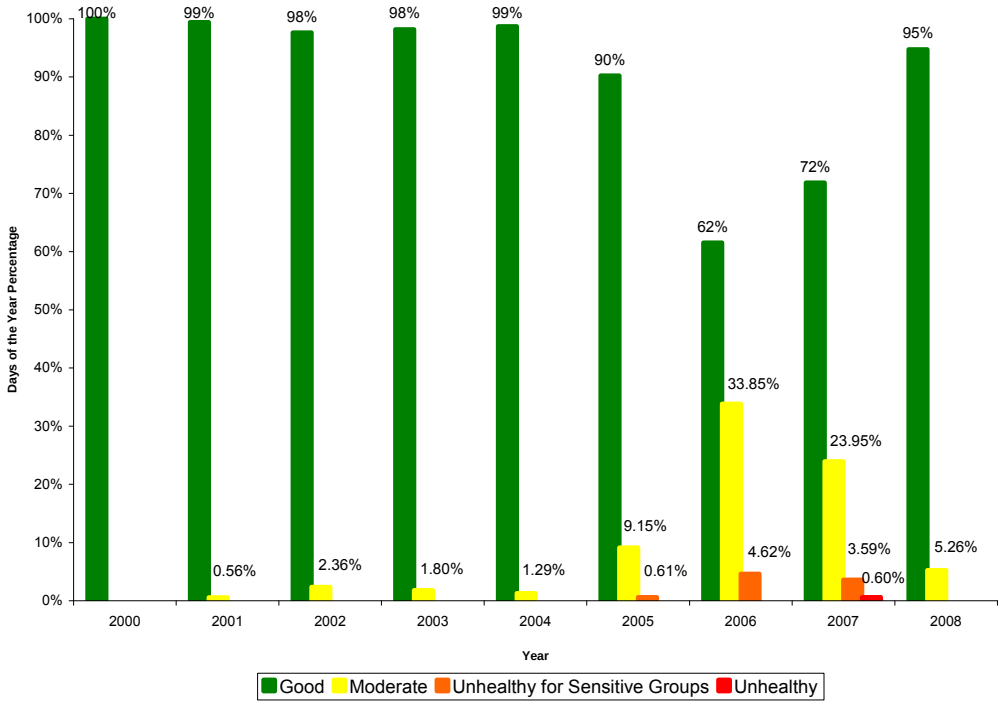

## Figure 46 – Air Quality for Shoshone County



## Figure 47 – Air Quality for Twin Falls County




## Figure 48 – Air Quality for Valley County



The number of "good" AQI days continues to dominate regionally in Idaho; however, there were brief periods when the air quality degraded into one of the other categories. Table 5 below shows the count of number of days in each AQI category in the Idaho counties where air quality is monitored. In 2008, the highest AQI value of 147 was recorded in Shoshone County for $PM_{2.5}$. This value was in the Unhealthy for Sensitive Groups range.

**Table 5: 2008 Air Quality Index Yearly Summary**

| 2008 AQI Ratings | | | | | | |
|---|---|---|---|---|---|---|
| | 2008 | AQI Rating # Days | | | | |
| County | # AQI Days | Good | Moderate | Unhealthy for Sensitive Groups | Unhealthy | Highest AQI |
| Ada | 366 | 296 | 68 | 2 | | 128 |
| Bannock | 363 | 349 | 14 | | | 99 |
| Benewah | 365 | 324 | 41 | | | 96 |
| Bonner | 365 | 335 | 30 | | | 92 |
| Bonneville | 321 | 301 | 20 | | | 77 |
| Butte | 364 | 334 | 30 | | | 87 |
| Canyon | 350 | 313 | 37 | | | 92 |
| Caribou | 317 | 317 | | | | 19 |
| Franklin | 90 | 85 | 4 | 1 | | 122 |
| Idaho | 297 | 295 | 2 | | | 55 |
| Kootenai | 364 | 333 | 31 | | | 100 |
| Latah | 340 | 337 | 3 | | | 60 |
| Lemhi | 350 | 334 | 16 | | | 76 |
| Nez Perce | 327 | 317 | 10 | | | 67 |
| Shoshone | 366 | 246 | 109 | 11 | | 147 |
| Twin Falls | 335 | 322 | 13 | | | 71 |
| Valley | 190 | 180 | 10 | | | 62 |

# Impaired Air Quality

## Winter Burn Bans

Idaho has a winter-impaired air quality program primarily targeting sources of particulate matter from open outdoor burning, prescribed fire use, wood stoves and fireplaces. Idaho's program is generally implemented through local ordinances in those areas that have historically had winter inversion problems. Generally, these ordinances specify that public actions such as open burning bans or indoor wood burning bans take place whenever DEQ reports an AQI above a certain value and air stagnation conditions are forecasted to continue for at least 24 hours.

The DEQ online Current Air Quality Report lists the daily air quality in many cities and regions in Idaho. Each report will list the pollutant being monitored, the AQI, and burn restrictions, if any, for the day. Anyone wanting to know if they can burn can go to this site to see what the forecast is for their area.

DEQ will issue an air quality advisory for specific locations between 2:00 and 4:00 p.m. for the next day when air quality is forecast to be poor. The advisories will be for the expected conditions the next day. Updates will be sent out on weekend days at the same times if conditions are expected to be poor. These advisories will be provided to local media outlets and to others through email notification lists.

## Summer Ozone Alerts

DEQ forecasts pollution conditions for ozone in the Treasure Valley and Kootenai County using pollutant monitoring data and meteorological information. Because ozone needs heat and sunlight to form, it is considered a summertime problem and is only monitored from May 1 through September 30. Ozone pollution can rise to very high levels when the valley experiences hot days with few clouds in the sky. The Treasure Valley and Kootenai County tend to see daily ozone levels that begin to rise in the late morning and peak in the late afternoon and early evening. This phenomenon follows very closely with the time of day that the sun is the highest in the sky through the time temperatures are the hottest. Since we have no control over our weather characteristics, we have to focus on controlling what we put into our air. Under yellow or moderate alerts, the public is requested to change certain behaviors to prevent further deterioration of air quality. These alerts will be reported to local media outlets and to others through an email notification list.

# DEFINITIONS

### Air Toxics

Air toxics are broadly defined as almost 700 pollutants that DEQ considers to be potentially harmful to human health and the environment. These pollutants are listed in the Idaho air rules in IDAPA 58.01.01.585 and 586 (http://adm.idaho.gov/adminrules/rules/idapa58/0101.pdf). Hazardous air pollutants (see below) are included in this list to identify them as a subset of air toxics.

### Criteria Air Pollutant (CAP)

The Clean Air Act of 1970 defined six *criteria pollutants* and established ambient concentrations of each to protect public health. EPA periodically has revised the original concentration limits and methods of measurement, most recently in 2008. See page 3 for the list and the allowed ambient concentrations.

### Hazardous Air Pollutant (HAP)

A *hazardous air pollutant* is an air contaminant identified as toxic in the Federal Clean Air Act, Section 112(b). 188 pollutants are currently listed as HAPs. They are listed by EPA at http://www.epa.gov/ttn/atw/188polls.html.

### Temperature Inversions

The earth gains and loses most of its energy at its surface. It is warmed by solar heating during the day and cooled by radiation emissions at night. During the late morning and afternoon hours, the air near the surface is warmer than the air aloft and allows for good pollutant dispersion (vertical mixing may be 1,500 meters or more). At night with clear skies, the surface radiates heat into outer space, creating cooler air at the surface and warmer air aloft. Warmer air above cooler air (temperature inversion) is a stable condition and limits the upward movement of pollution because the warmer air acts as a barrier. With little or no wind, pollutants are trapped near the surface (vertical mixing may be 200 meters or less) and can reach high levels of concentration.

### Volatile Organic Compound (VOC)

An organic compound that participates in atmospheric photochemical reactions. This excludes all compounds determined to have negligible photochemical reactivity by EPA and listed in 40 CFR 51.100(s) in effect July 1, 1998.

### Visibility/Regional Haze

Visibility is often explained in terms of visual range and light extinction. *Visual range* is the maximum distance—usually miles or kilometers—that you can see a black object against the horizon. *Light extinction* is the sum of light scattering and light absorption by fine particles and gases in the atmosphere. The more light extinction you have, the shorter your visual range will be. Reduced visibility (or visual range) is caused by weather (clouds, fog, and rain) and air pollution (fine particles and gases). The major pollution contributor to reduced visibility is fine particulate matter ($PM_{2.5}$) emissions, which are transported aloft and may remain suspended for a week or longer. Fine particles have a greater impact than coarse particles at locations far from the emitting source because they remain suspended in the atmosphere longer and travel farther. $PM_{2.5}$ also presents some of the most serious health hazards to the public, so you can roughly assume that the worse the visibility, the unhealthier the air is to breathe.

## Pollution Sources

### Area Sources

Categories of pollution sources, in which each individual industrial source emits pollutants below the thresholds for a point source facility designation, and other categories that are a result of human activities and are best estimated at a county level in association with population numbers. For example, natural gas use for home heating, gas stoves, or woodstoves.

### Biogenics

Natural sources such as trees, plants, grass, crops, and soils. The worldwide emissions rate of these natural hydrocarbons has been estimated to exceed that of non-methane hydrocarbons originating from human sources. Isoprene, one of the major constituents of biogenic emissions, is very photo reactive and makes biogenic VOCs a contributor in the formation of ozone.

### Emission Factor

A value derived from source tests, material balance calculations, or engineering comparisons with similar processes. Used to estimate emissions from process quantities.

### Non-road Mobile Sources

Farm vehicles, on-site construction/industrial vehicles, logging equipment, small marine craft, aircraft, trains, lawn and garden equipment, and off-road trail machines.

### On-road Mobile Sources

Cars, trucks, sport utility vehicles, motorcycles and buses.

### Point Sources

For the every-third-year statewide emissions inventory, point sources are defined as facilities that have actual annual air pollutant emissions equal to or exceeding 1000 tons per year of CO; 100 tons per year of $NO_X$, $PM_{10}$, $PM_{2.5}$, $SO_x$, or VOCs; or 5 tons per year of lead.

### Registered Facility

The total of all pollutant-emitting activities located on adjacent or contiguous properties owned or operated by one person or corporate entity. It includes all of the pollutant-emitting buildings, processes, structures, equipment, control apparatuses, and storage areas at a facility.

## Criteria Air Pollutants

### Ozone ($O_3$)

- **What is it?**
  Ozone, a bluish-colored gas molecule with a strong odor, is composed of three atoms of oxygen. In the upper atmosphere ozone occurs naturally and partially absorbs the sun's harmful ultraviolet rays. Ozone at ground level is a summertime air pollution problem.
- **How is it caused?**
  Ozone forms when photochemical pollutants from cars, trucks, and industrial sources react with sunlight. Ozone-forming pollutants include $NO_X$ and VOCs; even gasoline-powered yard equipment, paints, solvents, and off-road vehicle motors contribute.
- **When does it happen?**
  Ozone pollution is most common in the summer months, when sunlight and stable atmospheric conditions occur. Ozone levels are usually highest in the afternoon, as sunlight photo chemically transforms $NO_X$ and VOCs into ozone.
- **Who is affected?**
  Adults and children who are active outdoors, people with respiratory disease such as asthma, and people with unusual sensitivity to ozone. During physical activity, ozone penetrates deeper into the lungs and can do more damage.

  Ozone is a very reactive gas. For this reason, high concentrations of ozone can cause respiratory distress and disease in humans, decreased yields of agricultural crops and forests, and damage to some rubber products, plastics, and paints used outdoors. National crop losses from ozone exposure are estimated at $3 billion to $5 billion annually. Forest losses are harder to estimate.
- **What are the health effects?**
  Ozone can cause coughing and throat irritation, make deep vigorous breathing more difficult, and increase the chance of respiratory infections. It increases sensitivity to allergens and can trigger asthma attacks. The damage it causes to the lungs heals within a few days, but repeated or prolonged exposure may cause permanent damage.
- **What can I do about it?**
  If ozone levels are high and you have a respiratory condition or are normally active outdoors, try to limit your outdoor exertion.

  In the United States, management of ozone and other photochemical oxidants has been a major goal of federal and state clean air legislation (Clean Air Act). Although many of the pollution control efforts required by the CAA have been implemented, efforts to decrease ozone pollution have been only partially successful.
- **Where is it measured?**
  Unlike other pollutants monitored here in Idaho, ozone is formed when precursor compounds react in the atmosphere. Winds transport ozone and precursor emissions from one area to another. For the Treasure Valley, ozone precursors are emitted into the air in urban areas of the airshed and subsequently travel southeasterly to more rural areas as they react to form ozone. As a result, for the Treasure Valley airshed, DEQ has monitors in various locations. Another ozone monitor has been running in the Coeur d'Alene area since 2005.

## Particulate Matter ($PM_{2.5}$ and $PM_{10}$)

- **What is it?**
  Particulate matter (PM) includes both solid matter and liquid droplets suspended in the air. Particles smaller than 2.5 micrometers in diameter are called "fine" particles, or $PM_{2.5}$. Particles between 2.5 and 10 micrometers in diameter are called "coarse" particles. $PM_{10}$ includes both fine and coarse particles. DEQ considers $PM_{2.5}$ to be one of the major air pollution concerns affecting our state.
- **How is it caused?**
  $PM_{2.5}$ comes from all types of combustion, including cars, diesel trucks, power plants, wood burning, and from some industrial processes. It can also be formed in the atmosphere by chemical reactions of pollutant gases. The "coarse" particles in $PM_{10}$ typically come from crushing or grinding operations and dust from roads.
- **When does it happen?**
  Daily $PM_{2.5}$ trends in urbanized areas suggest that $PM_{2.5}$ levels peak in association with traffic flow and rush hour periods. Periods of stagnate weather patterns, such as when surface inversions typically occur, contribute to elevated $PM_{2.5}$ trends.
- **Who is affected?**
  People with asthma and heart or lung disease, the elderly, and children. $PM_{2.5}$ also significantly affects visibility.
- **What are the health effects?**
  Fine particulates ($PM_{2.5}$) pose a greater risk to human health than coarse particulates, because they penetrate deeper into the respiratory system. $PM_{2.5}$ exposure can have serious health effects. People with heart or lung diseases are at increased risk of attacks or premature death. Children and the elderly are more likely to develop heart or lung problems. $PM_{10}$ can aggravate respiratory conditions such as asthma.
- **What can I do about it?**
  If $PM_{2.5}$ levels are high, people with respiratory or heart disease, the elderly, and children should avoid outdoor exertion. If $PM_{10}$ levels are high, people with respiratory conditions should avoid outdoor exertion.
- **Where is it measured?**
  Due to the health risks associated with PM, both $PM_{2.5}$ and $PM_{10}$ are monitored in various population-oriented locations throughout Idaho.

## Carbon Monoxide (CO)

- **What is it?**
  CO is an odorless, colorless gas that can enter the bloodstream through the lungs and reduce the amount of oxygen that reaches organs and tissues.
- **How is it caused?**
  Carbon monoxide forms when the carbon in fuels doesn't burn completely. Vehicle exhaust contributes 60% of all CO. In cities, that can be a 95% contribution.

- **When does it happen?**
  CO pollution is at its worst in cold weather because fuels burn less efficiently in low temperatures. CO levels usually peak during morning and evening rush hours.
- **Who is affected?**
  People with cardiovascular disease, such as angina, or cardiovascular or respiratory problems; also fetuses and young infants.
- **What are the health effects?**
  Chest pain and increased cardiovascular symptoms, particularly while exercising. High levels of CO can even affect alertness and vision in healthy individuals.
- **What can I do about it?**
  If CO levels are high, limit exertion and avoid sources of CO such as heavy traffic.
- **Where is it measured?**
  CO monitoring stations are located in urban canyon areas with heavy traffic congestion. These include central business areas, roadsides, and shopping malls. The Boise CO monitor is located in downtown Boise and monitors CO as part of an air quality maintenance plan. Beginning in 2009 CO will also be monitored in Meridian.

**Sulfur Dioxide ($SO_2$)**

- **What is it?**
  Sulfur dioxide is a colorless, reactive gas.
- **How is it caused?**
  $SO_2$ is produced by burning sulfur-containing fuels such as coal and oil and by some industrial processes.
- **Where does it happen?**
  The highest concentrations of $SO_2$ are usually near large industrial sources.
- **Who is affected?**
  People with asthma who are active outdoors.
- **What are the health effects?**
  Bronchoconstriction, which can cause wheezing, shortness of breath, and tightening of the chest. When exposure to $SO_2$ ends, the symptoms should clear up within an hour.
- **What can I do about it?**
  If $SO_2$ levels are high, limit your outdoor exertion.
- **Where is it measured?**
  Because the large primary sources of $SO_2$ in Idaho are industrial, DEQ monitors for $SO_2$ near large facilities with high $SO_2$ emissions. The only monitors running in 2008 were in Pocatello and Soda Springs. Beginning in 2009 it will also be monitored in Meridian.

## Lead (Pb)

- **What is it?**
  Lead is a highly toxic metal that was used for many years in household products, automobile fuel, and industrial chemicals.
- **How is it caused?**
  Locally, airborne lead is associated primarily with automobile exhaust and lead smelters. Since the phase-out of lead in fuels, cars and trucks are no longer a significant source of lead. Also, the Kellogg Bunker Hill Mine ceased operations in 1981.
- **When does it happen?**
  Lead concentrations are likely to be highest near sources where current or former lead smelting/processing operations caused particle fallout, especially in nearby soils such as unpaved parking lots.
- **Who is affected?**
  Everyone. Children six years and younger are most at risk.
- **What are the health effects?**
  Lead can have health effects ranging from behavioral problems and learning disabilities to seizures and death.
- **What can I do about it?**
  According to EPA, the primary sources of lead exposure are lead-based paint, lead-contaminated dust, and lead-contaminated residual soils. Refer to EPA's Web site at http://www.epa.gov/ttn/atw/hlthef/lead.html for ways to limit your exposure to these lead sources.
- **Where is it measured?**
  Due to the phase-out of leaded fuels and the closure of Idaho's only lead smelter in 1981, DEQ discontinued monitoring for airborne lead. Historical monitoring was continued until 2002 but was discontinued due to the low levels being measured. With the lowering of the lead standard, DEQ will resume monitoring of lead in 2011 at the NCore site in Meridian.

## Nitrogen Dioxide ($NO_2$)

- **What is it?**
  Nitrogen dioxide ($NO_2$) is a reddish brown, highly reactive gas that forms from the reaction of nitrogen oxide (NO) and oxygen in the atmosphere. $NO_2$ will react with VOCs and can result in the formation of ozone.
- **How is it caused?**
  High temperature combustion sources such as power plants and automobiles are major producers of NO. Home heaters and gas stoves can also produce NO.
- **When does it happen?**
  $NO_2$ pollution is greatest in cold weather. It follows a similar trend to CO.
- **Who is affected?**
  People with respiratory diseases such as asthma; also children.

- **What are the health effects?**
  $NO_2$ can cause respiratory symptoms such as coughing, wheezing, and shortness of breath. Long-term exposure can lead to respiratory infections.
- **What can I do about it?**
  Since the 1970s, motor vehicle manufacturers have been required to reduce NO emissions from cars and trucks. It is not a significant pollution problem in Idaho.
- **Where is it measured?**
  $NO_2$ is not a major concern in Idaho. It was measured during 2008 at the Lancaster site near Coeur d'Alene concurrent with the ozone monitoring season. Beginning in 2009 it will be monitored year-round at Meridian.

# Appendix

## Table 6: Calculation and Breakpoints for the Air Quality Index (AQI)

| Breakpoints for Criteria Pollutants | | | | | | | AQI Categories | |
|---|---|---|---|---|---|---|---|---|
| $O_3$ (ppm) 8-hour | $O_3$ (ppm) 1-hour[a] | $PM_{2.5}$ ($\mu g/m^3$) | $PM_{10}$ ($\mu g/m^3$) | CO (ppm) | $SO_2$ (ppm) | $NO_2$ (ppm) | AQI value | Category |
| 0.000–0.059 | — | 0.0–15.4 | 0–54 | 0.0–4.4 | 0.000–0.034 | (b) | 0–50 | Good |
| 0.060–0.075 | — | 15.5–35.4 | 55–154 | 4.5–9.4 | 0.035–0.144 | (b) | 51–100 | Moderate |
| 0.076–0.095 | 0.125–0.164 | 35.5–65.4 | 155–254 | 9.5–12.4 | 0.145–0.224 | (b) | 101–150 | Unhealthy for sensitive groups |
| 0.096–0.115 | 0.165–0.204 | 65.5–150.4 | 255–354 | 12.5–15.4 | 0.225–0.304 | (b) | 151–200 | Unhealthy |
| 0.116–0.374 | 0.205–0.404 | 150.5–250.4 | 355–424 | 15.5–30.4 | 0.305–0.604 | 0.65–1.24 | 201–300 | Very unhealthy |
| (c) | 0.405–0.504 | 250.5–350.4 | 425–504 | 30.5–40.4 | 0.605–0.804 | 1.25–1.64 | 301–400 | Hazardous |
| (c) | 0.505–0.604 | 350.4–500.4 | 505–604 | 40.5–50.4 | 0.805–1.004 | 1.65–2.04 | 401–500 | |

a Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be safer. In these cases, in addition to calculating the 8-hour ozone value, the 1-hour ozone value may be calculated, and the greater of the two values reported.

b $NO_2$ has no short-term National Ambient Air Quality Standard (NAAQS) and can generate an AQI only above a value of 200.

c 8-hour $O_3$ values do not define higher AQI values (above 300). AQI values above 300 are calculated with 1-hour $O_3$ concentrations.

For more detailed information about the AQI and the pollutants it measures, go to www.epa.gov/airnow/aqibroch

## Table 7: 2008 Air Quality Index Summary Report

| | | | Number of Days AQI was: | | | | | | | | Number of Days Main AQI Pollutant was: | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # AQI data days | Good | Mod | Unhealthy Sensitive Groups | Un-healthy | Very Unhealthy | Max AQI | 90th % AQI | Median AQI | CO | NO2 | O3 | SO2 | PM2.5 | PM10 |
| 2008 | Ada | 366 | 296 | 68 | 2 | | | 128 | 60 | 38 | 13 | | 133 | | 184 | 36 |
| 2008 | Bannock | 363 | 349 | 14 | | | | 99 | 68 | 23 | | | | 102 | 189 | 72 |
| 2008 | Benewah | 365 | 324 | 41 | | | | 96 | 54 | 25 | | | | | 365 | |
| 2008 | Bonner | 365 | 335 | 30 | | | | 92 | 54 | 24 | | | | | 338 | 27 |
| 2008 | Bonneville | 321 | 301 | 20 | | | | 77 | 56 | 23 | | | | | 321 | |
| 2008 | Butte | 364 | 334 | 30 | | | | 87 | 49 | 40 | | | 364 | | | |
| 2008 | Canyon | 350 | 313 | 37 | | | | 92 | 60 | 30 | | | | | 263 | 87 |
| 2008 | Caribou | 317 | 317 | | | | | 19 | 34 | 14 | | | | 317 | | |
| 2008 | Franklin | 90 | 85 | 4 | 1 | | | 122 | 78 | 20 | | | | | 90 | |
| 2008 | Idaho | 297 | 295 | 2 | | | | 55 | 88 | 23 | | | | | 297 | |
| 2008 | Kootenai | 364 | 333 | 31 | | | | 100 | 49 | 32 | | | 138 | | 226 | |
| 2008 | Latah | 340 | 337 | 3 | | | | 60 | 88 | 24 | | | | | 340 | |
| 2008 | Lemhi | 350 | 334 | 16 | | | | 76 | 56 | 20 | | | | | 350 | |
| 2008 | Nez Perce | 327 | 317 | 10 | | | | 67 | 88 | 21 | | | | | 327 | |
| 2008 | Shoshone | 366 | 246 | 109 | 11 | | | 147 | 81 | 37 | | | | | 361 | 5 |
| 2008 | Twin Falls | 335 | 322 | 13 | | | | 71 | 52 | 21 | | | | | 335 | |
| 2008 | Valley | 190 | 180 | 10 | | | | 62 | 47 | 21 | | | | | 190 | |

**Table 8: 2008 Monitor Values Summary for Particulate Matter $PM_{2.5}$**

| | | 24-Hour PM2.5 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 1st Max | 2nd Max | 3rd Max | 4th Max | 98th Pct | # Exceed | Annual Mean | Annual # Exceed | Monitor Number | Site ID | Site Address | City |
| 2008 | Ada | 79 | 29.4 | 29.0 | 18.8 | 17.5 | 29.0 | 0 | 7.55 | 0 | 1 | 160010010 | 520 S. Eagle Road, Meridian | Meridian |
| 2008 | Ada | 102 | 32.0 | 29.1 | 22.0 | 21.5 | 22.0 | 0 | 7.47 | 0 | 1 | 160010011 | Mtn View School/3500 Carbarton Lane | Boise |
| 2008 | Benewah | 113 | 25.2 | 23.0 | 22.4 | 21.1 | 22.4 | 0 | 9.25 | 0 | 1 | 160090010 | 9th And Center | St. Maries |
| 2008 | Canyon | 43 | 26.7 | 17.2 | 17.0 | 16.9 | 26.7 | 0 | 8.23 | 0 | 1 | 160270002 | Nampa Fire Station/923 1st Street | Nampa |
| 2008 | Canyon | 63 | 34.7 | 29.8 | 27.6 | 24.2 | 29.8 | 0 | 6.67 | 0 | 1 | 160270004 | Northwest Nazarene University (NNU) | Nampa |
| 2008 | Franklin | 90 | 51.3 | 26.6 | 20.7 | 20.0 | 26.6 | 1 | 7.19 | 0 | 1 | 160410001 | Franklin - Water Treatment Facility At E | Franklin |
| 2008 | Lemhi | 58 | 28.0 | 27.9 | 25.4 | 23.3 | 27.9 | 0 | 8.97 | 0 | 1 | 160590004 | N. Charles St. | Salmon |
| 2008 | Shoshone | 322 | 56.2 | 50.8 | 41.2 | 37.7 | 36.2 | 7 | 11.79 | 0 | 1 | 160790017 | Pinehurst/Pinehurst School, Pinehurst | Pinehurst |
| 2008 | Shoshone | 46 | 56.0 | 35.2 | 31.3 | 29.2 | 56.0 | 1 | 12.26 | 0 | 2 | 160790017 | Pinehurst/Pinehurst School, Pinehurst Precision Monitor | Pinehurst |

* Values indicated come from Federal Reference or Equivalent Method measurements.

# Exceed indicates the number of times measurements exceeded the NAAQS standard of 35.5 ug/m3. Exceedances themselves do not cause an area to be designated non-attainment but often times cause the 98$^{th}$ percentile value to be higher which, when averaged with the previous two years can cause an area to be designated non-attainment. For 2008, Pinehurst 98$^{th}$ percentile is above the NAAQS standard of 35.5 ug/m3. The three year average (2006-2008) of the 98$^{th}$ percentiles is used to assess whether the area is classified as "non-attainment." Pinehurst 3-year average of 98$^{th}$ percentile is 34 ug/m3, below the standard.

## Table 9: 2008 Monitor Values Summary for Particulate Matter $PM_{10}$

| | | 24-Hour PM10 | | | | | Annual Mean | | |
|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 99th percentile | Data Completeness Met? | # Exceed | Comments | Site ID | Site Address | City |
| 2008 | Ada | 328 | 67 | Yes | 0 | | 160010009 | Fire Station #5/16th & Front | Boise |
| 2008 | Bannock | 49 | 68 | Yes | 0 | Precision Monitor | 160050015 | G&G/Corner Of Garret & Gould | Pocatello |
| 2008 | Bannock | 98 | 68 | No | 0 | Primary monitor | 160050015 | G&G/Corner Of Garret & Gould | Pocatello |
| 2008 | Bonner | 360 | 38 | Yes | 0 | | 160170004 | 310 South Division Street | Sandpoint |
| 2008 | Canyon | 242 | 75 | No | 0 | | 160270002 | Nampa Fire Stn/923 1st St | Nampa |
| 2008 | Shoshone | 338 | 50 | Yes | 0 | | 160790017 | Pinehurst/Pinehurst School | Pinehurst |

* Values indicated come from Federal Reference or Equivalent Method measurements.

## Table 10: 2008 Monitor Values Summary for Ozone

| | | 8-Hour Ozone | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | 1st Max | 2nd Max | 3rd Max | 4th Max | Days >Std | Required Days | # Days | % Days | Monitor Number | Site ID | Site Address | City |
| 2008 | Ada | 0.072 | 0.072 | 0.072 | 0.071 | 0 | 153 | 137 | 90 | 1 | 160010010 | 520 S. Eagle Road, Meridian | Meridian |
| 2008 | Ada | 0.079 | 0.074 | 0.071 | 0.071 | 1 | 153 | 129 | 84 | 1 | 160010019 | 3311 W. State Street, Boise | Boise |
| 2008 | Ada | 0.077 | 0.074 | 0.072 | 0.069 | 1 | 153 | 141 | 92 | 1 | 160010030 | Whitney Elementary School | Boise |
| 2008 | Butte | 0.071 | 0.069 | 0.069 | 0.067 | 0 | 153 | 148 | 97 | 1 | 160230101 | Craters Of The Moon National Mon, Idaho | COMNM |
| 2008 | Kootenai | 0.060 | 0.060 | 0.059 | 0.058 | 0 | 153 | 142 | 93 | 1 | 160550003 | North Of Lancaster Road - Near Hayden, I | Hayden |

**Table 11: 2008 Monitor Values Summary for Carbon Monoxide (CO)**

| | | 1-Hour CO | | | | 8-Hour CO | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 1st Max | 2nd Max | # Exceed | 1st Max | 2nd Max | # Exceed | Monitor # | Site ID | Site Address | City |
| 2008 | Ada Co | 6443 | 8.0 | 7.3 | 0 | 2.9 | 2.9 | 0 | 1 | 160010014 | Eastman Bldg/166 N. 9th St | Boise |

**Table 12: 2008 Monitor Values Summary for Nitrogen Dioxide ($NO_2$)**

| | | 1-Hour NO2 | | | Annual NO2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 1st Max | 2nd Max | Mean | # Exceed | Monitor # | Site ID | Site Address | City |
| 2008 | Kootenai | 3298 | 0.024 | 0.021 | 0.0038 | 0 | 1 | 160550003 | North Of Lancaster Road - Near Hayden, I | Hayden |

**Table 13: 2008 Monitor Values Summary for Sulfur Dioxide ($SO_2$)**

| | | 1-Hr SO2 | | | 3-Hr SO2 | | | 24-Hr SO2 | | | Annual SO2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 1st Max | 2nd Max | 1st Max | 2nd Max | # Exceed | 1st Max | 2nd Max | # Exceed | Mean | # Exceed | Site ID | Site Address |
| 2008 | Bannock | 7604 | 0.080 | 0.078 | 0.068 | 0.061 | 0 | 0.028 | 0.023 | 0 | 0.0055 | 0 | 160050004 | Stp/Batiste & Chubbuck Rd |
| 2008 | Caribou | 7593 | 0.116 | 0.097 | 0.091 | 0.031 | 0 | 0.013 | 0.009 | 0 | 0.0016 | 0 | 160290031 | 5 Mile Road |

**Table 14: 2008 Monitor Values Summary for Lead (Pb)**

| | | 24-Hour Lead | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data Year | County | # Obs | 1st Max | 2nd Max | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | # Exceed | Site ID | Site Address | City |
| 1999 | Shoshone | 59 | 0.14 | 0.13 | 0.04 | 0.03 | 0.05 | 0.04 | 0 | 160790006 | Medical Clinic/204 Oregon | Kellogg |
| 2000 | Shoshone | 61 | 0.49 | 0.10 | 0.04 | 0.04 | 0.08 | 0.04 | 0 | 160790006 | Medical Clinic/204 Oregon | Kellogg |
| 2001 | Shoshone | 58 | 0.06 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0 | 160790006 | Medical Clinic/204 Oregon | Kellogg |
| 2002 | Shoshone | 30 | 0.05 | 0.04 | 0.03 | 0.03 | | | 0 | 160790006 | Medical Clinic/204 Oregon | Kellogg |