Citizen's Guide to Air Quality Management in Sublette County



A publication of the
Sublette Board of County Commissioners
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Sublette County is a western Wyoming treasure, with its hospitable small towns, outstanding educational and public facilities, and a wealth of natural resources that provide the foundation for a robust economy.

This wealth of resources draws people to Sublette County – to live, work, and recreate. Sublette County is home to two of the nation's top-producing natural gas fields: the Pinedale Anticline and Jonah fields. These two fields are relatively new additions to our long-standing oil and gas industry, which has traditionally centered on the Big Piney/LaBarge area where most oil and gas production in the county's history has occurred. The Pinedale Anticline and Jonah fields combined hold more than 35 trillion cubic feet of recoverable natural gas reserves that significantly contribute to southwest Wyoming's economic vitality.

The employment opportunities associated with recent energy development have also made Sublette County one of the fastest growing counties – we were ranked the fifth fastest growing county in the nation just a few years ago. The combination of increased industrial development, population growth, and increases in recreation and tourism has heightened concern about keeping our county's air, land, and water in good health to ensure our high quality of life continues. Of special concern are air emissions from oil and gas operations and from population growth, which could adversely affect our local air quality.

State and county officials, along with industry partners, are committed to addressing citizen concerns about activities in Sublette County that affect air quality. This guide explains what is being done to protect air quality in Sublette County, and what you can do to help. Addressing air quality is a team effort, and we invite all citizens to join our team.

Sincerely,

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WHAT IS AIR QUALITY?

Air quality is determined by the degree to which the atmosphere is polluted by the presence of pollutant materials in excess of naturally occurring amounts because of human activities. Many pollutants occur naturally, but human activities can lead to high amounts in localized areas, which can adversely affect humans, plants and animals, and can lead to undesirable conditions such as a reduction in visibility.

WHAT ARE THE SOURCES OF OUTDOOR AIR POLLUTION?

Elevated concentrations of gases and particles in the air originate from many sources. Sources influencing air quality in Sublette County may originate within or outside of the county and can be classified as stationary, mobile, and natural.

- **Stationary sources** include industrial emission sources at permanent locations such as oil and gas production and liquids gathering facilities, power generation facitilies, asphalt plants, gravel pits, and cement plants, as well as commercial sources such as restaurants, paint shops, agriculture facilities and gas stations.
- **Mobile sources** include motorized emission sources that do not remain at a set location, such as motor vehicles of all sizes—from passenger cars to heavy-duty trucks, non-road mobile engines, and aircraft.
- **Natural sources** include wind-blown dust, wildfires and prescribed fires, animals and insects, and trees and other vegetation.





Wildfires, gas development, and heavy equipment are some of the major sources of outdoor air pollution in Sublette County.

Other sources of air pollution include recreational sources such as emissions from boats, all-terrain vehicles, snowmobiles, and recreational vehicles, as well as residential sources such as wood-burning stoves, fireplaces, and trash burning. Air quality is influenced by a variety of factors, including local, regional and global man-made and natural emission sources, as well as meteorology. This includes industrial sources in Asia, and natural events such as the dust storm from the Mongolian desert that reached the Wind River Mountains in 2001.

WHAT SOURCES AND POLLUTANTS ARE REGULATED?

The Federal Clean Air Act (CAA) is the cornerstone of legislation regulating air quality in the United States. The U.S. Environmental Protection Agency (EPA) administers the CAA, setting national standards and providing guidance to the states. States, including Wyoming, are charged with administering the CAA at the state level. The details of the CAA will only be briefly reviewed here. For more information on these standards, visit **www.epa.gov/air/criteria.html.**

The various provisions of the CAA can be grouped in two categories; (a) sections that set limits on emissions of pollutants or their precursors from mobile sources such as cars and trucks, and stationary sources such as power plants, and (b) sections that set national ambient air quality standards.

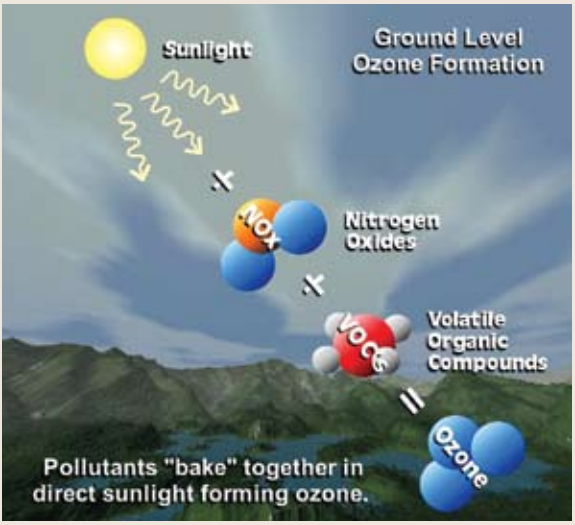
The emission standards for cars and trucks have become progressively more stringent over the years. These tougher standards have been achieved through the introduction of improved engine technology and use of cleaner fuels including lead-free gasoline and ultra-low-sulfur diesel fuel. In recent years, the EPA has focused on reducing the emissions of particulate matters and nitrogen oxides from diesel-powered trucks. The EPA has also extended these regulations to include off-road equipment powered by internal combustion engines. Clean Air Act provisions have also imposed increasingly tighter emission limits on electric power generating stations such as the coal-fired plants upwind of Sublette County, requiring that they reduce particulate matter, sulfur dioxide and nitrogen oxide emissions.

A key section of the CAA charges EPA with setting National Ambient Air Quality Standards (NAAQS) for six criteria pollutants that originate from multiple sources and are found across the United States. The six criteria pollutants are ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), lead, and particulate matter (PM), with standards set for particles of different size irrespective of their chemical composition.

Of the six criteria pollutants, **ozone** is unique in that it is not directly emitted from specific sources. Ground level or ambient ozone is formed by chemical reactions of volatile organic compounds (VOC) and nitrogen oxides (NOx) in the presence of sunlight. The VOC sources include oil and gas operations and other industrial activities, as well as natural sources such as plants and forest fires. The NOx is formed as a by-product of combustion, such as internal combustion engines in cars.

The CAA directs the EPA to set NAAQS for each criteria pollutant that will be protective of public health with an adequate margin of safety. In setting the level of the standards, the EPA cannot consider the economic costs of attaining compliance with the standards.

The individual states, such as Wyoming, are responsible for establishing monitoring programs for the criteria pollutants and "attaining" compliance with the NAAQS for each pollutant standard. Areas that have not attained the NAAQS are designated as "non-attainment areas." Each state is responsible for developing implementation plans for achieving attainment of the NAAQS within specified periods of time.



Ground level ozone formation. Source: NASA.

Another section of the CAA requires the EPA to regulate Hazardous Air Pollutants (HAPs), a class of compounds which are sometimes referred to as air toxics. The CAA identifies 188 chemicals or substances to be regulated as HAPs. Many chemicals found in the air in Sublette County are identified as HAPs including acetaldehyde, acetone, benzene, butanone, formaldehyde, hexane, 2-propanol, toluene and xylene. The EPA no longer sets specific national standards for HAPs. Instead, the EPA sets regulatory emission standards for specific industrial activities, such as oil and gas production, to limit emissions of HAPs through the use of control technology.

The federal Occupational Safety and Health Administration establishes separate standards and monitoring requirements for workers.

WHAT AIR MONITORING TAKES PLACE IN SUBLETTE COUNTY?

Several agencies are actively monitoring air quality in Sublette County for all six criteria pollutants. The U.S. Forest Service began regional haze monitoring in the Bridger Wilderness in 1989. However, most air quality monitoring in the Upper Green River Basin was initiated in 2005 by the Wyoming Department of Environmental Quality (DEQ). Permanent monitors are positioned to provide coverage of the larger communities in the county. Other monitors are positioned near oil and gas production sites as part of research studies of air quality. Some monitors are positioned to measure background concentrations of pollutants transported into the county from other areas.



Monitoring sites both within and surrounding Sublette County collect data on a variety of pollutants.

Such an intensive monitoring program is costly. For example, in 2008, the commission set aside $2 million in a reserve account for future natural resource monitoring in the county. Last year the county allocated $240,000 for an air toxics risk assessment, while the Jonah Interagency Office used $442,000 in funding from industrial sources toward air quality monitoring. The Wyoming Legislature recently budgeted $1.5 million specifically for southwestern Wyoming ozone monitoring.

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Parameters monitored at these sites include ozone, NOx and PM. Automated digital images are collected at these sites, and meteorological conditions (including temperature, relative humidity, barometric pressure, wind speed and direction, and precipitation) are also recorded.

In addition, the DEQ monitoring site near Boulder operates a particle scattering instrument, which calculates the scattering component of regional haze. This site also has been equipped to monitor methane and non-methane VOCs, with triggers set to sample additional VOCs when methane levels rise. VOCs are carbon-based compounds, some of which can react with oxides of nitrogen in the presence of sunlight to form ozone.

Hourly real-time results of air quality monitoring from sites in Sublette County, with photos updated every 15 minutes, are available on the DEQ Air Quality Monitoring web site at www.wyvisnet.com.

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In 2005, monitoring performed by DEQ in Sublette County surprised the scientific community with observations of elevated ozone levels during winter months. Elevated ozone levels in Sublette County occur in localized areas, but under very specific circumstances, and for relatively short periods of time. It was previously thought that, due to the nature of ozone formation, elevated levels of ozone were only possible during hot summer months. Since 2005, DEQ has investigated the wintertime ozone phenomenon with several intensive wintertime ozone studies. These studies have successfully determined the distinct meteorological conditions associated with wintertime ozone formation, which include strong temperature inversions, low winds, snow cover, and bright sunlight. Forecasts of these conditions are now being used to alert citizens of possible high wintertime ozone days.

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Between February 2009 and March 2010, the Sublette County Commissioners, in cooperation with DEQ and the Wyoming Department of Health, sponsored a special monitoring program to determine HAPs concentrations from a network of fifteen sites in and near Sublette County. Five of these sites also included ozone monitors. Results from this monitoring study will be used as input to prepare a screening health risk assessment, which will identify possible health risks associated with exposure to airborne HAPs. For more information about HAPs, visit: **www.epa.gov/ttn/atw/allabout.html**.

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Particles and gases in the atmosphere can reflect and absorb light to alter visibility and create regional haze. Visibility impairment is a complex issue because it is the combined effect of many types of particles and meteorological factors such as relative humidity. Regulations for regional haze require the

gradual improvement of visibility in national parks and wilderness areas with a return to natural levels by the year 2064.

Since 1989, the Interagency Monitoring of Protected Visual Environments network has monitored visibility-degrading compounds that are present in the ambient air of the Bridger Wilderness. For more information, check out: **http://vista.cira.colostate.edu/improve/.**

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Deposition refers to the process in which particles or gases are transferred from the air to the surface of the earth. Wet deposition refers to gases or particles associated with precipitation, and dry deposition refers to gases or particles directly deposited onto a surface. Particle and gas deposition can adversely affect vegetation and water sources.

In Sublette County, both wet and dry deposition are monitored by the EPA at two sites as part of the National Atmospheric Deposition Program (NADP) and the Clean Air Status and Trends Network (CASTNet). Deposition can also influence lake chemistry, which is monitored for several lakes in the Wind River Range by the U.S. Forest Service. Data from the NADP network is available at **http://nadp.sws.uiuc.edu/**, and data from CASTNet is available at **www.epa.gov/castnet/**.

AIR QUALITY AND HUMAN HEALTH

Breathing high concentrations of ozone over a period of time can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Long-term exposure to sufficiently high concentrations of ground-level ozone also can reduce lung function and inflame the linings of the lungs and may permanently scar lung tissue.

In 1997, the EPA set the federal eight-hour average standard for ozone for both human health and the environment at 0.08 parts per million (ppm); with rounding the standard was effectively 0.084 ppm. In 2008, the standard was lowered to 0.075 ppm. The eight-hour average standard may be lowered again in 2010 as a result of recommendations by the Clean Air Scientific Advisory Committee to set the standard between 0.070 and 0.060 ppm. In addition, the EPA may set an additional, longer averaging time standard for ozone to protect plants.

The EPA and DEQ have taken steps to inform the public about air quality by publicizing the NAAQS. In addition, the EPA has developed a metric called the Air Quality Index (AQI) that is used to inform the general public of potential health risks associated with exposures to elevated levels of the criteria pollutants including ozone and particulate matter. Local real-time pollutant levels in Sublette County are available at **www.wyvisnet.com**. National real-time AQI health advisory levels are available on the EPA AIRNow website at **www.airnow.gov**.

Ozone* (8-Hour Average)	Air Quality	Cautionary Statements
0-59 ppb	Good	None
60-75 ppb	Moderate	Unusually sensitive people should consider limiting prolonged outdoor exertion.
76-95 ppb	Unhealthy for Sensitive Groups	At or above 76 ppb for an 8-hour average, children, older adults, people with respiratory problems, and people who are active outdoors should limit prolonged outdoor exertion.
96 ppb or greater	Unhealthy for General Public	At or above 96 ppb for an 8-hour average, children, older adults, people with respiratory problems, and people who are active outdoors should avoid prolonged outdoor exertion. Everyone else should limit prolonged outdoor exertion.

Air Quality Index health advisory levels for ozone are based on the 2008 eight-hour average ozone standard.

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The DEQ, during the winter, closely monitors meteorological conditions and snow cover to predict when conditions might result in elevated levels of ozone. When elevated ozone might occur, the DEQ issues "Ozone Advisories" to warn citizens and alert oil and gas operators of the need to modify operations.

An ozone advisory indicates the potential for elevated eight-hour ozone levels. Advisories are issued at noon on the day prior to the day of the alert. The advisory will remain in effect for a 24-hour period, but advisories could be issued on consecutive days.

Ozone advisories are available through local media, the DEQ ozone advisory hotline (1-888-996-9337), and the DEQ website **http://deq.state.wy.us/**. The wintertime ozone forecasting season runs from January through March.

As a point of reference, monitoring in Yellowstone National Park in the 1990s revealed the maximum 4th high eight-hour average was 64ppb, and was 66 ppb from 2006 to 2008. If the air quality standard is lowered to 0.064, it will likely be impossible for Sublette County to meet the new standard, since the background level would, at times, be either at or above the standard.

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Particulate matter (PM) is a mixture of solid particles and liquid droplets found in the air. PM comes in a variety of sizes and can be composed of many types of materials and chemicals. Particles that are small enough to be inhaled have the potential to cause health effects. Of particular concern is a class of particles known as fine particulate matter or PM2.5 that gets deep into the lung. There are many sources of PM, including road dust, diesel exhaust, construction, and wildfires.



This chart shows Air Quality Index health advisory levels for particulate matter.

Fine particles (PM2.5) like nitrate, sulfate, and organic compounds are the predominant components of haze. Precursors of nitrate and sulfate include NOx and SOx, which are principally generated by industrial and vehicle sources. In western states, forest fires are a significant source of the organic compounds that cause regional haze.

WHAT ARE WE DOING ABOUT AIR POLLUTION IN SUBLETTE COUNTY?

Balancing federal and state regulations with industrial development and the community's economic vitality is critical to reducing air emissions. As new and emerging technologies continue to make natural gas exploration and production more efficient, safe, and environmentally friendly, state and county officials will continue to work alongside industry to implement the most state-of-the-art equipment and emission controls that make sense for this region.

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The State of Wyoming regulates oil and gas drilling and production with state statutes, regulations, guidelines, and policies related to oil and gas operations. Many of these regulations and policies are linked to meeting requirements imposed by the EPA. The DEQ and the Wyoming Oil and Gas Conservation Commission have the authority to enforce Wyoming's statutes and regulations.

In Sublette County, most oil and gas wells are located on federal land, so the federal Bureau of Land Management (BLM) governs leasing and permitting of gas development on the federal mineral estate.

In 2009, DEQ successfully secured a competitive federal grant from the EPA to retrofit engines in Sublette County with advanced emissions controls on non-road construction equipment and to retrofit diesel-powered school buses in the county.



Regional haze is a complex issue because it is the result of the cumulative effects of multiple pollutants.

The Sublette County Commission has undertaken an intensive dust-suppression effort for county roads, from paving and placing other hard surfaces on county roads to spraying a dust-suppressant mixture on other roads. Industrial companies and even a private property association have undertaken other dust suppression projects on roads located in Sublette County.

Other air quality projects undertaken in Sublette County include a program for citizens to change out their older wood stoves for newer, less polluting EPA-certified stoves; the installation of oxidation catalysts on heavy-duty diesel engines; and a muffler change-out program for heavy machinery. In addition, a community outreach program was undertaken to detail opportunities for citizens to lessen their contribution to environmental pollution. For more information, check out: **www.wy.blm.gov/jio-papo/**.

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As oil and gas exploration and production continues to expand, new policies and regulations have been adopted at state and federal levels, including:

- In 2006, the BLM created the Jonah Interagency Office (JIO) and in 2008 the Pinedale Anticline Project Office (PAPO) to provide overall management of on-site field monitoring and off-site mitigation activities at the Jonah and Pinedale Anticline natural gas fields. The JIO and PAPO represent an innovative approach that requires industry to minimize its development footprint, maximize recovery of natural gas, and speed up the reclamation process.

- In 2008, the BLM issued a land lease agreement requiring drillers in Sublette and surrounding counties to employ best management practices and best available control technology on their equipment. This means that the most cost-effective emission control technologies available must be used when technically and economically feasible.
- In 2009, Wyoming Governor Dave Freudenthal asked the EPA to designate Sublette County and portions of two other neighboring counties in the state's southwest corner as exceeding current ozone ambient air quality standards. Following a formal non-attainment designation, Wyoming will be required to develop a state implementation plan containing state commitments to return the area to attainment status. Actual designation of the county is on hold until a new ozone standard is announced by the EPA in 2011.
- In 2010, the DEQ adopted new permitting requirements for oil and gas production facilities that require more stringent control of emission sources.
- Effective in 2011, the EPA will require oil and gas sources to begin collecting greenhouse gas emissions data under a new mandatory reporting rule.

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Energy companies in Sublette County have taken aggressive action to identify sources and reduce emissions, including the development and implementation of innovative emissions reduction technology and increased air quality monitoring. Specific efforts undertaken in Sublette County include:

- **Implementing** ozone contingency plans for short-term emission reductions during the times when conditions seem favorable for ozone formation. As part of these plans, if it does not affect safety or impact essential operations, companies take actions to minimize emissions. These actions include minimizing idling and use of equipment, deferring some activities until conditions have eased, minimizing traffic, increasing surveillance of combustors, and suspending completion and hydraulic fracturing activities that require flaring during ozone advisories as well as halting or reducing other non-essential activities.
- **Converting** some engines on drill rigs used in Sublette County to run on lower-emission natural gas.
- **Adding** Selective Catalyst Reduction technology to reduce NOx emissions up to 90 percent on diesel-powered drill rig engines.
- **Reducing** the impact to the environment by converting some company field vehicles to clean-burning natural gas, busing employees to work sites, and installing man camps to house employees and reduce commuting.

- **Installing** liquids gathering systems (LGS) to reduce emissions associated with tanks and with tanker truck trips that would otherwise be necessary to collect liquids at well sites. An LGS is a system of pipelines that transports condensate and produced water from the wells to centralized gathering facilities and trunk pipelines.
- **Expanding** remote and automatic well monitoring and computer-assisted operations to further reduce emissions from truck trips.
- **Using** low-sulfur or ultra-low-sulfur diesel fuel to reduce particulate emissions.
- **Implementing** controls on exhaust from heat trace pumps and changing out separator controllers to low- or no-bleed devices.
- **Applying** current control requirements to older locations that were grandfathered under less stringent emissions regulations.
- **Increasing** inspection of gas production facility equipment to reduce fugitive emissions such as VOCs from oil and gas operations, including the use of Forward Looking Infrared camera inspections and other technologies.

WHAT CAN INDIVIDUALS DO TO HELP?

We all play a role in actively managing air quality in Sublette County. The cooperative efforts of citizens, state and local officials, and private industry in Sublette County is increasingly viewed as a model for other regions and states to use in improving air quality and sustaining economic activity. Continued cooperation can lead to further improvements in air quality and sustained economic benefits for Sublette County in the future.

Stay informed: Learn more about what is being done to protect and improve air quality in Sublette County by checking these websites for updated information:

www.SubletteWyo.com



http://DEQ.State.WY.US



www.WyVisNet.com



Get involved: Attend meetings and public forums to become better informed about air quality issues, share your concerns with county officials, and assist in community efforts.

Reduce your impact:

- *Tune your vehicles*—a well-tuned vehicle with proper tire pressure reduces emissions and conserves energy by using less gas.
- *Reduce idling*—it wastes fuel and money and impacts the environment.
- *Drive less*—organize your activities to reduce driving time, and use alternate forms of transportation like carpooling or biking when you can.
- *Avoid burning*—avoid burning garbage and yard waste that may contain chemicals.
- *Replace wood stoves*—get rid of wood-burning stoves by replacing them with more efficient EPA-certified wood-burning appliances or appliances that burn cleaner fuels. (Check out **www.epa.gov/burnwise** for more information.)
- *Conserve energy*—by using less energy, you save money and create less emissions.
- *Increase your home's efficiency*—cut back on heating and cooling, unplug appliances, and turn off the lights when you leave a room.
- *Limit use of volatile chemicals* such as solvent-based paints, cleaners, varnishes, and other household and personal products that emit VOCs that may be harmful to your health and contribute to ozone formation.
- *Become a "Locavore"*—purchase products locally and consume foods produced in the local area to reduce the environmental and financial costs associated with transportation of goods into the area.

Other resources:

www.WY.BLM.gov/jio-papo



www.PAPAoperators.com





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SUBLETTE COUNTY AIR QUALITY MANAGEMENT INFORMATION