



DESERT BREEZE

VOLUME V ISSUE III

SEPTEMBER 2017

Wood Burning Fireplaces and Cold Weather Pollution

When the fall and winter temperatures arrive, we tend to like to cozy up with blankets, hot cocoa and a nice wood burning fireplace. The sound of the fire burning the wood, the smell and most of all the warmth, seems so natural for us to experience that we don't even think about the harm it is doing to our ambient air. In fact, when wood burns, in a wood burning fireplace, particles are released into the air inside of our homes as well. The smoke contains very small particles that are trapped in the air, and we breathe them in to the deepest part of our lungs. These particles pose a threat and can be detrimental to our health sooner or later.

Smoke from a wood burning fireplace mostly emits from the chimney and what happens next may surprise you. In the cold weather months the smoke may get trapped under an inversion layer. An inversion layer is when a layer of warm air abnormally sits at a higher elevation than the cooler air from the ground level, stopping the ground level

air from dispersing. This traps the cooler air with pollutants which results in the stagnant air that we inhale in the form of smog. Areas surrounded by mountains have it even worse as the air is not only trapped from the top by the warm air but also on the perimeter by the mountains. Hence, wood burning fireplaces affect everyone breathing the ambient air as well as our visibility. Those who are affected the most are those who are using their wood burning fireplace because they are also producing indoor pollution which can be even more troublesome.

When wood is burned it releases PM_{2.5} (particulate matter with diameter of 2.5-micrometers or less), carbon dioxide, carbon monoxide, oxides of nitrogen, volatile organic compounds, polycyclic aromatic hydrocarbons (PAH) and other types of chemicals that can cause different problems in our environment as well as our bodies. PM_{2.5} is probably the most dangerous because it is inhaled and moves into our lung tissue and may cause cardiovascular issues, asthma, and other respiratory problems along with some risks of cancer. Those who are particularly at risk are children, adults with pre-existing respiratory and/or cardiovascular issues, and the elderly. Some short term effects of breathing in wood smoke include headaches, irritated throat, eyes, sinuses and lungs, risk of heart attack and stroke, and lung inflammation. Long term effects include chronic bronchitis, emphysema and cancer.

Some local air districts have started programs to help people with replacing or retrofitting their wood burning fireplaces with cleaner burning options. These districts offer rebate programs or funding for replacing your old wood burning fireplace. The Eastern Kern Air Pollution Control District will be receiving grant money in the future for these types of programs. So what can you replace your wood burning fireplace with? One alternative is a gas fireplace insert which uses natural gas as a fuel. They look just like traditional fireplaces, are cleaner, easier to start, and safe. You insert these fireplaces into your old existing fireplace. The EPA has also certified some wood burning fireplace inserts for use that have very little smoke output. Pellet stoves use compressed wood waste and/or biomass wastes in the form of pellets as fuel. They burn clean and are the most efficient stove out of all three alternatives listed.



Wood Burning Fireplaces (continued from page 1)

If you are still using a wood burning fireplace, here are some tips to help you use your fireplace more efficiently and safely:

1. Do not use charcoal! Charcoal burning in your home is extremely dangerous. Carbon monoxide is produced and displaces the oxygen in your home. Carbon monoxide is deadly at high levels in enclosed places.
2. Burn dry wood only. The dryer the wood the cleaner the burn. Wood should be left to dry at minimum 6 months to 12 months. Dry wood is usually lighter in weight and contains no green under the bark. Seasoned firewood is a term for wood containing 20% moisture or less by weight which is what you should be burning.
3. Do not burn trash in your fireplace! Plastics, metals, treated wood, painted objects etc. contain chemicals that, if burned are toxic to inhale.
4. Start with a softer wood to begin the fire then add a hard wood to sustain the fire. Softer wood are species such as pine and fir wood.

They tend to catch on fire much easier and burn fast and hot. Harder wood species consist of oak and orchard tree wood. These woods will keep the fire burning longer because the wood is usually denser.

5. Do not leave your fireplace burning overnight. It is a safety hazard as smoke could fill the home and injure the occupants.
6. The darker the smoke the worse your fire is burning. You should only see wisps of white smoke coming from the chimney. If you see dark smoke you need to adjust the way the fire is burning. You can do this by adding more air to the fire by opening your air inlets or adjusting your dampers.
7. Always make sure your fireplace is clean and the chimney is cleaned by a professional. Certain substances, one being creosote, can settle along the inside of the chimney and cause a fire.

For more information on wood burning fireplaces and ways to burn wood efficiently, please visit: <https://www.epa.gov/burnwise>

By Nicole Dickerson

POLLUTANT OF THE QUARTER: NITROGEN OXIDE (NO_x)

How is Nitrogen Oxide Formed?

Nitrogen Oxides (NO_x) are gases formed when Nitrogen bonds with Oxygen. Nitrogen does not bond with Oxygen at ambient conditions, it requires heat for a reaction to take place. NO_x formation happens naturally from lightning, volcanoes, and microorganisms converting atmospheric nitrogen to ammonia. Human activity, primarily through combustion of fuels (coal, oil, natural gas) and agriculture fertilizing also cause formation of NO_x. The most common forms of nitrogen oxide found in the air are Nitric Oxide (NO) and Nitrogen Dioxide (NO₂). Nitric Oxide is a colorless gas, and is a precursor to NO₂. Nitrogen Dioxide is a reddish-brown gas with a pungent, sharp odor when above 70F, and a yellowish brown liquid when temperatures are below 70F.

What is Nitrogen Oxide Used For?

Nitric Oxide is blended with oxygen and used to treat pulmonary hypertension in neonatal patients and angina (chest pain or pressure from lack of blood flow into the heart as a result of obstruction or spasming of the coronary arteries). Nitrogen Dioxide is used in the manufacture of nitric acid, chemical explosives, flour bleaching, and as an oxidizer in rocket fuel.

Why Does the Air District Care?

The presence of NO_x in the atmosphere can have a variety of negative impacts on people and the environment around them. NO_x will react with other chemicals in the air (known as Volatile Organic Compounds, or VOC) to form ozone and fine particulate matter (PM_{2.5}), both of which are harmful when inhaled, and the fine particulates contribute to the haze you see on those hot, dry days. Ozone is of primary concern to the Eastern Kern Air Pollution Control District (District), and the District is mandated by law to control ozone. NO_x also bonds with water, oxygen, and other chemicals to form acid rain. Most NO_x molecules have a lifetime of several days; NO₂ in particular has a longer lifetime, which allows it to be transported significant distances by wind currents before forming ozone or particulates.

Exposure to NO₂ has both acute and long-term effects. Direct exposure of skin to NO₂ can cause irritation and burns. Depending on the ambient concentration of NO₂, the effects of inhalation can range from mild irritation of the nose and throat (≤ 10 parts per million (ppm)) to asphyxiation from fluid in the lungs (>100 ppm); continued exposure to NO_x can lead to the development of asthma. Both NO and NO₂ are



classified as extremely hazardous substances as part of the 1986 U.S. Emergency Planning and Community Right-to-Know Act, and facilities that produce, use, or store significant quantities of NO or NO₂ are subject to reporting requirements.

What control measures limit the formation of NO_x?

Several techniques are available to either limit the amount of NO_x that can form during combustion or to reduce the NO_x after it leaves the combustion chamber. NO_x prevention typically focuses on keeping the temperature of the flame low, since lower temperatures mean less heat available for NO_x formation. Add on control technologies to prevent NO_x from escaping to the atmosphere after formation include Selective Catalytic Reduction (SCR), Non-Selective Catalytic Reduction (NSCR), and Selective Non-Catalytic Reduction, (SNCR). Selective reduction, typically implemented in boilers, furnaces, and diesel trucks, consists of injecting either ammonia or urea into the exhaust path to react with NO_x molecules to form nitrogen gas and water. On diesel trucks, you may see a tank on the side with a blue cap labeled DEF for diesel exhaust fluid: this tank contains the ammonia or urea solution. The ammonia or urea needs to be injected at a point in the exhaust path that is within a specific temperature range: too hot and the ammonia decomposes into more NO_x; too low, and the ammonia "slips" through without reacting, which is not desirable as ammonia gas is toxic to humans.

POLLUTANT OF THE QUARTER (continued from page 2)

Most passenger vehicles use NSCR, which makes use of a catalyst made of ceramics, metallic oxides (aluminum oxide, titanium oxide), ceria (an oxide of the metal cerium), and noble metals such as platinum, palladium, or rhodium, to help create oxidation reactions that reduce NOx, carbon monoxide (CO), and unburned fuel vapor (a VOC) emissions; since the catalyst reduces each of these 3 pollutants, it is called a 3-way catalyst; you may also know it as a catalytic convert-

er. Instead of ammonia or urea, non-selective reduction uses the fuel to react with NOx, which converts both into carbon dioxide, water, and nitrogen gas.

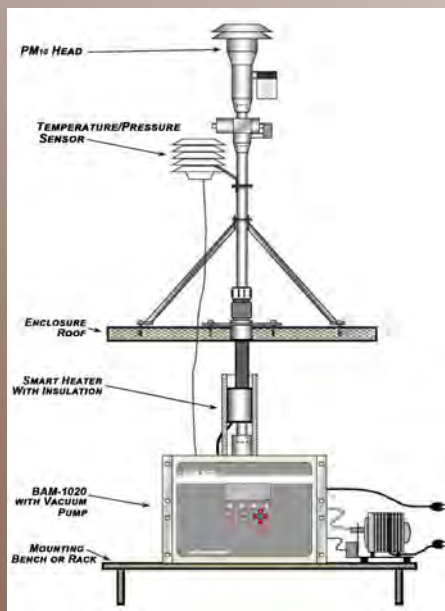
As older vehicles are steadily replaced with newer ones, and industrial combustion equipment is modified or upgraded for better performance or to meet new standards, NOx emissions from human sources should decrease, the result being cleaner air for you to breathe.

By Samuel Johnson

THE AIR QUALITY SYSTEM (AQS)

The Air Quality System (AQS) is the official record of measured air quality data in the United States. It contains historical data for thousands of monitoring stations. The United States Environmental Protection Agency (EPA) collects data from State and Local Air Monitoring Sites (SLAMS), and Tribal air pollution agencies. AQS also includes meteorological data; site information details like location and operator; and data quality assurance and quality control information. AQS data is used to: designate areas as Attainment (meeting or beating the air quality Standards) or Non-Attainment (not meeting the Standards and to what degree of Non-Attainment); prepare and evaluate State Implementation Plans (SIP) for Non-Attainment Areas (not meeting Federal and State health-based air pollution standards); and, for modeling.

Modeling can be used for the Authority to Construct (ATC) engineering review; to forecast air quality; and to test strategies that are proposed to achieve the Standards. A SIP are roadmaps to Attainment – detailing strategies and targeting reductions that a District proposes to achieve Attainment. AQS data is used to prepare reports for Congress as required by the



Clean Air Act.

To ensure that data is of the highest quality (accurate and representative), a system of Quality Assurance checks and procedures are in place to ensure data is valid before publication to the AQS and deemed official. The California Air Resources Board (ARB) is the Primary Quality Assurance Organization (PQAO) for monitoring Operations for 25 of the 35 air districts in California. Districts coordinate and collaborate with the ARB to implement and sustain monitoring activities that are consistent, and well documented. The EPA has determined the data needs to be of high quality legally defensible.

The Annual Network Plan (ANP) details operations for each Monitoring Organization (MO) and describes the changes that are to occur within the next 18 months. Curious readers please note: the ARB ANP is available for a 30 day public inspection and comment period prior to submittal to the U.S. EPA. Also, the final version of the ARB ANP is available for download from: <http://www.arb.ca.gov/aqd/amnr/amnr.htm>.

The Eastern Kern Air Pollution Control District (District) currently operates three types of air pollutants: ozone, particulate matter 10-microns and smaller (PM₁₀) and particulate matter 2.5-microns and smaller (PM_{2.5}). For more information on PM₁₀ and PM_{2.5} see our Desert Breeze, December 2016 issue (http://www.kernair.org/Documents/Desert_Breeze/DB_V4_I4_December_2016.pdf). The District's air monitors are generally in remote locations to assess the regional air quality (as compared to local air quality near a cement plant or a specific road). A diagram of a PM₁₀ Beta Attenuation Monitor (BAM) is shown on the left.

Please look to future editions of the Desert Breeze for an in depth examination of each element; and, how it is addressed.

By Brenton Smith

DMV GRANT & VEHICLE VOUCHER PROGRAMS

The District will begin accepting 2018 DMV Grant Program applications for Tier I and Tier II projects October 31, 2017. Eligible projects can receive up to \$50,000 for Road Paving, Public EV Charge Station, Public Education, and other innovative projects that reduce oxides of nitrogen (NOx), reactive organic gas (ROG), or particulate matter (PM₁₀) emissions from on-road motor vehicle related activities.

Additional financial incentives for vehicle emissions reductions are offered to East-

ern Kern residents through the DMV Voucher Program. Eligible applicants can receive a vehicle grant voucher for the purchase of the following new lower-emission vehicles:

- \$2,000 for purchase of an Ultra-Low Emission Vehicle (ULEV).
- \$3,000 for purchase of a Partial Zero Emission Vehicle (PZEV) includes Hybrid.
- \$5,000 for purchase of a Zero Emission Vehicle (ZEV).

The DMV Voucher Program is ongoing with no deadline to apply. Applications are processed first-come first-served and vouchers are issued accordingly. Program guidelines and applications are available on the District's website: www.kernair.org.

Please contact the District at: (661) 862-5250 or ekapcd@kerncounty.com with any questions or comments.

Board of Directors

Ed Grimes, Chair (Mayor, Tehachapi)
Don Parris, Vice Chair (Councilman, California City)
Eddie Thomas (Vice Mayor, Ridgecrest)
Mick Gleason (KC 1st District Supervisor)
Zack Scrivner (KC 2nd District Supervisor)

Board of Directors usually meet once every two months starting in January at the Tehachapi Police Department Community Room.

Air Pollution Control Officer

Glen E. Stephens, P.E.

Hearing Board Members

William Deaver
Doris Lora
Dr. Wallace Kleck
Chris Ellis
Charles Arbaut



For news updates and other information, please visit the Eastern Kern APCD website at www.kernair.org

EASTERN KERN APCD
2700 M STREET, SUITE 302
BAKERSFIELD, CALIFORNIA 93301

