

Burning Wood Safely in a Stove or Fireplace

When wood burns, the fire goes through three stages. In the first stage (up to around 500 degrees), the heat of the fire simply dries the wood. In the second stage (500 to 1,100 degrees), sometimes referred to as pyrolysis, the wood breaks down chemically, emitting flammable gases that contain more than half of the heat energy of the wood. In the third stage (over about 1,100 degrees), the gases and remaining charcoal burn.

Just for fun, if you watch a log burn in an open fireplace, you might catch a glimpse of a jet of hot gases blowing out the end of a log. You may actually see that the gases are escaping from the log, but not igniting until the jet of gas is a measurable distance away from the surface of the wood.

Problems develop when the flammable gases enter the chimney or vent pipe before they have burned. As the gases cool below 250 degrees, they condense as acids on the inside of the chimney. As they dry and coagulate, the acids thicken into a highly flammable, tar-like substance called creosote.

Because the creosote formation is caused by cooling the unburned gases, anything that leads to incomplete combus-

tion or cool chimney temperatures will increase the problem. Wet wood uses more of the fire's heat to evaporate water and reduces the exhaust gas temperature. Restricting the combustion air to the fire slows the burning rate and leads to incomplete combustion and lower temperatures. Even using heat exchangers to capture more chimney heat will lead to cooler chimney temperatures and more creosote formation.

Slow burning fires and efficient heat transfer to the room would seem to be desirable situations. However, the risk associated with creosote formation is that if the chimney gets hot enough, the creosote will ignite, causing a chimney fire.

Chimney fires are easily identified. You may first hear a "crackling" in the chimney. If enough creosote fuel is present, the crackling may develop into a roar. The chimney will become extremely hot. Metal vents may actually glow red or orange. The chimney may become hot enough to ignite nearby building materials and start a house fire. Flames and sparks shooting out the top of the chimney may cause a fire on the house roof or on surrounding buildings. The chimney liner may be cracked or warped by the hot fire, making

the chimney unsafe for future use.

You can avoid chimney fires by preventing creosote build-up in your chimney. Here are some pointers:

- Season wood properly before burning. Wet, unseasoned wood causes more creosote than dry wood.
- Avoid long, slow-burning fires. Restricting the fresh air supply causes incomplete combustion and more creosote build-up in the chimney.
- Allow frequent hot fires. A brief hot fire every day or two can help remove small creosote deposits.
- Check your chimney monthly. Clean your chimney with a stiff wire chimney brush annually, or before the creosote reaches a thickness of one-eighth inch.
- Use a catalytic stove that allows the volatile gases to burn at a much lower temperature, greatly reducing wood smoke and creosote and also increasing heat output by 25 to 30 percent. These catalytic combustors can be purchased in new stoves or can be added to existing stoves. They generally add around \$200 to the cost of a stove and must be replaced every several years.

Chimney fires are a real and dangerous possibility when heating with wood. A 1982 study by the U.S. Consumer Product Safety Commission reported that wood-burning appliance fires accounted for 20 percent of all residential fires and five percent of all fire deaths. While most chimney fires are confined to the chimney itself, the intense heat sometimes ignites surrounding building materials and furnishings.

Ashes must be stored in a metal container with a tight lid. The closed container should be placed on a non-combustible floor or on the ground well away from all combustible materials. Wood ashes do contain small

amounts of phosphorus and potassium, essential plant nutrients. However, wood ashes are also very alkaline. Adding large amounts of ashes to the soil can raise pH to undesirable levels and cause plant growth problems. Before you add ashes to your garden, test your soil. If the pH is above 7.5, don't add ashes. If you do add ashes, spread them uniformly at no more than 15 pounds per 1,000 square feet. If you are unsure about using ashes on your garden, it would be best to not use them.

Careful operation and maintenance can help minimize the risk of accidental chimney fires. (DJ)

If a chimney fire does happen, take these steps:

1. Call the fire department and evacuate the house.
2. Close all air inlets and dampers to smother the fire.
3. Discharge a fire extinguisher into the stove, or use a chimney fire extinguisher stick.
4. Wet the roof and watch for outside fires caused by sparks.
5. Have your chimney inspected before putting it back into service.

Baking soda can be used to help suffocate a fire in the absence of a fire extinguisher. Check with your local fire department for the availability of fire extinguisher sticks. These devices emit large amounts of smoke to help smother a fire.

Water Quality Standards Apply To Public, Not Private Drinking Water

Drinking water may be unsafe to drink in some parts of the world, but in the United States, public drinking water is regulated for quality and safety.

According to Sharon Skipton, extension educator, NU/IANR, public drinking water must meet standards established as a result of the 1974 Safe Drinking Water Act to ensure that it's safe. However, the act doesn't apply to private drinking water supplies.

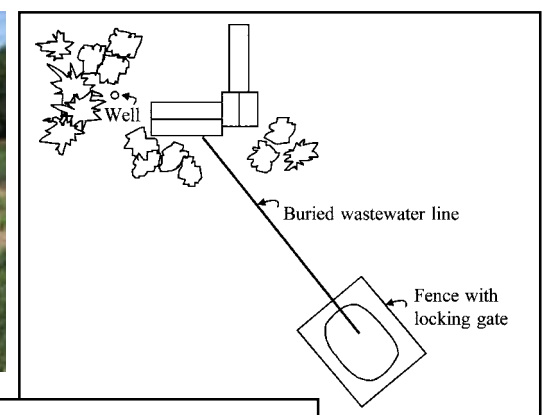
Every public water supply in the country serving at least 15 service connections or at least 25 people must ensure that its water meets minimum standards established by the Environmental Protection Agency. This includes non-community supplies such as campgrounds and roadside motels.

The EPA standards set limits on amounts of more than 90 potential contaminants. That number is being increased and standards are re-evaluated as new data becomes available.

Private drinking water is not regulated for its quality and safety. Water users may decide to test their water supply, but it may be costly and unnecessary to test for all potential contaminants because there are so many. However, private water supplies should be tested annually for nitrate and bacteria. They are general indicators of the safety of private well water.

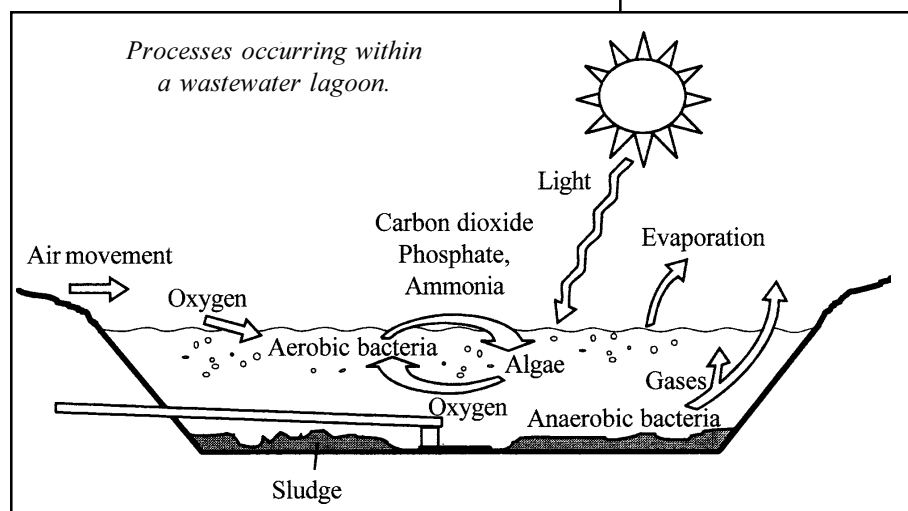
For information on testing drinking water, consult the NebGuide "Testing for Drinking Water Quality" (G89-907-A) available at the extension office or online at www.ianr.unl.edu/pubs/water/g907.htm. In addition, there are several other NebGuides on the topic of drinking water. (DJ)

Lagoon Design and Construction



The lagoon system is an effective method of home sewage treatment and is well-suited for larger lot areas having very slow soil percolation rates. This system generally discharges home sewage directly into the lagoon. Properly designed and sized lagoons use evaporation for dewatering.

Both aerobic and anaerobic decomposition occur in lagoon treatment of home sewage. Anaerobic treatment generally occurs at and near the bottom of lagoons where settled solids and sludges accumulate. This treatment is similar to the anaerobic treatment that occurs in septic tanks. Aerobic treatment occurs in the presence of oxygen and usually occurs near the lagoon surface. Aerobic treatment aids in reducing the odors released during anaerobic treatment and also provides additional treatment of home sewage. Wind movement aids in mixing oxygen into the lagoon surface and helps to increase evaporation.



Proper lagoon sizing and construction is essential for holding and treating home sewage. The surface area of a lagoon must be at least 900 square feet. When more than five people live in a house, an additional 175 square feet of lagoon surface area is required for each person. Lagoon length should not exceed three times its width and the liquid depth is about three feet. For ease of mowing, the lagoon should have side slopes of three units horizontal to one unit vertical. It may also be necessary to place a diversion terrace around part of the lagoon to keep surface water from entering into it.

Lagoons must be at least 50 feet from any property line and 200 feet

from neighboring residences. Therefore, the minimum size lot area for lagoon construction is three acres. Lagoons must be enclosed with a four foot high fence having a locking gate, and signs stating: NO

TRESPASSING — WASTE LAGOON.

In areas where the soil is not conducive to compaction, additional materials such as soda ash, bentonite, or plastic liners may be required to completely retain seepage of effluent. Open water during the summer months provides a nesting ground for mosquitoes, which requires mowing of the lagoon banks to reduce possible mosquito breeding area.

For more information, consult the NebGuide "Residential On-site Wastewater Treatment: Lagoon Design and Construction" (G01-1441-A) available at the extension office or online at www.ianr.unl.edu/pubs/wastemgt/g1441.htm. (DJ)