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Seasonal smoke from outdoor wood-fired boilers poses health risk

Madison, Wis.--The heating season is upon us, and with it comes nuisance and health complaints related to smoke from outdoor wood-fired boilers (OWBs). Wisconsin is a leader in the number of operating OWBs, and this trend is expected to continue.

Several features make OWBs a popular alternative heating source in Wisconsin and other northern states: the fire hazard is outside of the building being heated; wood storage and handling is outside of the building being heated; and wood is a renewable energy source that may be less expensive than gas, oil or electricity.

However, there are significant disadvantages to using an OWB for home heating, says David S. Liebl of UW-Extension's Solid and Hazardous Waste Education Center. "The energy efficiency of pre-2008 OWBs, as tested by the Environmental Protection Agency, only ranges from 20-50 percent, with an average of about 40 percent. When OWBs are improperly located or operated, or a large number are located in a small area, conflicts with neighbors can occur due to excessive wood smoke and related health effects."

The Wisconsin Department of Health Services (DHS) reports that homeowners who are chronically exposed to smoke often complain of adverse health effects such as respiratory irritation, sinus issues or headaches. People with preexisting sensitivity or lung or heart conditions are more at risk.

What causes excessive OWB smoke? According to Scott Sanford, rural energy program specialist with UW-Extension, it can result from the design or operation of the stove, or by inappropriate fueling practices. For example, operators should only add wood when there is a demand for heat, and only add enough for heating the next 8 to 12 hours (or less) to help reduce smoke emissions. Poor location, or weather conditions that prevent smoke from dispersing, can also lead to excessive wood smoke.

"Installing a stove with a stack that is too short, or at a distance too close to a neighboring building is probably the foremost reason for exposure to OWB smoke," says Sanford.

Strong smoke odors combined with a visible plume indicate the presence of particulates and irritating chemicals found in wood smoke. When smoke envelops a neighboring house or property, air quality degrades to conditions similar to what would cause the DNR to issue an air quality advisory for fine particles, according to Liebl. The difference is that a DNR air advisory covers large areas of the state, not neighborhoods or towns. Neighbors downwind of an OWB may find themselves in the path of frequent and visible smoke impacts from an OWB. Liebl says that as a public health concern a visible plume, odors and health or nuisance complaints should be sufficient to establish an individual's exposure to OWB emissions; air monitoring is not required.

Current installation recommendations provided to OWB manufacturers and dealers come from the Outdoor Furnace Manufacturers Caucus of the Hearth, Patio and Barbecue Association (HPBA). The HPBA represents many OWB manufacturers. With OWB placement, the HPBA recommends that the furnace should be located no less than 100 feet from any residence not served by the furnace. If located within 100 feet to 300 feet of any residence not served by the furnace, it is recommended that the stack be at least two feet higher than the peak of that residence. These are minimum guidelines that OWB installers should follow. Frequently, even these guidelines are not adequate to protect area residents from OWB smoke emissions.

While Wisconsin does not have statewide OWB regulations, many local municipalities have developed them, making it easier to resolve conflicts. If your community does not have an ordinance, Liebl and Sanford recommend that you work with your local village, township, city or county officials to develop an OWB/Open Burning Ordinance. Adopting such an ordinance will reduce the likelihood of exposure to OWB emissions, and provide a way to resolve conflicts.

The Wisconsin DNR has a model ordinance for municipalities available at <http://dnr.wi.gov/environmentprotect/ob/modelOrdinance.htm>

If you are dealing with an issue related to OWBs, you can take these steps:

- Meet with the OWB owner/operator to discuss the exposure problem.
- Check for proper stack height and property line setbacks.
- Review OWB fueling practices with the operator.
- Make sure nothing but clean dry wood is used as fuel (no trash or other materials).

If you are unable to resolve the OWB emission exposure issue, your local health department may be able to provide assistance.

The EPA sponsors a voluntary OWB certification program in which OWB manufacturers can apply for units that meet EPA emission guidelines and receive a certification tag. Newer EPA Phase-2 units have an average energy efficiency of about 65 percent to 90 percent. However, even with the increase in efficiency and decrease in emissions of these approved boilers, it is essential that the units be properly located and operated. "Having an ordinance is the best way to ensure that this happens," says Liebl. More information is available on the EPA's programs at <http://www.epa.gov/burnwise/>

A more energy-efficient and cleaner approach to using wood as a home heating fuel is a wood pellet heater. When comparing an OWB and pellet boiler, the pellet boiler burns cleaner, and has an energy efficiency of 80 to 90 percent (depending on the brand or model) and often provides a faster return on investment, despite the higher fuel cost. To learn more about energy efficient heating using wood as a fuel see:

<http://learningstore.uwex.edu/Assets/pdfs/A3907-04.pdf>
<http://learningstore.uwex.edu/Assets/pdfs/A3907-05.pdf>

If you have questions about the health effects of OWB smoke emissions, contact DHS

Rob Thiboldeaux at 608-267-6844 Robert.Thiboldeaux@wi.gov

You will also find more information on OWBs at the following websites:

<http://dhs.wisconsin.gov/eh/HlthHaz/fs/waterstoves.htm>

<http://dhs.wisconsin.gov/eh/HlthHaz/fs/WoodBrn.htm>

<http://www3.uwm.edu/Dept/shwec/publications/cabinet/p2/Woodburning2-06.pdf>

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