



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Outdoor Hydronic Heaters

www.idem.IN.gov

Mitchell E. Daniels, Jr.

Governor

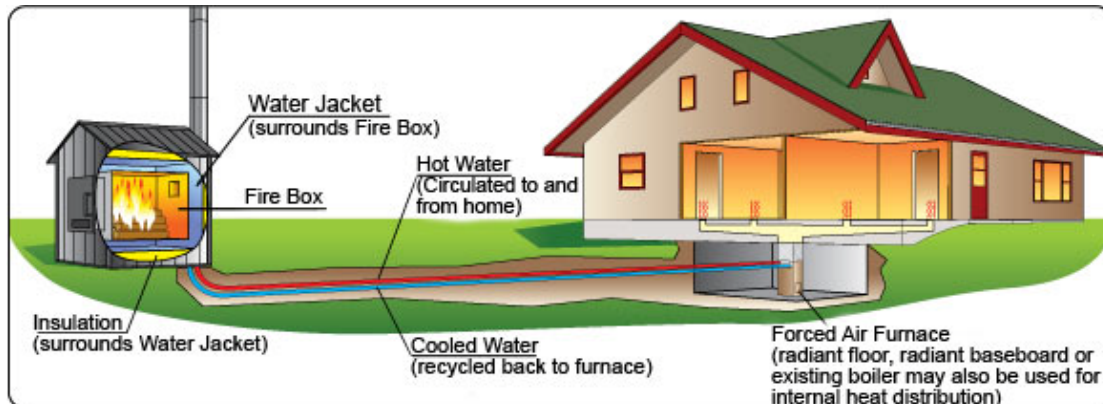
Thomas W. Easterly

Commissioner

100 North Senate Avenue, Mail Code 61-50, Indianapolis, IN 46204

Phone: (317) 233-3861

Toll Free: (800) 451-6027



Picture Source: [Hearth, Patio and Barbecue Association \(HPBA\)](http://www.hpba.org)

What are outdoor hydronic heaters?

Outdoor hydronic heaters (also called outdoor wood boilers or outdoor wood furnaces) are free standing wood burning appliances that heat water, which is then pumped to one or more structures to provide heat. An outdoor hydronic heater also can be used to provide hot water year-round to structures and to heat swimming pools. Units are typically the size and shape of a small storage shed or mini-barn with a short smoke stack on top and are much larger and differ in design, operation, and emissions produced from the smaller indoor wood stoves, pellet stoves, fireplaces and barbecue pits.

What are the health and environmental effects of wood smoke?

Wood smoke is a primary source of airborne particulate matter. Fine particulate matter (particles smaller than 2.5 microns, or "PM 2.5," 1/20th the width of a human hair) is a significant health concern. Fine particulate can lodge deep in the lungs and has been linked to significant health problems, including decreased lung function, aggravated asthma, irregular heartbeat and even premature death. Medical studies also show that individuals with pre-existing medical conditions, children and older adults, are especially vulnerable to the negative health effects from exposure to fine particulate.

Wood smoke generated by outdoor hydronic heaters may contribute to a community's violation of the fine particulate health standard. Fine particulate matter is one of the U.S. Environmental Protection Agency's (U.S. EPA) six criteria pollutants for which a health-based air quality standard has been established.

In addition to fine particulate, wood smoke is a source of carbon monoxide, polycyclic aromatic hydrocarbons and toxic air pollutants, also known as hazardous air pollutants (i.e. formaldehyde and benzene). Hazardous air pollutants are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

How are outdoor hydronic heaters different from other wood burning appliances?

Outdoor hydronic heaters are different from other wood burning devices in several ways. Lower stack heights, design differences and lower combustion temperatures result in more intense smoking and smoldering conditions nearer to ground level than for other typical wood burning appliances.

Outdoor hydronic heaters typically have a much higher fuel capacity than other residential wood burning appliances. A potential concern is that in some cases, individuals may fully load a unit with oversized

capacity in order to extend the unit's operating period between loadings. Operation in this manner results in longer smoldering conditions inside the firebox.

Chimneys from indoor wood burning appliances usually extend past the roof line of the house and are typically 20 to thirty feet above ground level. Stack heights on outdoor hydronic heaters are usually in the range of eight to ten feet above ground level. The lower stack heights on outdoor units decrease the opportunity for wood smoke to disperse in the surrounding air before affecting nearby individuals, residences or other structures.

The basic design of older outdoor hydronic heaters causes fuel to burn incompletely or smolder, which results in thick smoke and potentially high particulate matter emissions. The firebox in most outdoor hydronic heaters is surrounded by a water-filled jacket. The fire then heats the water, but the presence of this water jacket cools temperatures inside the firebox, causing more incomplete combustion. Incomplete combustion, due to lower operating temperatures, is the main reason why outdoor hydronic heaters emit much more particulate matter pollution than other wood burning appliances.

USEPA has had emissions standards in place for all indoor wood heaters manufactured and sold at retail locations since 1992, but these standards do not apply to outdoor hydronic heaters.

IDEM's Role:

- IDEM is responsible for protecting human health and the environment while providing for safe industrial, agricultural, commercial and governmental operations vital to a prosperous economy.
- IDEM is concerned about the potential health and environmental affects outdoor hydronic heaters may have as this becomes a more popular home heating method. Additionally, IDEM has received numerous complaints concerning smoke from outdoor hydronic heaters in residential areas.

Citizen's Role:

Tips to reduce air pollution and nuisance smoke emissions from outdoor hydronic heaters:

- Review operator's manual for best operating practices and follow manufacturer's recommendations for operation and maintenance of the units.
- Use only clean hardwoods. Never use treated woods, green wood, discarded construction materials, or residential trash.
- Inspect flues, chimneys, seams and gaskets regularly; repair and replace as necessary.
- Keep the combustion level high; this enables the cleanest burning.
- Avoid over-feeding the boilers and letting the wood "smolder" for long periods of time.
- Raise stack above surrounding building's roof lines to direct smoke up above adjacent areas and give the smoke more room to disperse.
- When placing an outdoor hydronic heater, consider how close the unit will be to neighboring residences, prevailing winds and the contours of the land.

Additional Information:

- For more information on outdoor hydronic heaters, visit IDEM's website at <http://www.idem.IN.gov/6507.htm>.
- For more information on the health and environmental effects of wood smoke, visit the following U.S. EPA website, Health effects of wood smoke (<http://www.epa.gov/burnwise/healtheffects.html>).
- For questions and concerns, please call IDEM's Office of Air Quality at (317) 233-3861 or toll free at 1-800-451-6027.