UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE

Agriculture and Natural Resources

FSA1020

Residential Fire Safety

Subodh Kulkarni, Ph.D.
Program Associate - Machinery

Each year residential fires claim more than 3,000 lives in the United States. Usually, more than 50 Arkansans are among this number. Cooking is the leading cause of residential fires, followed by heating systems and arson. Most home fires start between midnight and 6 a.m., when residents are asleep and least prepared to survive a fire.

Many home fires start where they are likely to block your usual hall/stairway exit. Your normal exit path can quickly become a death trap when you open your bedroom door. The location where residential fires start has been traced for some of the fires: (1) kitchen, 24 percent; (2) bedrooms, 13 percent; (3) living room, 8 percent; (4) chimney, 7 percent; and (5) laundry, 5 percent.

Fire experts estimate that most fires could be prevented if families were aware of common fire hazards in homes. They also estimate that up to 60 percent of all lives could be saved **if** homes were equipped with **working smoke detectors** and families had escape plans.

Fire hazards, early warning devices, escape plans and fire extinguishers will be discussed in this publication.

Common Fire Hazards

Negligence, equipment malfunction and lack of knowledge about fire safety contribute to most accidental home fires. Most mechanical equipment, whether an electrical appliance, a gas-fired furnace or a wood heater, normally will not cause a fire when it malfunctions IF IT IS PROPERLY INSTALLED, PROPERLY MAINTAINED AND PROPERLY USED. This means following the manufacturer's instructions regarding installation, care and use of the equipment.

Sixty percent of all lives could be saved if homes had working smoke detectors and families had escape plans.

Electrical Fires

Home fire prevention starts with having your home wired in accordance with the electric code for your locality. If you live in an area where there is no code, insist that the National Electric Code be followed and that the wiring be installed by a competent professional. Do not alter your home wiring unless you are qualified. **Never** bypass a fuse or circuit breaker, and **do not increase** the size of one that is in place. Every circuit must have correctly sized protection.

Arkansas Is Our Campus

Visit our web site at:
http://www.uaex.edu

Permanently wired appliances such as ranges, disposals and dishwashers should be installed following the manufacturer's instructions. Pay particular attention to clearances, fuse and wire sizes for that circuit and electrical grounding. Portable electric appliances should be frequently inspected for abuse. Carefully inspect the cord and plug for frayed or worn insulation. Do not use extension cords for permanent outlets. Never nail or staple them around doors or windows or run them under carpeting or throw rugs.

Never put oversized light bulbs in light fixtures. It not only shortens bulb life, but it also overheats the fixture, may deteriorate insulation on internal wiring connections and may cause a fire.

Any extension cord or plug that gets hot to the touch is overloaded and is too small for that electrical load.

Heating Equipment

Home heating equipment should be inspected at least once per year. Gas furnaces require attention, particularly heat exchangers and vents for flue gases. Burned-out heat exchangers or rusted-out burners are hazardous. Unburned gases or carbon monoxide may accumulate in the house. Several months of dust accumulation can be hazardous, especially if proper clearances are not maintained around the equipment. A safe flue system and adequate combustion air for gas-fired equipment also minimize the potential of carbon monoxide poisoning.

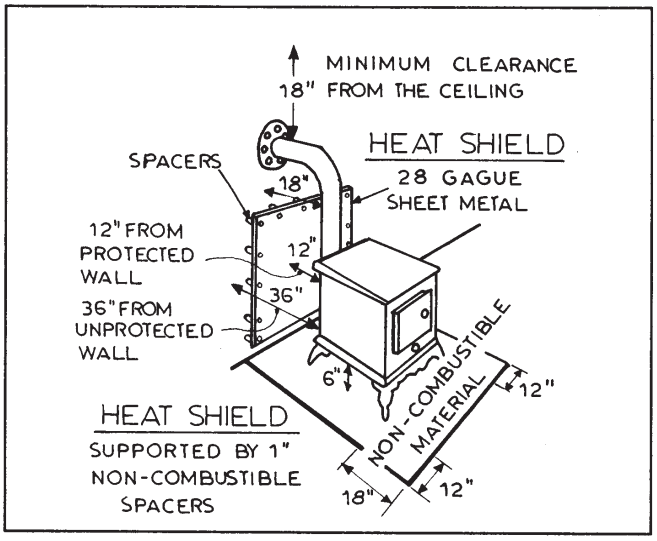
Portable heaters should be at least 3 feet from a bed or any flammable materials. Don't place portable heaters where they can be bumped over. Consider pets and children. Shut off/unplug portable heaters when adults are not in the vicinity.

Wood Heating

A quality wood stove, set on a safe hearth or stove mat with proper clearance from combustible materials on all sides and top, should operate safely if it is connected to an approved flue that is inspected regularly and cleaned to prevent creosote accumulation. Avoid using homemade or burned-out stoves. Be sure the hearth or mat is constructed so that sparks cannot burn through it. It also must be large enough to prevent sparks from popping out on the floor in front of the loading door or air vents.

Clearances from combustible surfaces range from 18 to 36 inches on all sides depending on stove construction. Be sure to allow the 36-inch distance if you are not positive the stove is certified for less clearance. Clearance can be reduced by 12 inches from walls that have been protected by a noncombustible heat shield spaced at least 1 inch from the wall.

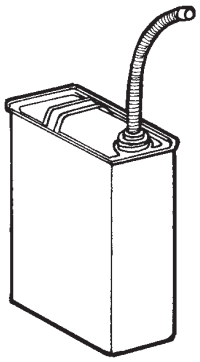
Flues should be listed by Underwriters Laboratories (UL) (or similar independent testing laboratory) and should be the Class A, All Fuel type. Or, a flue can be tile-lined masonry, preferably with double brick around the tile. The connector pipe from the stove to the flue can be single wall stove pipe, not to exceed 10 feet.



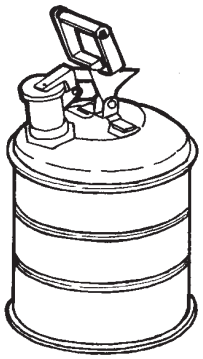
Fires caused by wood stoves can often be traced back to the flue fires in an inadequate or unserviceable flue. However, a flue fire can ignite a house even if the flue has been installed properly. Repetitive flue fires weaken and damage flues making them unsafe to use.

Flammable Liquids

Gasoline is often the most common flammable liquid around the home. It is one of the most dangerous. Homeowners may have a gallon or two of gasoline stored for use in a lawn mower, chain saw, weed trimmer, ATV, etc. A gasoline container should be an approved safety can and should never be stored in the trunk of a car, inside the home or in any room where an open flame (pilot light) is present.



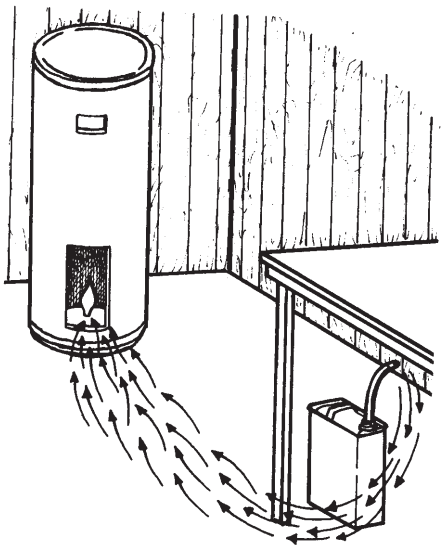
This is <u>not</u> a safety can.



This is a safety can.

A typical hazard is a garage storage room housing a gas clothes dryer or water heater and the gasoline can. Never store flammable liquids in rooms where

gas-fired appliances are located. Remember that a closed area inside the home that includes a gas water heater should not be used for gasoline storage.



Never use or store gasoline around ignition sources such as matches, pilot lights or electrical equipment.

House Ventilating Fans

Energy costs have encouraged many homeowners to install "attic fans." These fans are usually mounted in the ceiling and pull air into the home and discharge it through the attic. They may create a negative pressure inside the house and can pull air backwards through gas flue vents creating a fire hazard, if backdraft dampers or draft hoods are not properly attached to the gas flue. If the home has gas appliances and a whole-house ventilating fan is installed, check appliances to be sure cover plates and draft hoods are intact and that all appliances have been installed with proper clearances from combustibles.

Other Hazards

Good personal habits and housekeeping practices can also reduce fire hazards in your home. Accumulations of papers, Christmas boxes, rags and other dry items are fire hazards. They often are kept in the worst possible places – under stairs or in a storage room where a hot water heater is located.

Smoking is the biggest personal cause of fire. Use large ashtrays. **Never smoke in bed or while dozing in a chair or on a couch.** Keep matches and lighters away from children.

Take the time to check your home for fire hazards. Prevent fires if at all possible, but be prepared if a fire should occur in your home.

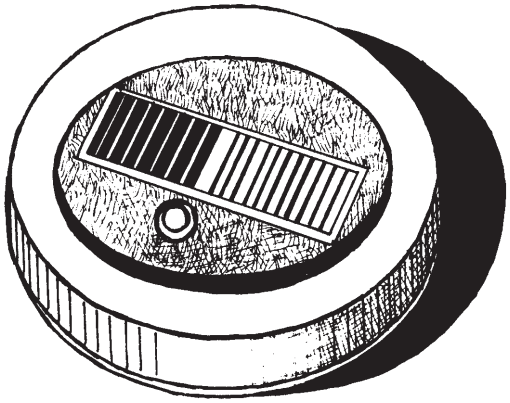
Early Warning Devices

Early warning devices have saved many lives from fire. Fire warning devices can be grouped into two general categories – SMOKE DETECTORS and HEAT DETECTORS. As the names imply, smoke detectors identify smoke and warn occupants, while heat detectors react to the presence of heat. Studies show that most fires start by smoldering and that the majority of fire fatalities result from inhalation of smoke and toxic gasses. Therefore, smoke detectors are vital as an early warning detection device.

There are two types of smoke detectors:

(1) Ion Chamber Detectors – This smoke detector uses a negligible radiation source to produce electrically charged molecules (ions) in the air. This sets up an electric current within the detector chamber. When smoke enters the chamber, it reduces the flow of current and sets off the alarm.

(2) Photoelectric Detectors – This smoke detector uses a photoelectric beam like an "electric eye." When smoke blocks light to the "eye," current flow is reduced and thus triggers the alarm.



Smoke detector

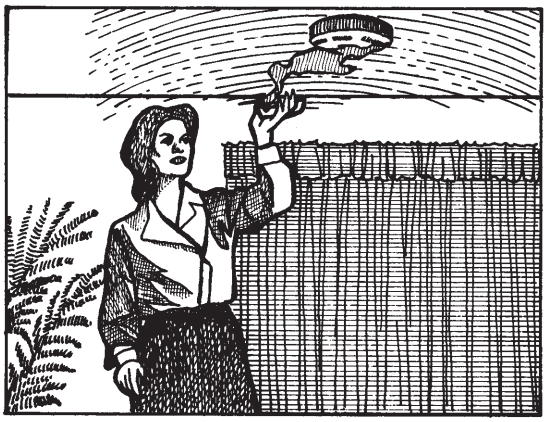
In general, photoelectric smoke detectors respond to small quantities of visible smoke particles. The ionization-type responds to small quantities of smoke containing particles that are invisible. Both are effective for fires in dwellings. Photoelectric may be preferable for use in cooking areas.

Smoke detectors are self-contained units that can either run on batteries or be plugged into existing electrical systems. Either kind is effective. The batteries must be replaced periodically to maintain the warning capability of most units. The most important thing is to install and maintain a smoke detector according to the recommendations of the

manufacturer. Make sure that smoke detectors are installed outside each bedroom in the house. Others may be installed for additional protection.

Check your smoke detectors regularly to make sure they are ready. Where residential fires have occurred, two-thirds of the smoke alarms were missing or not working.

SMOKE DETECTORS SAVE LIVES.



Escape Plans

The smoke detector may warn you before exits are on fire, but you have to make the best use of the time. What will you do if you awaken to the sound of your smoke detector? What will your children do?

You might do the wrong thing unless you have planned what to do if fire occurs. Each family member must know where to go and what to do in case of fire. Escape by walking down the hallway and out the front door may be impossible. By having plans for the worst possible conditions, your life and the lives of your family may be saved.

The basis for a fire escape plan is simple: GET OUT! Seconds count. If you have a plan, you won't waste precious moments trying several unsuccessful escape routes.

All family members should become acquainted with EDITH (Exit Drills In The Home). EDITH can help you quickly plan your family's escape.

The basics for a good home escape plan as outlined by experts at the National Fire Protection Association (NFPA) are:

- Plan at least two routes to the outside from every room in the house, especially bedrooms.
- Arrange a home fire alert signal loud enough to make sure everyone is awake.
- Have everyone sleep with bedroom doors closed to hold back smoke, heat and flame. This provides occupants extra time to escape by alternate routes.
- If a window is the only alternate escape route, be sure it opens easily. Have an escape rope or ladder from upper floors.
- Designate a gathering location well away from the house where all household members will meet. Be sure everyone understands that the house must not be reentered for any purpose.
- Always notify the fire department from someone else's telephone or from a street alarm, not from inside your own burning house.

Other key safety precautions to remember:

(1) Get down on your hands and knees and crawl if there is smoke.
(2) Stop, drop and roll if your clothes catch on fire to smother the flames.

Plan what to do before fire occurs in your home.

Get down on your hands and knees and crawl if there is smoke.

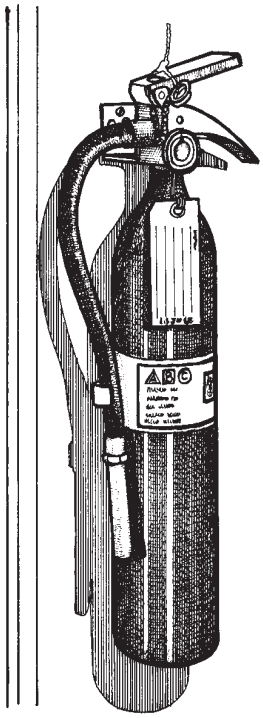
Plan escape routes and practice escape routes. This could mean the difference between life and death during a fire emergency.

Stop, drop and roll if your clothes catch fire.

Fire Extinguishers

The correct fire extinguisher in a handy location can reduce fire losses tremendously. The most practical for household use is a multipurpose dry chemical extinguisher labeled Class A-B-C. This means the extinguisher can be used on localized fires, smothering such material as wood, paper, cloth, flammable liquids, grease and electricity. Select a fire extinguisher that has the label of a major testing laboratory. Follow regular maintenance and inspection procedures recommended by the manufacturer. Take fire extinguishers to a competent fire department or fire extinguisher service establishment to be recharged after use on a fire, even if only partially used in putting out a small fire.

Protect Your Family From Fire



- Take time to locate fire hazards around your home. Correct these hazards; prevent a fire if possible.
- Install more smoke detectors to alert you in case of fire. Replace batteries immediately when they begin "chirping." A few extra minutes or seconds provided by an alarm may be extremely important to allow a safe escape.
- Have an escape plan. If the family has discussed and practiced the fire escape plan, chances are that training, rather than panic, will determine personal reaction.
- Have fire extinguishers in proper locations in the home for use on localized fires. Consider cooking areas, chimneys and laundry room locations.

Acknowledgment is given to Gary Huitink, former Extension agricultural engineer, as original author of this fact sheet and to Richard DeSpain, former Extension illustrator, for the artwork.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

DR. SUBODH KULKARNI is program associate - machinery, Biological and Agricultural Engineering, University of Arkansas Division of Agriculture, Little Rock.

FSA1020-PD-1-11RV

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director, Cooperative Extension Service, University of Arkansas. The Arkansas Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, gender, age, disability, marital or veteran status, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.