

AGRICULTURAL GUIDE

Published by the University of Missouri-Columbia Extension Division

FEB 22 1985



Unvented portable kerosene heaters - safety considerations

David E. Baker
Department of Agricultural Engineering
College of Agriculture

Dramatic increases in home heating costs have resulted in a significant expansion in the sales and use of portable kerosene heaters. The Consumer Product Safety Commission (CPSC) estimates 3,500 heaters were sold in 1974, compared to an estimated 4.5 million in 1982. The CPSC also estimates there may be as many as 9 million kerosene heaters in use in consumers' homes. Of those, 5.5 million are unvented heaters.

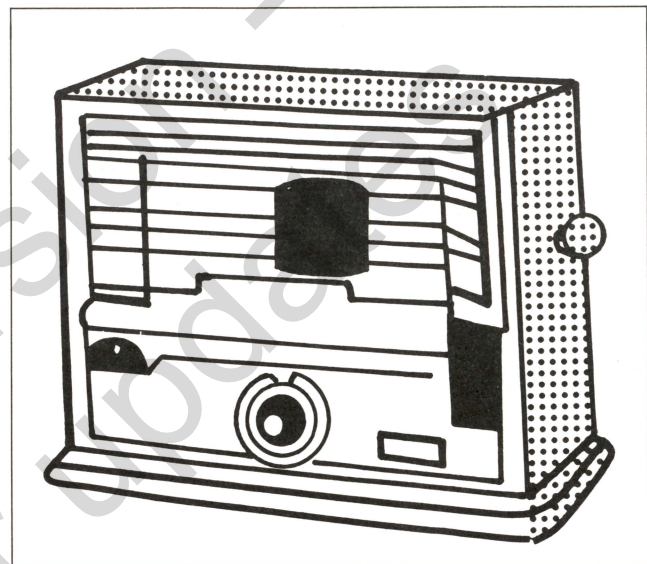
Most portable kerosene heaters are similar in design. Most include a device for igniting the wick, a wick so kerosene can be drawn from the tank to the combustion area, an automatic tip-over device designed to extinguish the wick should the unit be kicked or turned over, and a fuel tank.

Manufacturers praise the units as a "new generation" of portable kerosene heaters because they are equipped with such features as battery-powered ignition devices, automatic extinguishing devices, fuel gauges, protective metal grills, leveling indicators, carrying handles, lift-out fuel canisters and decorator finishes. Many also have a wide base to prevent easy tip-over.

However, many fire officials, government agencies and safety specialists feel the heaters are not hazard-free and feel kerosene heaters present hazards not found with other heating systems. The major hazard is fire that could result from the use of gasoline instead of kerosene in the heater. Carelessness while refueling and improper storage of combustible liquids are also hazardous. Many health officials are also concerned about health hazards from the pollutants an unvented kerosene heater puts into the building.

Operator's knowledge

Before purchasing or using a kerosene heater, consumers must learn safety and maintenance procedures necessary to safely operate a kerosene heater.



Before you purchase a heater, make sure local building and fire codes permit its use in residential structures. Check with your insurance carrier to determine what impact the use of these heaters may have on your homeowner's policy.

To ensure the safe operation of the heater, every adult member of the family must become an informed consumer and operator. **Never allow children to operate the unit!!!** Adults should be aware of the equipment maintenance, safety considerations, operating procedures, emergency procedures and fuel storage requirements. The best source of information for the unit should be the owner's manual. Read, heed and follow the procedures and safety alerts in the owner's manual before you attempt to operate, service or perform maintenance on the unit.

Kerosene heater safety guidelines

Follow these recommendations when buying and using a portable kerosene heater.

Use only listed heaters.

Only heaters that have been tested and listed in accordance with Underwriters Laboratories Standard

647 should be purchased and used. This listing should be shown on the name plate of the heater.

Use the correct fuel.

The National Kerosene Heater Association, the American Petroleum Institute, the Consumer Product Safety Commission and others recommend only 1-K kerosene be used in these heaters. According to American Society of Testing and Materials Standard D-3699, "Standard specifications for kerosene," there are two types of kerosene fuels: 1-K and 2-K. The primary difference is sulfur content. Type 1-K contains .04 percent sulfur by weight and 2-K contains .30 percent sulfur by weight. The higher sulfur content of 2-K fuel tends to adversely affect proper fuel wicking and increases sulfur dioxide emissions. The use of 2-K kerosene creates the need for frequent wick cleaning and maintenance, which, if not carried out properly, may produce a fire or explosion hazard.

The distinction between 1-K and 2-K kerosene fuels cannot be made through visual examination. The terms "water clear" or "clear white" are often used to describe the type of kerosene that can be used in the unvented heater. Although water clear or clear white kerosene may be 1-K in most cases, color should not be used as a sole indicator. The type of crude from which the kerosene is refined, temperature, aging and contamination can all cause kerosene to yellow and become darker. So if the retail dealer does not specifically market the kerosene as the 1-K type of fuel, you should assume the product is not 1-K kerosene. Find a dealer who can certify you are buying 1-K grade kerosene.

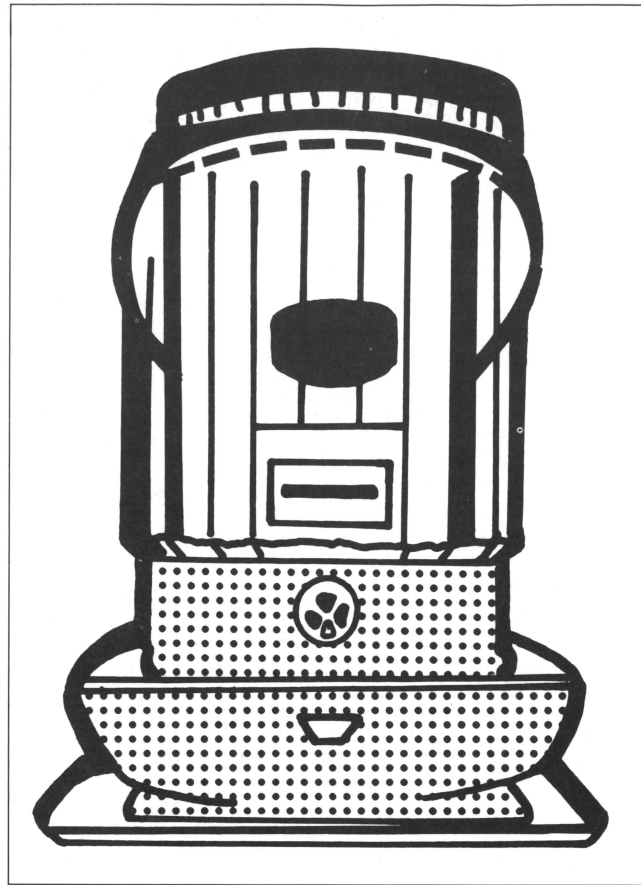
In addition, never use diesel, jet "A" fuel, No. 1 fuel oil, No. 2 fuel oil or gasoline in your heater. The use of any of these fuels could result in a fire or explosion resulting in death or injury to you or your family.

Proper clearances from combustible material.

The heater should be kept a minimum distance of 36 inches from all combustible materials such as curtains or furniture unless specified otherwise by the manufacturer. (If fewer than 36 inches are acceptable, the manufacturer will specify on the name plate.) Do not use flammable solvents, aerosol sprays or lacquers near the heater. Do not operate the heater in the same room where other flammable liquids such as gasoline are stored. Don't operate in dusty environments. The surface temperature of some units can exceed 500 degrees F, which can ignite flammable liquids, combustible liquids, flammable vapors or grain dusts, resulting in a fire or explosion.

Provide required maintenance and upkeep.

Consult your operator's manual for instructions



or recommended maintenance and upkeep to ensure the heater's proper operation. Required maintenance should include periodically cleaning the unit, trimming the wick, cleaning the unit of soot and carbon, inspecting for fuel leaks and other maintenance procedures recommended by the manufacturer. If you suspect the heater is not working properly, extinguish it immediately and allow it to cool. Then perform the necessary maintenance or take it to a qualified service center for repair. **Don't take a chance!** An improperly operating heater can result in a fire or can generate an excessive amount of the by-products of combustion: soot, carbon monoxide and sulfur dioxide.

Provide adequate ventilation.

Adequate ventilation is necessary for safe operation of the kerosene heater. Burning kerosene consumes oxygen and produces carbon dioxide, sulfur dioxide, nitrogen dioxide, carbon monoxide and other gases. Ventilation must be provided to replace oxygen as well as to remove gases in order to prevent asphyxiation or respiratory problems. The manufacturer's recommendations should be followed to provide adequate oxygen for combustion; in many instances, this may require opening a window or a door leading to another room. If no specifications are listed in the manufacturer's literature, one rule of thumb is to provide 1 square inch of window opening

for each 1,000 BTUs of the heater rating. An example—a 10,000 BTU heater may require opening an outside window 10 square inches to provide the necessary air intake. In an energy efficient home, additional air intake may be necessary.

Use only as supplemental heat.

The heater should never be used as the only heat source, except in an emergency situation. Don't operate it while you are asleep because heater malfunction could cause asphyxiation. Do not leave a heater unattended.

Keep the heater out of the traffic flow.

Place the heater in areas where there is little chance someone will bump into it. UL Standard 647 requires that in the tipped over position, the burner "flame shall not continue to burn longer than 30 seconds." The standard also requires "that kerosene discharged from the reservoir or the burner shall not be ignited" as a result of the heater tip-over. Although equipment must meet the strenuous test before it is "listed" by nationally recognized testing organizations such as UL, the equipment could fail or malfunction. So take care to prevent the potential for heater tip-overs.

Allow heater to cool before refueling.

The heater should be allowed to cool for a minimum of 15 minutes before refueling. The surface temperature of many of the heaters can be as high as 500 degrees F. Kerosene has a flash point (lowest temperature at which a liquid gives off enough vapors to form an ignitable mixture) of approximately 110 degrees F and an ignition temperature of 410 degrees F. If kerosene is spilled on a hot heater, it could ignite, causing fire.

Refuel heater and store kerosene outdoors.

Always refuel the COOL heater outside in a well ventilated area away from other ignition sources. Refueling should also be done in an area where small spills can quickly be cleaned up. Fuel should be stored outdoors in an approved blue safety can. "Kerosene" should be lettered on the safety can in a readily visible location. Never store kerosene in a red container which could easily be mistaken as a gasoline storage container.

Never overfill heater.

When refueling the heater, leave sufficient space for fuel expansion. Follow manufacturer's refueling

directions contained in the owner's manual or on the name plate.

Do not let children operate or refuel the heater.

Only an adult familiar with the operating and refueling procedures of the heater should be allowed to operate or refuel it.

Prevent burns.

Warn children of the dangers of the hot surface temperature on the portable kerosene heater. Remember, the surface temperature of some heaters may be as high as 500 degrees F.

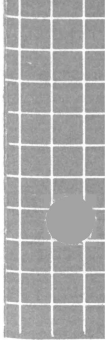
Develop a pre-fire plan.

Every family should take time to develop and practice a pre-fire plan. In your plan:

- **Install and maintain a smoke detector system.** Review UMC Guide 1907 "Residential smoke detectors" and install one smoke detector per living level in accordance with National Fire Protection Association Standard No. 74, "Standard for household fire warning equipment."
- **Install and maintain a fire extinguisher.** Install an approved multi-purpose dry chemical fire extinguisher(s) in a visible and easily accessible location. Review UMC Guide 1906, "Selecting and using a fire extinguisher."
- **Develop an evacuation plan.** An evacuation plan should be developed and practiced by all occupants to ensure safe escape from the building in the event of a fire. Use UMC Guide 1907 to assist you in developing a plan for your residence. Remember the plan is only good if everyone knows about the plan and has practiced it to make sure it works.

References:

- Grinnell Mutual Reinsurance Company, "Portable Kerosene Heaters, Unvented," File No. H108, 2/84.
- Pfister, Richard and Howard Doss, "Some Considerations About Portable Kerosene Heaters," Energy Facts, Extension Bulletin E-1669, Cooperative Extension Service, Michigan State University, November 1982.
- UL 647, Standard for Unvented Kerosene - Fired Room Heaters and Portable Heaters.
- Consumer Product Safety Commission, Fact Sheet No. 97: Kerosene Heaters, December 1982.
- Consumer Reports, October 1982, Mount Vernon, NY 10550, "Are Kerosene Heaters Safe?" pp. 499-507.
- Burke, Beverlee, Family Safety, Fall 1982, National Safety Council, Chicago, IL, pp. 12-13, "Something You Should Know About Kerosene Heaters."
- Schnieder, Rollin and Gerald Bodeman, "Space Heaters - Safe or Unsafe?" Neb. Guide D-3, University of Nebraska, Lincoln, NE, November 1983.



■ Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914 in cooperation with the United States Department of Agriculture. Leonard C. Douglas, Director, Cooperative Extension Service, University of Missouri and Lincoln University, Columbia, Missouri 65211. ■ An equal opportunity institution.