

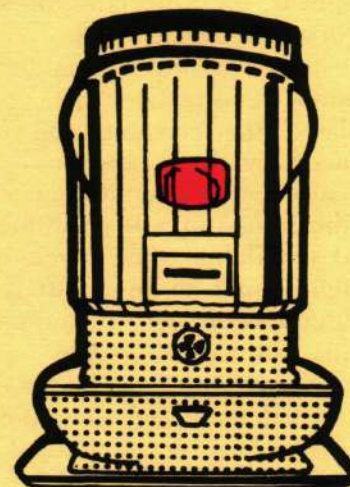
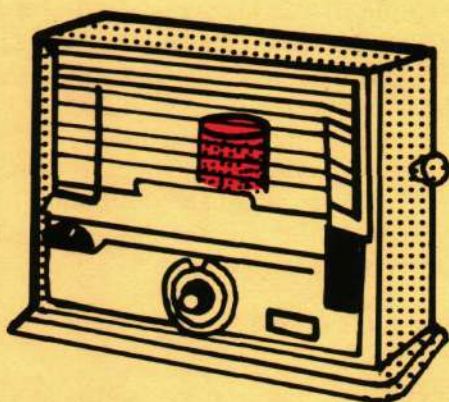
ENERGY FACTS

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Some Considerations About Portable Kerosene Heaters¹



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DO NOT REMOVE

Above left, example of a radiant heater. Above right, example of a convective heater.

Increases in home heating costs have helped develop a market for portable kerosene heaters to provide localized or emergency heat for homes, cottages and service buildings. Many questions are being asked about the safety of these units. This publication answers typical questions and suggests practices to follow when using a portable unvented kerosene heater.

Questions and Answers

#1 How safe are the new unvented portable kerosene heaters?

That depends upon who you talk to. Some public health and safety officials take a cautious view of these types of heaters. Some manufacturers and dealers, however, do not. But it is a fact that these types of heaters can be a potential fire hazard and

that the pollutants these heaters produce may represent a significant health hazard.

For these reasons, some communities and some states have banned the use of these types of heaters in homes. Would-be buyers of unvented, portable kerosene heaters should check with building authorities and/or fire officials and insurance representatives first.

If this type of heater is purchased, be sure to follow the manufacturer's exact directions for operation.

#2 What are some of the hazards of using unvented, portable kerosene heaters?

This type of heater:

— increases the potential of a home fire loss if it is placed too close to combustibles — paper, curtains and other readily flammable household material — or is used carelessly.

— increases the potential for personal burns. Tests by Consumer Reports (Oct. 1982 issue) show that during normal operation, these types of heat-

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ers can develop surface temperatures from 320 degrees F to more than 500 degrees F. Obviously, keep small children well away from the heater.

— produces carbon monoxide (a poisonous gas), nitrogen dioxide (which may cause throat and lung irritation), and sulfur dioxide (which can impair breathing).

#3 Are there portable, unvented kerosene heaters on the market that do not produce these gases?

No. Any heating system that burns fuel, and does not have a chimney, will give off some gases into the room or area where it operates.

#4 Is there an accumulative "indoor pollution hazard" from use of several unvented appliances?

It would appear so, especially in a "weatherized" home or a unventilated room.

Following tests of 18 types of portable, unvented heaters, Consumer Reports states that:

"We calculated the concentration of four gases produced by these heaters — carbon monoxide, carbon dioxide, nitrogen dioxide, and sulfur dioxide — in a 10x12x8-foot room with normal ventilation. The levels of each gas were high enough to be a serious health hazard to high-risk groups, including pregnant women, asthmatics, people with cardiovascular disease, children, and the elderly. The levels we calculated for some pollutants may pose risks for healthy people."

Hazard from indoor pollution is highest on calm days when an unvented heater is used along with an unvented gas range, gas refrigerator and a gas clothes dryer; along with a vented water heater and furnace.

Only heating units connected to chimneys exhaust products of combustion safely to the outside of the home.

#5 Of the gases that are produced by a portable, unvented heater, which is potentially the most lethal?

Carbon monoxide. It is toxic because it interferes with the blood's ability to carry oxygen to the cells of the body. It may reach toxic levels in the blood stream within minutes or several hours. Carbon monoxide may be a particular threat to persons with heart ailments.

Early carbon monoxide poisoning symptoms include dizziness, headache, weakness, drowsiness and/or nausea. Some people could experience impaired judgement and irritability.

#6 Why is carbon monoxide so deadly?

Carbon monoxide replaces oxygen in the blood until suffocation occurs. Carbon monoxide mixes

with your blood 210 times quicker than oxygen, so even getting fresh air after poisoning symptoms begin may not help and suffocation can still occur. It takes from 10 to 24 hours to rid the blood of excessive carbon monoxide.

#7 Do I really have to open a window one inch or keep a door ajar to another room to maintain a margin of safety while using a portable, unvented kerosene heater?

Yes, especially if the heater is located in a room having less than 150 square feet. Be sure to read the manufacturer's instructions about ventilation. The Consumer Product Safety Commission recommends one square inch of open window in the room where the heater is being used for each 1,000 Btu of the heater's rated output.

For example, if the heater is rated at 9,100 Btu per hour, and the window in the room is 24 inches wide, the window should be opened almost one-half inch. If the heater is rated at 20,000 Btu, that window should be open almost 1 inch.

Obviously, this causes a loss of heat, but it should help provide adequate ventilation provided that the portable heater is operating at manufacturer's specifications.

#8 What grade or quality of kerosene should be used?

Use ONLY 1-K grade of kerosene in portable, unvented heaters.

Kerosene is generally retailed in two grades — 1-K, which is low in sulfur (.04 percent sulfur by weight) and 2-K, which is much higher in sulfur. Use of 2-K grade kerosene will dramatically increase sulfur dioxide emissions.

Using kerosene other than the 1-K grade may increase health risk.

However, finding 1-K grade kerosene may be difficult. Just because a kerosene dealer says that the grade of kerosene is "water-clear" or "clear white" does not mean it is the 1-K grade. Both grades can look clear.

Find a dealer who can certify that what is being sold is 1-K grade kerosene.

#9 What happens if other fuels are substituted in place of 1-K kerosene?

The risk of a fire or an explosion increases dramatically. In March 1982, the Consumer Product Safety Commission and the National Kerosene Heater Association warned against using gasoline in kerosene heaters, citing a number of serious injuries and deaths from such use.

Other fuels, such as diesel or jet "A" fuel, may be equally dangerous.

#10 What about storing 1-K grade kerosene?

Storage of any type of liquid fuel requires a certain amount of care and common sense.

All kerosene should be stored in a metal fuel container clearly marked KEROSENE. Paint the container green, or some color other than red, so that it will not be accidentally confused with a container of gasoline.

Don't store kerosene in an old gasoline can. This will prevent getting it mixed up with gasoline and inadvertently putting gasoline in the heater.

Store kerosene out of the home in a well-ventilated and cool area, away from where children play.

#11 What safer choices do I have for spot or localized heating inside my home?

Portable electrical heaters may also be used to conserve energy if used to briefly warm persons in one part of the house instead of turning on the furnace. Use portable electric heaters rated no higher than 1500 watts to avoid overloading ordinary outlets in the home. Check for the "U.L. listed" statement on the nameplate before buying. Radiant heat types (quartz-nichrome wire enclosed in clear tubes) are more efficient in providing warmth to persons within 3 to 10 feet, without heating the entire room.

#12 Is it cheaper to use a portable kerosene heater or a portable electric heater for spot heating my home?

It costs about the same to operate either heater when your electrical rate is 5 cents per kilowatt hour and you can buy 1-K grade kerosene for \$2 per gallon. A gallon of 1-K kerosene has a Btu equivalence of approximately 40 kilowatt hours. (135,000 Btu and 3,413 Btu/KwHr). To estimate operating costs, multiply your actual cost per kilowatt hour by 40 to determine what you could pay for 1-K kerosene per gallon to produce the same number of Btu's. In addition, consider comparative purchase prices of electric and kerosene heaters, maintenance costs of both, convenience and related factors. For example, the operating costs provided above for kerosene units does not allow for the heat lost by slightly opening a window for ventilation, as recommended by the Consumer Product Safety Commission and most manufacturers. Neither is allowance made for costs of new electrical outlets or circuits that might be needed for a portable electrical heater.

#13 Should I use a portable, unvented kerosene heater in my home?

While the choice is clearly yours, consider this:

— The National Kerosene Heater Association contends that these units are very safe when used properly.

— The Consumer Product Safety Commission has twice rejected petitions asking that kerosene heaters be banned.

However:

— Consumer Reports: "CU thinks not. A kerosene heater's open flame poses an obvious fire hazard. The gases it gives off as it burns pose a less obvious — but no less serious — problem. Storing kerosene poses hazards of its own."

— Fire officials remain concerned about the demanding management practices that must be used to avoid making the heater dangerous.

— No regulatory, social, or educational agency in Michigan currently recommends using a portable, unvented heater in the home.

Precautions and Suggestions on Use

A portable kerosene heater can be used during waking hours to take the chill off an area without starting up the central heating system. Its temporary use can help remove dampness in a basement or vacation cottage, and help provide working comfort in a garage, construction site or storage area if adequate ventilation exists. A gas or unvented portable kerosene heater has value for TEMPORARY use during a power failure, especially in remote areas.

The following practices should be followed when kerosene portable heaters are used.

1. Portable kerosene heaters are prohibited in schools, hospitals, nursing homes, homes for the aged and adult foster homes. Some local communities may restrict use of portable kerosene heaters. If in doubt, check with local fire authorities or building inspectors.
2. Purchase and use only those heaters that have "Underwriters Laboratories listed" (U.L. listed) on the nameplate.
3. Multiply the number of square feet in the room to be heated x 28 to determine recommended size of heater (number of Btu's). Never substitute a portable kerosene heater for a central heating system.
4. Read manufacturer's instructions booklet carefully and follow directions for operation and maintenance. Read and heed decal warning messages.
5. Only adults with some mechanical know-how should operate or refuel the heater.
6. Use in well-ventilated room. Keep the door ajar to adjacent room. In a relatively small room, open a window for ventilation.

7. Use 1-K grade kerosene. **Never substitute regular kerosene, fuel oils, diesel, or any type of gasoline.**
8. Install smoke detectors in the home (see AEIS #360, "Smoke Activated Fire Alarms").
9. Shut off the heater and allow it to cool for a few minutes before moving, handling, servicing or refueling.
10. Always refuel the heater outside with unit off. Do it in an area where small spills can be quickly cleaned up. Avoid carpets or vinyl surfaces. Carpets absorb odor and fuel and vinyl will deteriorate from spills. **Never** refuel inside the home or while heater is in operation.
11. Place heater at least 3 feet away from curtains, drapes, bedding, books, papers, furniture or other flammable material.
12. Prevent children from coming in contact with the heater by instructing them and/or by guarding with a barrier around the heater. Make sure pets cannot tip the unit over.
13. Inspect the heater for leaks and excess carbon every time it's refueled. Clean and maintain according to the manufacturer's instructions.
14. Shut off the heater when you must leave it unattended.
15. Shut off the heater before going to sleep.
16. When turning the heater off, be sure the flame goes out.
17. Use hair spray and other flammable aerosol sprays, lacquers and flammable liquids away from kerosene heaters.
18. Store kerosene in a metal can labeled **KEROSENE** and in a tool shed or other outbuilding in an area away from direct sunlight and other heat sources. **Never** store kerosene in a home basement.

References

ASTM-3699, American Society for Testing and Materials.

Consumer Reports, October 1982, Mount Vernon, NY, 10550, "Are Kerosene Heaters Safe?," pp. 499-507.

Fire Command, January 1979, National Fire Protection Association, Boston, MA. Assorted publications and typical advertisements by portable kerosene heater manufacturers on specifications, features, guidelines for selection, safety tips and warnings.

Haley, Gregory W. "The Portable Kerosene Heater Controversy," **Fire Journal**, July 1981, pp. 78, 128-129.

Kesler, Nancy. "K-1 or K-2? But Without a Flue?" Gannett News Service, Lansing State Journal, p. 11A, January 24, 1982.

Kweller, E. R. and W. Cuthrell. Ventilated Room Combustion Test for Three Portable Kerosene Heaters. A report to the Consumer Product Safety Commission, National Bureau of Standards, March 1980.

Lavery, Donald S. "Design and Performance of Kero-sun Heaters." Testimony presented to the Connecticut General Assembly, Joint Hearing, the Energy and Public Utilities Committee and Judiciary Committee, Oct. 10, 1979.

Pfister, R. G. "Smoke Activated Fire Alarms," AEIS #360, Department of Agricultural Engineering, Michigan State University, East Lansing, MI, October 1976.

Powell, Evan. "Portable Radiant Heaters," **Popular Science**, Vol. 218, January 1981, pp. 8-13.

Rashidi, M., M.S. Massoudi, and F. Shadman. "Relation of Carbon Monoxide from Domestic Kerosene Heaters," **Journal of Environmental Science and Health**, Vol. A12, No. 3, 1977, pp. 115-126.

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