What to do

Educate family and friends about carbon monoxide so they are aware of what the early poisoning signs are.

If your boat has rear-vented generator exhaust, check with the boat manufacturer for possible recall or reroute the exhaust to a safe area.

Assign an adult to watch when anyone is swimming or playing in the water.

Schedule regular engine and exhaust system maintenance inspections by experienced and trained technicians.

Keep forward-facing hatches open, even in inclement weather, to allow fresh air circulation in living spaces. When possible, run the boat so that prevailing winds will help dissipate the exhaust.

Do not confuse carbon monoxide poisoning with seasickness, intoxication or heat stress. If someone on board complains of irritated eyes, headache, nausea, weakness or dizziness, immediately move the person to fresh air, investigate the cause and take corrective action. Seek medical attention, if necessary.

Install a carbon monoxide detector in each accommodation space on your boat. Check detectors before each trip to be sure they are functioning properly. If the detector goes off, believe it!

Facts

Carbon monoxide is a potentially deadly gas produced any time a carbon-based fuel, such as gasoline, propane, charcoal or oil, burns. Sources on your boat include gasoline engines, generators, cooking ranges, and space and water heaters. Cold or poorly tuned engines produce more carbon monoxide than warm, properly tuned engines.

Carbon monoxide is colorless, odorless and tasteless and mixes evenly with the air. It enters your bloodstream through the lungs and displaces the oxygen your body needs. Early symptoms of carbon monoxide poisoning - irritated eyes, headache, nausea, weakness, and dizziness - are often confused with seasickness or intoxication. Prolonged exposure to low concentrations or very short exposure to high concentrations can lead to death.

Each year, boaters are injured or killed by carbon monoxide. Most incidents occur on older boats and within the cabin or other enclosed areas. Exhaust leaks, the leading cause of death by carbon monoxide, can allow carbon monoxide to migrate throughout the boat and into enclosed areas. New areas of concern are the rear deck near the swim platform with the generator or engines running and teak surfing or dragging behind a slow moving boat. Regular maintenance and proper boat operation can reduce the risk of injury from carbon monoxide.

All carbon monoxide poisonings are preventable!

Information

To find out more about making boating safer — including how you can prevent carbon monoxide poisoning on recreational boats — contact:

Lake Pleasant Regional Park
41835 N. Castle Hot Springs Road
Morristown, AZ 85342
www.maricopa.gov/parks/lake_pleasant
(602) 372-7460 ext. 200

Arizona Game and Fish Department
5000 W. Carefree Highway
Phoenix, AZ 85086
www.azgfd.gov/boating
(602) 942-3000

National Marine Manufacturers Association
200 East Randolph Drive, Suite 5100
Chicago, IL 60601-6528
www.nmma.org
(312) 946-6200

United States Coast Guard
Office of Boating Safety
CG Headquarters (G-OPB-3)
2100 Second Street SW
Washington, DC 20593
www.uscgboating.org
(202) 267-0984

American Boat & Yacht Council, Inc.
3069 Solomon's Island Road
Edgewater, MD 21037-1416
www.abyc.com
(410) 956-1050

U.S. Department of the Interior
Office of Managing Risk and Public Safety
755 Parfet Street, Suite 364
Lakewood, CO 80215
safetynet.smis.doi.gov/cohouseboats.htm
(303) 236-7130

Take a boating education class online at www.azgfd.gov/boating.

Reproduced by a grant from the Arizona Game and Fish Department, Boating Safety Program.

May 2009

WITHOUT WARNING!

A boater's guide to prevent a SILENT KILLER!

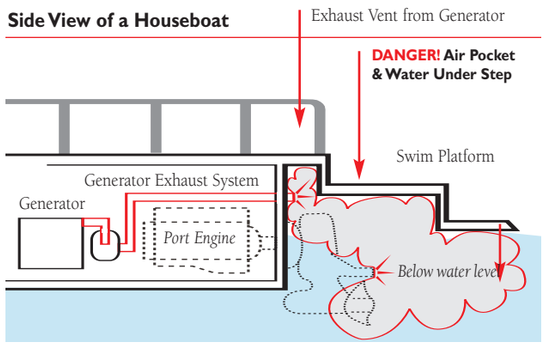
CO

Carbon Monoxide

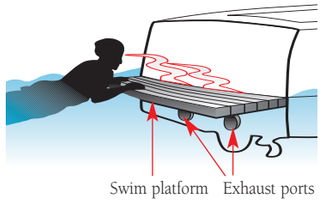
Carbon monoxide can collect within, along side or behind a boat in minutes in a variety of ways.

AVOID THESE DEATH ZONES!

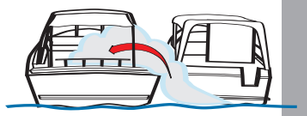
Do not swim near or under the back deck or swim platform. Carbon monoxide from exhaust pipes of inboard engines, outboard engines and generators build up inside and outside the boat in areas near exhaust vents. **STAY AWAY** from these exhaust vent areas and **DO NOT** swim in these areas when the motor or generator is operating. On calm days, wait at least 15 minutes after the motor or generator has been turned off before entering these areas. **NEVER** enter an enclosed area under a swim platform where exhaust is vented, not even for a second. It only takes one or two breaths of the air in this "death chamber" for it to be fatal.



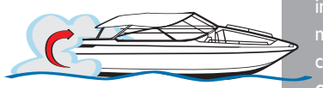
- Teak surfing, dragging and water skiing within 20 feet of a moving watercraft can be fatal.
- Avoid idling boat motors (unless absolutely necessary) especially when large groups of boats are tied together or anytime swimmers are present. Be careful of carbon monoxide accumulations in calm or no wind conditions.
- The U.S. Coast Guard advises not to use hand-held showers at or near the swim platform if either the gasoline-powered propulsion engine(s) and/or generator set are in use. Also, a hand-held shower system should never be connected to the engine's raw water open cooling system.

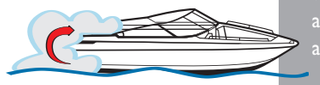


Blockage of exhaust outlets can cause carbon monoxide to accumulate in the cabin and cockpit area -even when hatches, windows, portholes, and doors are closed.



Exhaust from another vessel that is docked, beached, or anchored alongside your boat can emit poisonous carbon monoxide gas into the cabin and cockpit of your boat. Even with properly vented exhaust, your boat should be a minimum of 20 feet from the nearest boat that is running a generator or engine.





Slow speeds or idling in the water can cause carbon monoxide gas to accumulate in the cabin, cockpit, bridge, and aft deck, **even in an open area.** A tailwind (force of wind entering from aft section of the motorboat) can also increase accumulation.

The "station wagon effect," or backdrafting can cause carbon monoxide to accumulate inside the cabin, cockpit and bridge when operating the boat at a high bow angle, with improper or heavy loading or if there is an opening which draws in exhaust.

This effect can also cause carbon monoxide to accumulate inside the cabin, cockpit, aft deck, and bridge when protective coverings are used and the boat is underway.

CO DANGER CARBON MONOXIDE

Do not operate the vessel without doing the following:

Checklist: Each trip

- ❑ Educate all passengers about carbon monoxide poisoning.
- ❑ Make sure all exhaust clamps are in place and secure.
- ❑ Look for exhaust leaking from exhaust system components, indicated by rust and/or black streaking, water leaks, or corroded or cracked fittings.
- ❑ Inspect rubber exhaust hoses for burned or cracked sections. All rubber hoses should be pliable and free of kinks.
- ❑ Confirm that water flows from the exhaust outlet when the engines and generator are started.
- ❑ Listen for any change in exhaust sound that could indicate an exhaust component failure.
- ❑ Test the operation of each carbon monoxide detector by pressing the test button. Make sure the battery is installed properly and is in good condition. Never remove the battery unless replacing it with a new battery.

Checklist: At least annually

- ❑ Replace exhaust hoses if any evidence of cracking, charring or deterioration is found.
- ❑ Inspect each water pump impeller and the water pump housing, and replace if worn. Make sure cooling systems are in proper working condition to prevent overheating and burn through the exhaust system. (Refer to the engine and generator manuals for further information.)
- ❑ Inspect each of the metallic exhaust components for cracking, rusting, leaking or loosening. Pay particular attention to the cylinder head, exhaust manifold, water injection elbow, and the threaded adapter nipple between the manifold and the elbow.
- ❑ Clean, inspect, and confirm proper operation of the generator cooling water anti-siphon valve (if equipped).

Annual Checklist must be performed by a qualified marine technician.

For additional boating safety tips, refer to the Arizona Boating Guide at www.azgfd.gov/boating.