

## 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.

Apply the enclosed carbon monoxide decals to your motorized vessel. Place the smaller "warning" decal on the interior of the vessel where it is immediately visible to the operator (near the helm). Place the larger "danger" decal facing out on the exterior of the stern or transom of the vessel (near the swim platform) unless the vessel is inflatable and the decal would not adhere to the surface of the stern.

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. When an engine or generator is running, the rear of the boat is an unsafe area. Teak surfing or dragging behind a boat is dangerous and a violation of California law. Regular maintenance, proper boat operation and safety awareness 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:

### **National Marine Manufacturers Association**

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

### **Commandant (G-OPB)**

U.S. Coast Guard Headquarters  
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 Occupational Health and Safety  
755 Parfet Street, Suite 364  
Lakewood, CO 80215  
safetynet.smis.doi.gov/cohouseboats.htm  
(303) 236-7130

### **California Department of Boating and Waterways**

2000 Evergreen Street Suite 100  
Sacramento, CA 95815-3888  
www.dbw.ca.gov  
(888) 326-2822



## Safe Boating Facts About the Silent Killer

# CO

## Carbon Monoxide

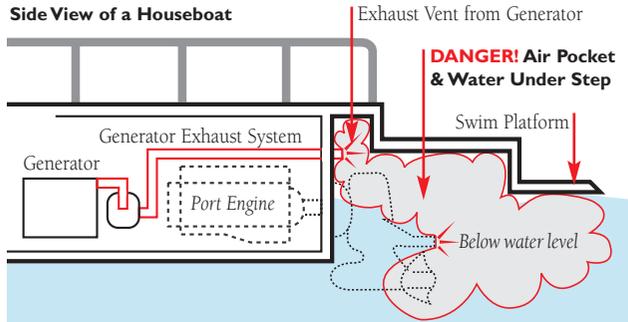
Carbon monoxide can collect within, alongside or behind a boat in minutes in a variety of ways.



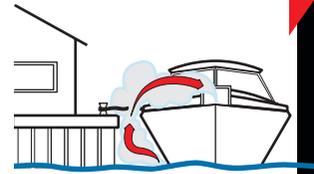
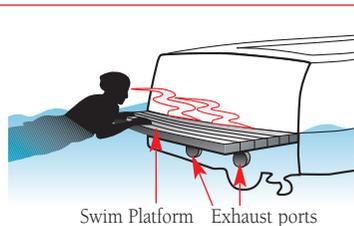


## AVOID THESE DEATH ZONES!

**Swimming near or under the back deck or swim platform.** Carbon monoxide from exhaust pipes of inboard engines, outboard engines and generators builds 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 shut 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.



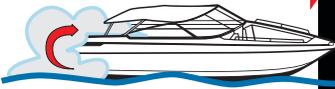
It is a violation of California law, punishable by a fine of up to \$100, to operate a vessel's engine while a person is occupying or holding on to the swim platform, swim ladder, or bodysurfing behind the motorized vessel. The law provides exceptions for briefly assisting with docking or departure, exiting or entering the vessel, or engaging in law enforcement or emergency rescue activity. However, there is no exception for body surfing behind the vessel at any time.



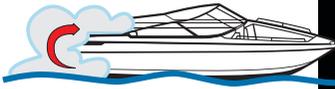
**Blockage of exhaust outlets** can cause carbon monoxide to accumulate in the cabin and cockpit area - even when hatches, windows, portholes, and doors are closed.



**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 under way.



## 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 burning 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.**