

Highlights of the NIOSH Health Hazard Evaluation

Evaluation of Carbon Monoxide (CO) Risk Associated with Houseboats

This sheet summarizes investigations performed by NIOSH industrial hygienists at Lake Powell, AZ (conducted in September and October, 2000) and Lake Cumberland, KY (conducted in October, 2000). These investigations were conducted to evaluate carbon monoxide (CO) concentrations on houseboats.

What NIOSH Did

- We sampled for CO on the back deck of houseboats.

What NIOSH Found

- The open space under the houseboat swim platform can have CO concentrations above the Immediately Dangerous to Life and Health (IDLH) level if the onboard gasoline generator and/or boat engines are operating and discharge exhaust into this area.
 - Under the conditions listed above, CO concentrations at Lake Powell were measured as high as 30,000 ppm and at Lake Cumberland as high as 10,000 ppm in the open space beneath the swim platform.
 - CO poisoning cases indicate that hazardous CO concentrations remain under the swim platform after engines/generator are deactivated.
 - The swimming area directly around the back of the swim platform on houseboats that discharge gasoline generator/motor exhaust in the space below the deck or out to the rear of the swim platform can have CO concentrations above IDLH.
 - Under the conditions listed above, a CO concentration was indicated greater than 7,000 ppm at Lake Powell, and at Lake Cumberland a CO concentration of at least 10,000 ppm was measured in the swimming area directly behind the swim platform in open air.
 - Houseboats with diesel generators/motors did not indicate a life threatening environment (CO concentrations near IDLH) around the back of the houseboat.
 - CO concentrations collected on and around houseboats with diesel generators/motors were considerably less than CO concentrations measured on and around houseboats with gasoline operated generators/motors.
- A houseboat with a diesel generator exhausting under the swim deck was not evaluated. This configuration could potentially allow a build up of CO in this area and may be potentially dangerous.
 - Personal sampling on workers was not conducted at Lake Cumberland. However, Lake Powell studies have indicated that dock workers can be exposed to hazardous concentrations of CO.

What Should Be Done

- Houseboat manufacturers should be informed of design concerns related to CO poisonings around the rear deck of boats that have gasoline powered generators/motors that exhaust into the area beneath the swim platform or out the back.
- The cavity below the swim deck and the area directly around the houseboat swim platform (on boats with gasoline generators that exhaust into these areas) should be redesigned to reduce CO hazards when the generator/motors are in operation.
- Improved design of gasoline powered boat generators/engines should be accomplished to ensure safety when engines and/or generators are operated.
- Training about the severity of CO hazards in boating should be developed for marina personnel, NPS personnel, EMS providers, and hospital emergency staff so that symptoms experienced by either employees or other boat operators might be more easily associated with exposures.
- A CO poisoning awareness campaign should be started to inform boaters about boat-related CO hazards.
- Permit required confined space procedures should be followed before any workers enter the space below the swim deck on houseboats that are in the water.



What To Do For More Information:
We encourage you to read the full report. If you would like a copy, either ask your health and safety representative to make you a copy or call 1-513/841-4252 and ask for HETA Report # 2001-0026

