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CO – A Bigger Problem Than First Imagined

Those in attendance at the recently concluded International Boating and Water Safety Summit were exposed to a compelling presentation by Robert Baron, MD and Jane McCammon. Dr. Baron is the Medical Director for the Glen Canyon National Recreation Area and Ms. McCammon is the Director of the Denver Field Office of the National Institute for Occupational Safety and Health (NIOSH).

The bottom-line of their presentation is that there are undoubtedly many, many more carbon monoxide intoxication deaths in the recreational boating world that we ever before realized.

While in time we will be modifying all of our boating safety courses to provide teaching resources that will be greatly expanded beyond the current content, this matter is significant enough that I would ask every Auxiliary Instructor to become aware how serious this problem is and reinforce SAFETY where carbon monoxide is concerned. Here are some captivating responses to frequently asked questions as cited by Baron and McCammon:

What kind of boat should I worry about?

Any boat with an engine...houseboats, cabin cruisers, ski boats, etc.

Where is the source of the CO?

Primarily boat engines – whether the engine propels the boat or is an electric generator.

Where is the danger?

On, under, or near any rear deck – in the rear seats – near the exhaust discharge – inside the cabin.

What is being done about it?

Engineering, education, legislation, legal action.

Here are some additional eye-opening revelations:

- Although 505 CO poisoning cases have been identified in the study period of 1990-2003, there might be more since many deaths attributable to other causes may have been the result of CO. Of the 505 identified cases, 102 died and at least 94 others lost consciousness.
- Houseboat generator – 12 year-old sitting on the deck of the houseboat for 30 minutes simply disappeared. Dead from CO poisoning and slipped into the water.
- Generator on a cabin cruiser – 2 9-year-old girls near generator exhaust for 10 minutes. First girl had difficulty responding to parents when called for lunch. Second girl disappeared. Found on bottom of the lake 30 minutes later in wading water...death from CO.
- Typical boat engine – Puts out as much Carbon Monoxide as **188 automobiles**.

- Some chilling numbers...World Health Organization (WHO) and NIOSH recommendations:

CO Exposure Concentration (PPM – Parts/million in air)	Relevant Exposure Limit or Outcome
26	WHO recommended limit for 1-hour exposure period
87	WHO limit for 15-minute exposure period
200	NIOSH ceiling limit – Shouldn't be exceeded in the workplace... anywhere in the workplace!
1,200	NIOSH Immediately dangerous to life and health
6,400	Danger of death in 10-15 minutes
12,800	Danger of death in 1-3 minutes

- Compare that table to the following examples:
 - “Death Zone” – In the airspace beneath extended rear houseboat decks during or after engine or generator operation:
 - Generator exhaust only – 30,000 PPM in the air space
 - Propulsion Engine exhaust only – 60,000 – 88,000 PPM in the air space
 - Bottom-line – Re-route rear directed generator exhaust away from this space. Seek guidance from the boat manufacturer about how to enter this space.
 - Houseboat generators –
 - Water surface near the houseboat – 7-10,000 PPM
 - Water surface 10' away from the houseboat – 200 PPM
 - Cabin cruiser generator –
 - 41,600 PPM measured at generator exhaust
 - Greater than 2,000 PPM as far as 5 feet away
 - 570 PPM 10 feet away
 - Ski Boat with inboards measured on the dive platform –
 - 26,700 PPM
- Fatalities from moving ski boats – Examination of carboxyhemoglobin (COHb) concentrations – this is the agent created when red blood cells bind with CO...these are all fatalities:
 - 57% after 5-minutes exposure
 - 50% in 2 minutes
 - 48% “in minutes”
 - 41% 100 yards from boat at 5-10 MPH
 - 61% in 20-25 minutes
 - 56% in 10-15 minutes
 - Normal COHb is less than 3% in non-smokers and is typically 5-7% in smokers. When COHb approaches or exceeds 30%, a person is in severe danger of collapse and possible death.

Have boaters look into mitigating technologies such as: Alarms, safety interlocks, CO free generators, dry stack exhaust systems. Encourage boaters to turn off the engine when skier/boarder/tuber is being recovered or there are people in the water near any boat...also reduces risk of propeller injuries in non-jet drive vessels.

My friends, here is a place we can significantly save lives preventively and it is vital that we make the recreational boating public aware of just how dangerous it is to linger around the rear of a boat when the engines are running or a generator is in operation.

Please incorporate this critical information in all of your public education efforts.