

Carbon Monoxide Related Drowning

Jane McCammon

Double Angel Foundation
CO Awareness Committee Chair

jmccammon@earthlink.net

(303) 718-3799

Robert Baron, MD

ED Co-Director, Phoenix Banner Good Samaritan RMC
Medical Advisor, Glen Canyon National Recreation Area

NDPA 2006

Gratefully acknowledging Dr. Tim Flood's contributions



DOUBLE ANGEL FOUNDATION®

www.doubleangel.org



Raising Awareness About the Dangers of Carbon Monoxide Poisoning on Boats

We only see what we look for,

and

we only look for what we know



Drowning and CO Overview

How do you know if CO was associated with the drowning?

What CO concentrations cause death?

How many drownings are CO-related?

Drowning and CO Overview

How much CO is there around boats?

What type of boats are associated with CO-related drownings?

What is being done about prevention?

FOR MORE INFORMATION – go to
<http://safetynet.smis.doi.gov/COhouseboats.htm>

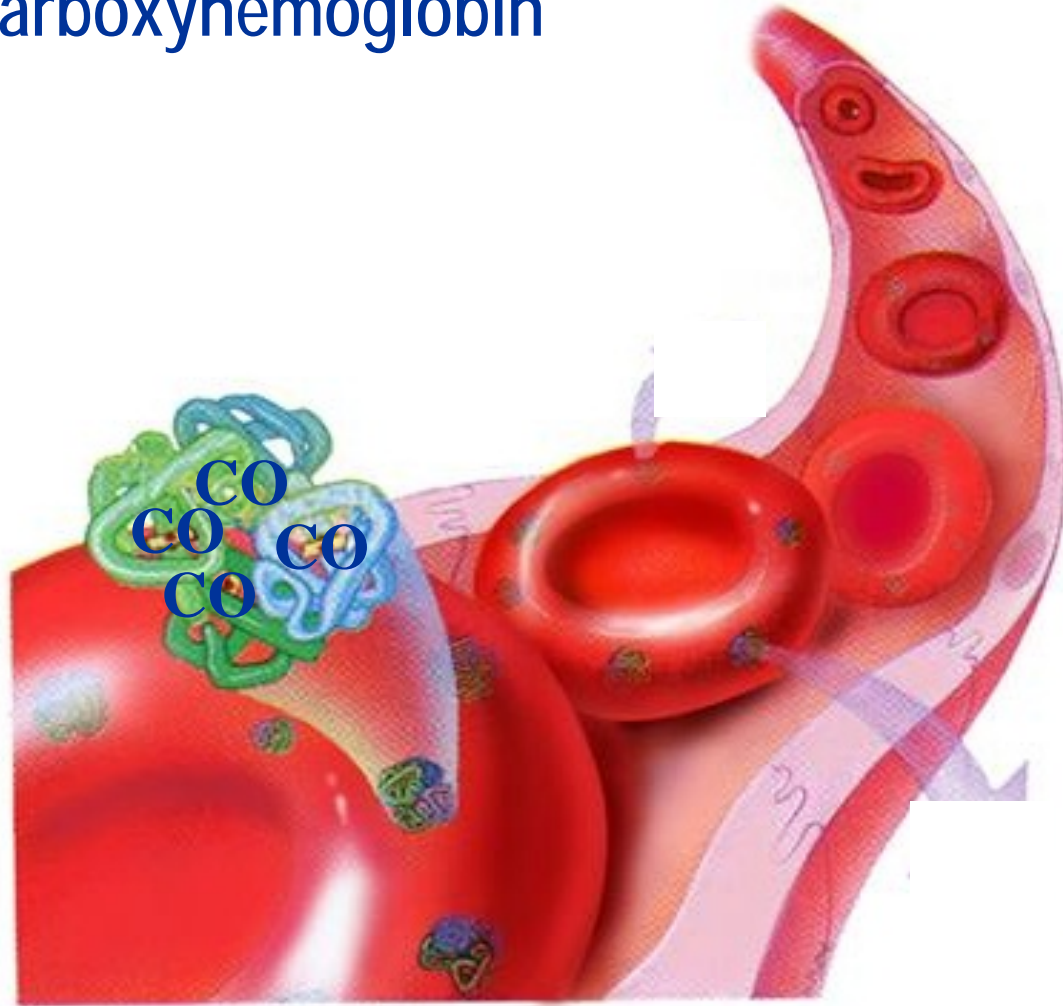
CO % in Blood

At 50 -60%
Coma
and
Death

At 20-30%
Loss of
conscious-
ness (LOC),
disorientation

At about 10%
Headache,
nausea,
confusion

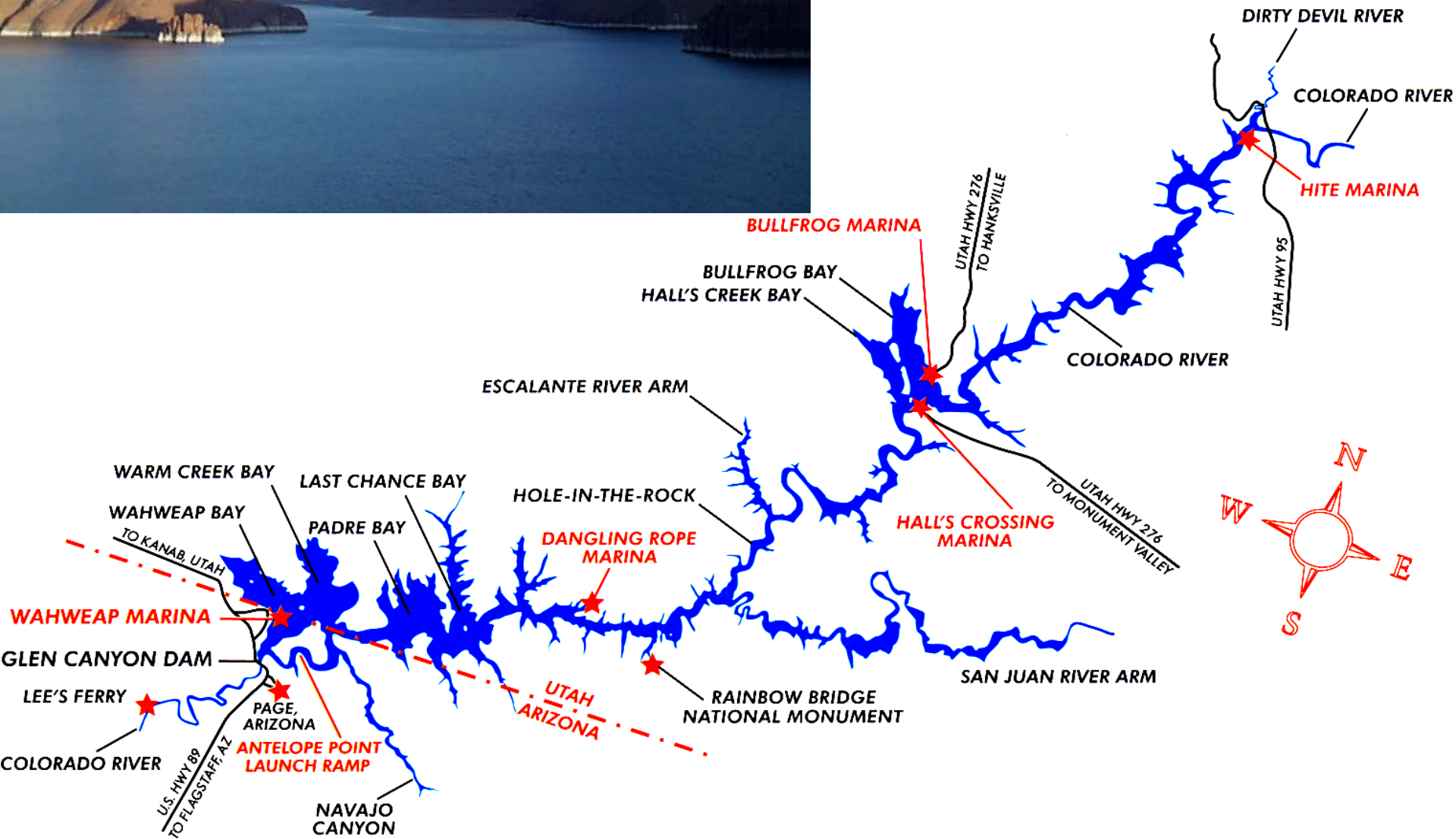
Carboxyhemoglobin



Lake Powell in Glen Canyon National Recreation Area (GCNRA)



Lake Powell



Drownings at Lake Powell: 1994 -2004

- National Park Service records were used to identify possible unintentional fatal drownings.
- Drowning as cause of death was confirmed through ME/coroner reports and AZ Health Department.
- CO-relatedness was confirmed by COHb analyses (range = 22% to 80%)

Drowning at Lake Powell 1994 - 2004

- 72 people drowned

*12 (17%) of all Lake Powell drownings
were CO poisonings first*

- 25 of the 72 drowned in boating accidents

*12 (48%) boat-related drownings
were CO poisonings first*

Philadelphia Inquirer:
Don Sapatkin July 18, 2003

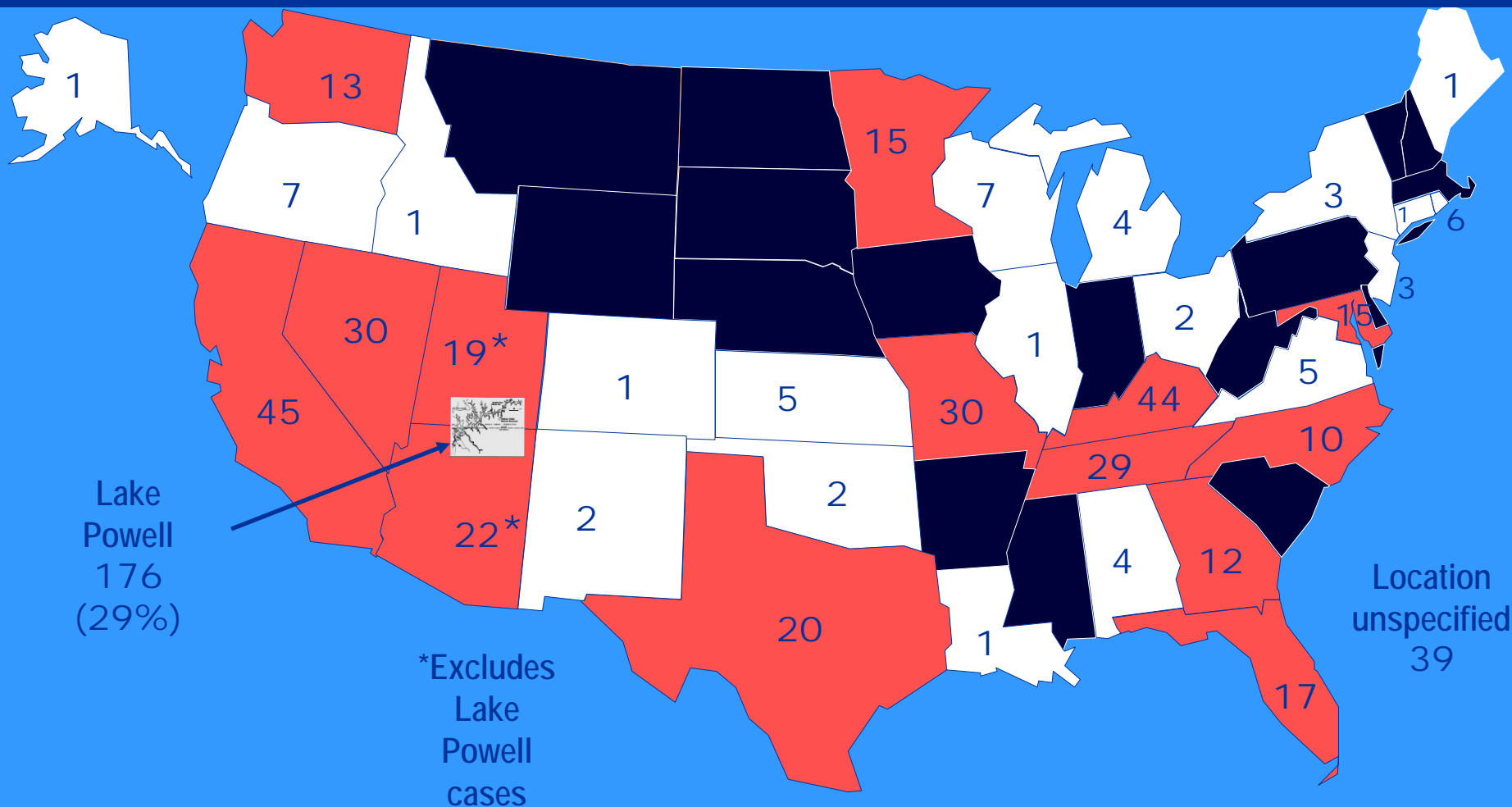
“Based on an estimated 40% of boat-related drownings at Lake Powell being CO-related, there could be as many as 215 similar drownings per year nationwide.”

How Many Boat-Related CO Poisonings?

607 poisonings in 33 states (99% occurred 1990 – 2004)

Severity: 122 people died / 128 lost consciousness (235 loc unknown)

Remember: Lake Powell data collection is the most extensive.



But How Many Poisonings?

An iceberg floating in the ocean, with a small tip above the water and a much larger, submerged portion below. The sky is blue with light clouds, and the water is a deep blue. The iceberg is white and blue, with some snow on top.

Is it 607?

Lack of Recognition

Lack of Reporting

Outdoor Fatal Poisonings

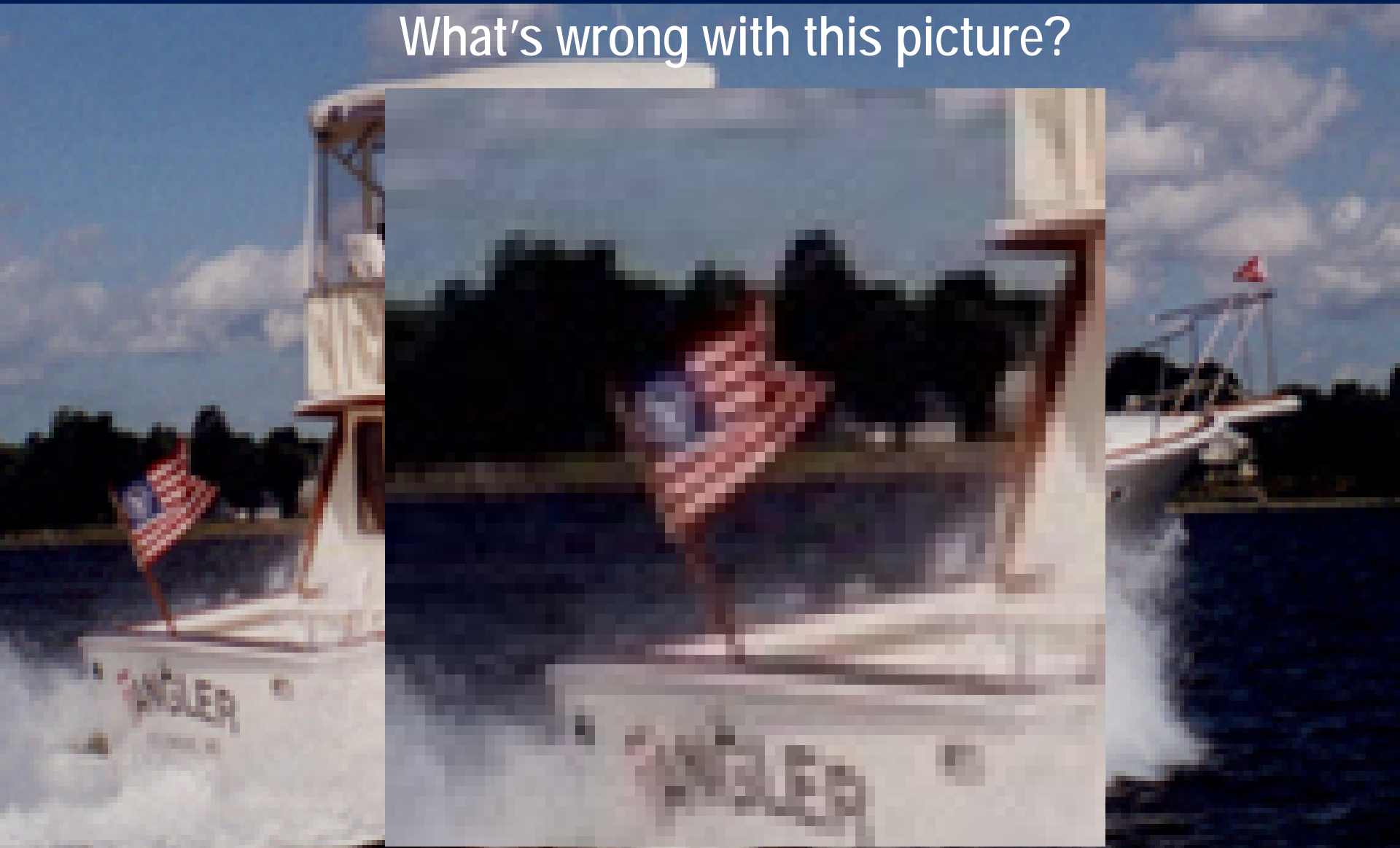
Why wasn't the extent of the problem
recognized earlier?

Because it's unbelievable.

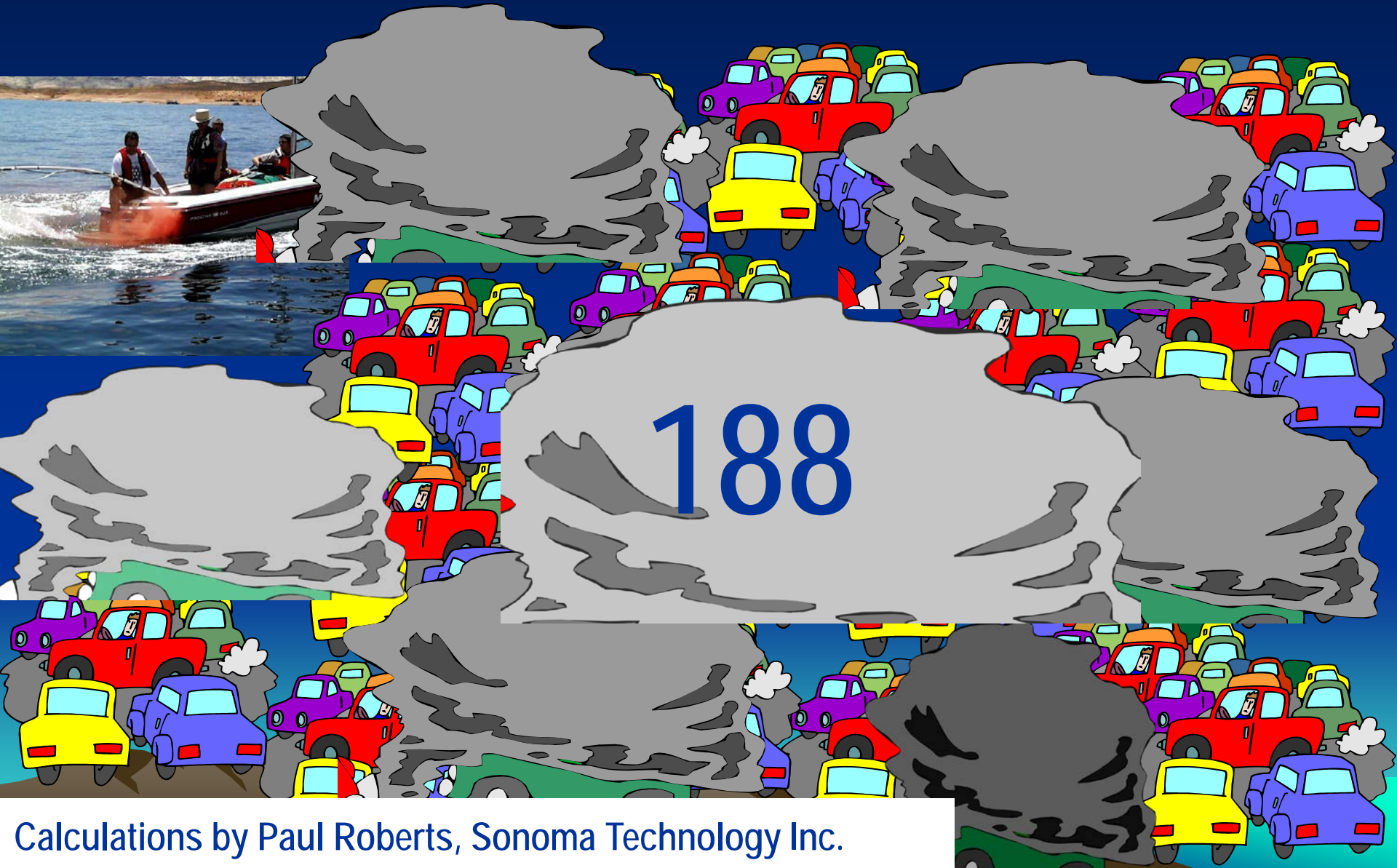


A sunny day on Chesapeake Bay

What's wrong with this picture?



CO: 1 typical boat engine = ??? cars



188

Calculations by Paul Roberts, Sonoma Technology Inc.

Ski Boats / Other Motorboats

A yellow and white ski boat is displayed in a museum. The boat is mounted on a metal stand and is viewed from a low angle, showing the hull and the propeller. The background is dark with some lights, suggesting an indoor exhibition space.

Nationwide:

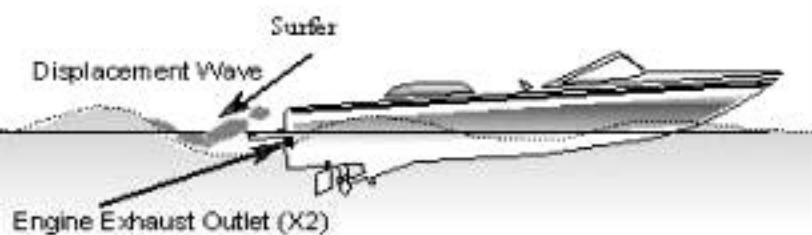
51 people poisoned on the swim platform

20 died

22 lost consciousness

**Most recent drowning:
August 20, 2005
(Lake Tapps, WA)**

“Teak Surfing or Dragging”



Vessel is operated at speed that will create the largest possible “Displacement Wave,” usually 10 to 12 MPH



JUN 20 2001

Boats Underway:

Death Comes Quickly

COHb: Duration of Exposure

57%: 5 minutes

50%: 2 minutes

48%: "in minutes"

61%: 20-25 minutes

56%: 10-15 minutes

64%, 62%,

53%, 41%,

etc.....

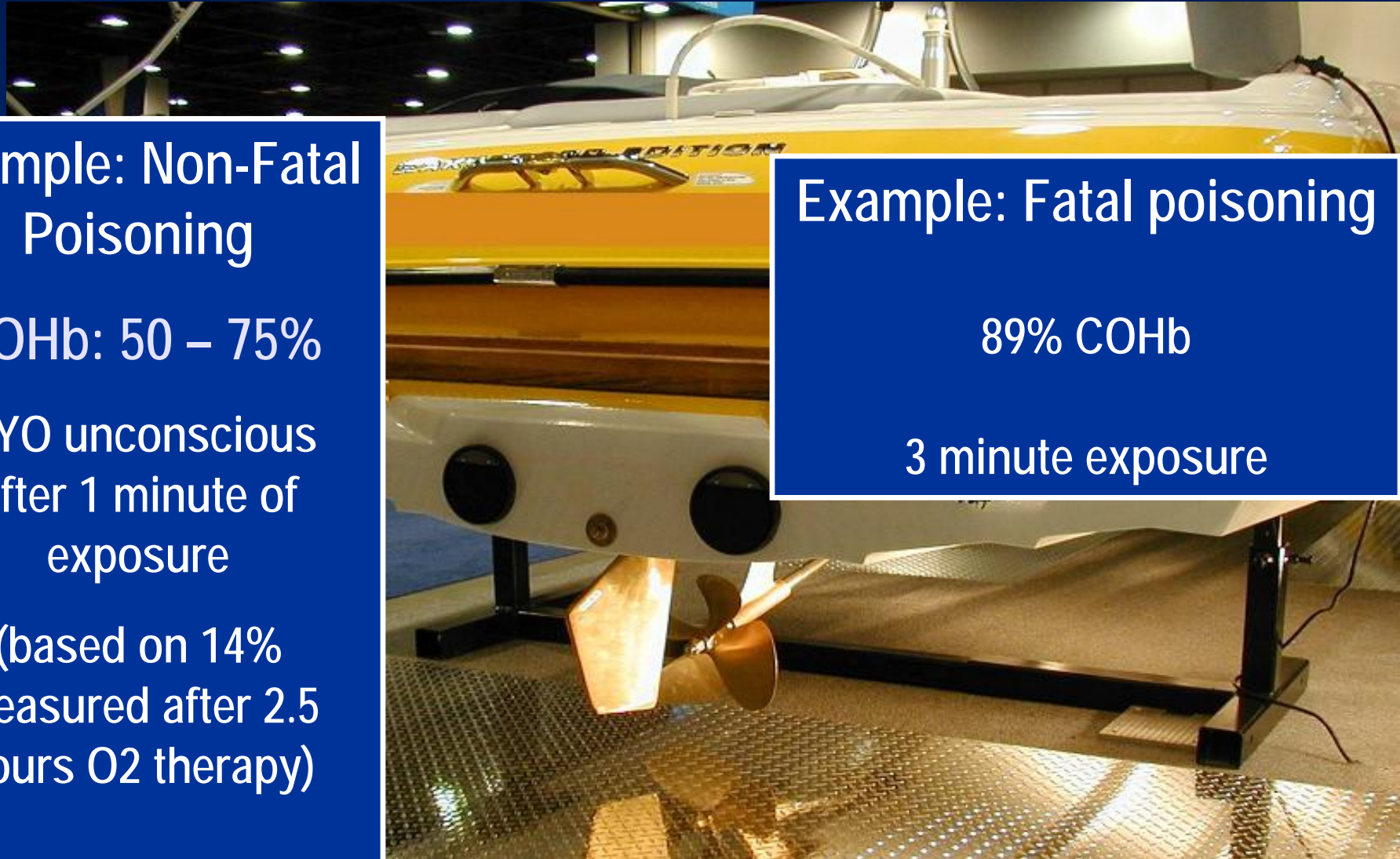


34 people poisoned on platforms of moving boats
17 died and 10 lost consciousness

Only 5 of these people were "teak surfing"

Most (19) were holding onto the platform while the boat moved along slowly (5 mph or "idle speed").

Boat Engine Idling - Not Moving



Example: Non-Fatal Poisoning

COHb: 50 – 75%

2 YO unconscious
after 1 minute of
exposure

(based on 14%
measured after 2.5
hours O2 therapy)

Example: Fatal poisoning

89% COHb

3 minute exposure

12 people poisoned on platform of stationary
boat: 3 died and 8 lost consciousness

Guidelines – CO in Air

(parts of CO per million parts of air – ppm)

WHO limit for a 15-minute exposure	87
Immediately Dangerous to Life and Health (IDLH)	1,200
Danger of death in 1-3 minutes	12,800



Maximum CO Measured on Platforms

Engine idling – boat still	10,000 ppm
Boat moving at 10 mph	26,700 ppm



So... What do we need to do?

Recognize it !

**If the drowning was anywhere on or
near a boat with an engine, think CO
- and get a COHb**