

EXHIBIT 14
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 HB 214

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 about
BOATING AND ALCOHOL
A DEADLY MIX



Boating and alcohol can be a deadly mix. Physical and mental impairment caused by alcohol can begin almost immediately after consumption. Significant impairment in boat operation can result from even moderate drinking. Unfortunately, in California and other states, intoxicated boat operators have caused serious boating accidents resulting in many fatalities, injuries, and damage to property. Some studies have estimated that alcohol is involved in approximately 25 percent of all motorboat accidents. The purpose of this pamphlet is to provide a basic understanding of alcohol's effect on boaters -- in the hope that even one death can be prevented.

Fact

Total number of drinks consumed = Total number of hours it takes to become sober.

Alcohol does not follow normal digestive patterns. Instead, it is absorbed directly into the blood stream with the result that the effects of alcohol are usually apparent within minutes.

The following chart was developed to show how drinking affects your blood alcohol concentration (BAC). BAC is a reliable gauge in predicting a person's ability to perform mental and physical tasks. A key factor to remember is that drinking alcohol faster than the body can burn it off will increase blood alcohol levels. Alcohol is burned off at a fairly constant rate -- about one drink per hour.

ALCOHOL CONSUMPTION CHART

Fact

At .035%, a boater's ability to operate a boat is impaired.

This chart is only intended to be a guide. Actual values may vary by body build, sex, and current health status. Also, fatigue and other "stress factors" found in the boating environment can lower a person's tolerance level to alcohol.

NUMBER OF DRINKS IN A ONE-HOUR PERIOD

BODY WEIGHT IN POUNDS	1	2	3	4	5	6	7	8
90 - 109								
110 - 129								
130 - 149								
150 - 169								
170 - 189								
190 - 209								
210 - 229								
230 & UP								
12 oz. Beer = 4 oz. Wine = 1 1/4 oz. 80 Proof Liquor								

BAC .01% to .05%

Loss of judgment, decreased coordination, thinking dulled, changes in mood and behavior.

BAC .05% to .08%

Operating ability impaired. Walking, speech, and hand movements clumsy. Blurred, split, or tunnel vision may occur. Judgment and boat operating ability impaired. Chance of accident is greatly increased.

BAC .08% and over

Inhibitions and judgment seriously affected.

Responses slowed and dull. Behavior greatly affected. High risk of accident. At .08%, you are legally under the influence of alcohol.

Developed from the California Department of Motor Vehicles *Driving Under the Influence Chart*.

ALCOHOL'S EFFECT ON BOATING

Fact

Alcohol impairs judgment and coordination -- two qualities essential for safe boating.

Many boaters are not aware that the effects of alcohol can be more pronounced in the operation of a vessel than in the operation of a vehicle. This is due to various stress factors -- boat and engine noise, sun, glare, vibration, wave action, temperature, and wind. Studies have shown that even when alcohol is not a contributing element, an operator's boat-handling skills can be greatly impaired from stress factors and fatigue. When these stress factors are combined with alcohol, the hazards associated with boat operation are intensified.

Alcohol, a depressant, slows your sensory abilities. Boating skills decline as alcohol begins to reduce:

- Depth perception
- Peripheral, color, and night vision
- Balance and coordination
- Reaction time
- Comprehension and concentration

After only a few drinks, boaters also begin to lose their ability to judge their degree of impairment and become overconfident, taking more risks. This factor combined with other effects of alcohol -- loss of judgment and coordination and decrease in reaction time -- lead to the inability to react appropriately to a dangerous boating situation.

ALCOHOL AND ACCIDENTS

Collisions

When boat operators are drinking, collisions with other vessels are more likely. Alcohol reduces your ability to detect the relative motion of other boats. (In California, collisions with other vessels account for more than 50 percent of the boating accidents.)

Falls Overboard

More than 80 percent of the people who die in boating accidents are drowning victims. Because alcohol reduces coordination and balance, your chances of falling overboard as well as drowning are increased. Alcohol also increases your susceptibility to hypothermia, reducing survival time in cold water. (Alcohol opens up the blood vessels close to the skin thereby increasing your body heat loss.) Because of the risk of accident, always wear your life jacket.

ACCIDENT REPORTING

Boat operators and owners are reminded of the legal requirement to file a written boating accident report with the Division of Boating and Waterways when: (1) a person dies, disappears, or is injured and requires medical treatment beyond first aid, or (2) total damage to all vessels involved and other property is more than \$500, or there is complete loss of a vessel. Boating accident report forms are available through the Division of Boating and Waterways and most sheriff, police, and harbormaster offices.

LEGAL CONSEQUENCES

Fact

It is illegal to operate a boat under the influence of alcohol.

While there is no "open container" law for boats, as there is for vehicles, it is just as illegal to operate a boat under the influence as it is to drive a car while under the influence. California boating law specifies:

- Operating a vessel while under the influence of alcohol and/or drugs is a misdemeanor and could carry a penalty of one year in the county jail, or a fine not to exceed \$1,000, or both.
- Operating a vessel under the influence of alcohol and/or drugs and causing injury to another person may be ruled a felony by the courts and could carry a penalty of one year in prison and a fine of up to \$5,000.
- Operating a vessel under the influence of alcohol and/or drugs and causing death to another person is a felony and could carry a penalty of up to 10 years in prison.
- A person arrested for operating a motorboat under the influence may be requested to take a blood or breath test to determine blood alcohol concentration (BAC). Refusal to take the test may result in increased penalties (fine, or jail, or both) if convicted. A BAC of .08% presumes intoxication, a BAC of .05% but less than .08% may be used with other evidence to determine intoxication.

- A person under 21 with a BAC of .01% or more may not operate any motorized vessel, or manipulate water skis, an aquaplane, or similar device.
- Previous alcohol- or drug-related convictions of vehicle and vessel operators can be used to enhance penalties for persons convicted of subsequent vehicle or vessel violations.
- A person convicted of operating a vessel under the influence of alcohol and/or drugs **MUST** be ordered by the court to take and pass a boating safety course.
- If you are convicted of operating a vessel while intoxicated, the Department of Motor Vehicles may suspend or revoke your vehicle driver's license. The duration of suspension or revocation could range from 6 months to 5 years, depending upon the number and type of vehicle and/or vessel violations accumulated.

**THESE LAWS WILL BE ENFORCED ON ALL CALIFORNIA
WATERWAYS. KEEP THEM IN MIND AND REMEMBER, IF
YOU ARE OPERATING A BOAT -- DO NOT DRINK!**

More than 150 state and local agencies are responsible for enforcing boating laws in California. Because of the serious problem of intoxicated boat operators, boating enforcement officers are increasing their efforts to reduce the number of alcohol-related accidents. The Division of Boating and Waterways is assisting in these efforts by training and equipping officers throughout the state.

DO NOT DRINK AND OPERATE A BOAT

Fact

Coffee does not rid your body of alcohol. The effects of alcohol remain.

The Department recommends that boaters do not drink while boating. However, if you do drink alcohol while boating, an important tip to remember is that time is the only way to sober up. Remedies such as black coffee, splashing cold water on your face, or fresh air have no effect on blood alcohol levels. Some ways to minimize the effects of alcohol include:

- Eat before and while drinking.
- Do not drink alcohol if you are on medication.
- Use moderation. The more you drink, the longer it takes to sober up.
- Remember that stress factors and fatigue lower your tolerance to alcohol.

The best advice is let someone who is sober operate the boat. For your safety and the safety of others, you may wish to designate a sober operator. However, even passengers increase their risk of accident if they drink alcohol. The Division of Boating and Waterways' 1993 Accident Report found that in 66% of all alcohol-related fatalities, the victims fell overboard and drowned. In 41% of all alcohol-related fatalities, intoxicated passengers were the victims of, or contributed to, the accidents. These findings contradict the "designated driver" concept, which is now popular in some boating safety literature. The idea of designating a sober operator has its roots in automobile safety, where the possibility of drowning is not a factor, and may impart a false sense of safety if applied to boating.

Persons drinking alcohol on a vessel and falling overboard face the further danger of hypothermia, a condition in which the body loses heat faster than it can produce it, causing a dangerous lowering of body temperature. Death can result if the body temperature drops too low. Alcohol greatly increases the effects of hypothermia, including disorientation, hyperventilation and involuntary taking of water into the lungs, heart attack, and numbness and the resulting loss of the ability to self-rescue.

Boating and Waterways recommends that neither boat operators nor passengers drink alcoholic beverages while boating.

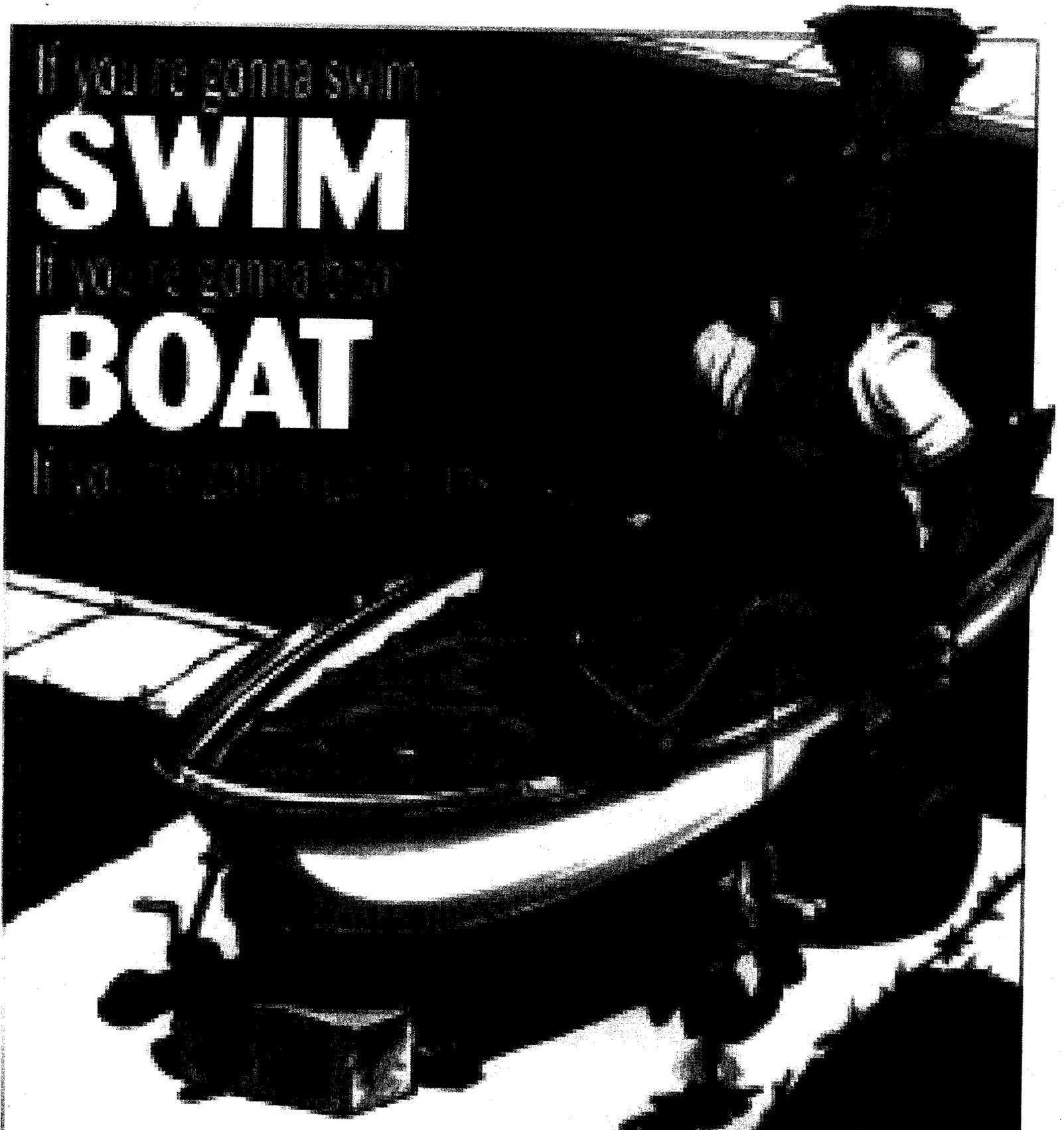
If you're gonna swim

SWIM

If you're gonna swim

BOAT

If you're gonna swim



STAY HOME



DUI DWI FOUNDATION

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BOATERS AGAINST DRUNK DRIVING (BADD)

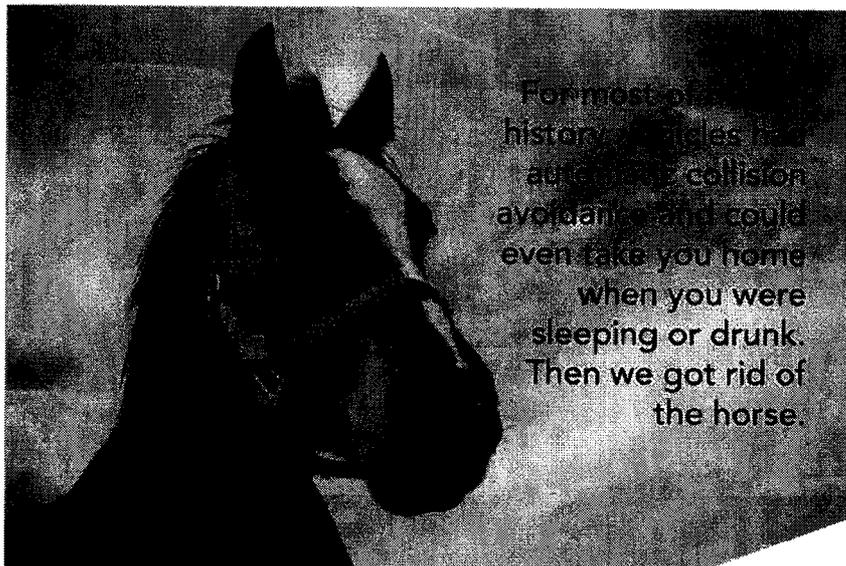
Boaters Against Drunk Driving (BADD) is an anti-drinking and boating advocacy group that was founded in 1989 by Jim Carlin, a former law enforcement officer. Carlin is an avid boater, and after personally observing the seriousness of intoxicated boaters and the injuries, deaths, and property damage associated with such behavior, he founded BADD.

BADD is based in Battle Creek, Michigan and currently has chapters in 38 states. Since its inception, BADD has been dedicated to promoting the objectives of safe, sober, and responsible boating and public awareness. The association's mottos are "Boat Smart. Boat Safe. Wear It!" and "Always Wear Your Life Jacket!"

The group advocates that boaters complete an approved basic boating safety course before they set sail for the first time. It also highly recommends that everyone in a boat wear life jackets while away from land.

For many years now, there has been a law restricting the national blood alcohol level for all people operating a motor vehicle on any road in the country to 0.08%. BADD has been working to make the same law applicable to watercraft operators in marine environments for over a decade. Thanks in part to BADD's efforts, about 40 states have implemented a 0.08% blood alcohol level maximum for their waterways. More states are expected to follow suit.

BADD has also recently implemented a project called the "Lighthouse of Law." Under this project, the organization monitors hundreds of cases of BUI, many of which involve the death of one or more victims. BADD plans to follow these cases through the judicial process and verify the progress and dispositions of the cases for the conviction and sentencing of the offenders. After a case is concluded, BADD will publish the results with the hopes of showing the boating community and the general public that boating under the influence of drugs or alcohol is a very serious crime with real consequences.



Alcohol Impairment

- Blood Alcohol Content
- Effects On Operating a Vehicle
- Symptoms of Alcohol Impairment

Boating Under the Influence

- Boaters Against Drunk Driving (BADD)
- Dangers
- Enforcement
- Penalties
- Prevention

Health Issues

- Alcohol and Health
- Calories and Weight
- Fetal Alcohol Syndrome

Piloting an Aircraft Under the Influence

- Dangers
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Related Accidents and Injuries

- Types of Accidents and Injuries
- Vehicular Manslaughter

Testing

- Chemical Tests
- Field Sobriety Tests

Traffic Laws

- Traffic Laws Frequently Violated
- Traffic Violations

Underage Drinking

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- Parenting
- Youth Issues

News and Events

November

The Collateral Damage of Alcohol and Drugs

Discussion surrounding alcohol abuse often revolves around the consequences of substance abuse individual - and understandably [...]

October 1

Three Strikes of West Virg

It is hard to believe that it has been almost 17 years since former President Clinton announced the nationwide initiative to [...]

September 2

Budweiser Releases Global Be(er) Responsible Day PS Video

From Budweiser: Next time you go be sure to make a plan to get home safely. Your friends are [...]

July 2

The Most Dangerous Cities: DUIs, Death and Your Insurance

Everyone knows that DUIs have a price, both personal and financial. Only do alcohol-related accidents!

About.com Alcoholism

By Buddy T Updated January 19, 2005

Alcohol-Related Impairment

Alcohol Alert From NIAAA¹

Alcohol consumption is associated with a wide range of accidents and injuries resulting from the impaired performance of complex mental and motor functions. The relationship between alcohol and motor vehicle crashes is well known; alcohol also has been implicated in many railroad, boating, and aircraft accidents. The subtlety and complexity of the skills required to operate these vehicles make them susceptible to impairment by low doses of alcohol (1).

This *Alcohol Alert* examines the ways in which alcohol impairs complex mental and motor functions and discusses approaches to impairment testing. The discussion is limited to the acute impairment that results from an episode of intoxication, rather than the chronic impairment that may develop after years of heavy drinking.

Extent of the Problem

Epidemiologic studies reveal the extent of alcohol's effect on transportation safety in the United States. First, 40 percent of all traffic fatalities (the leading cause of accidental death) are alcohol related (2). Second, although alcohol has not been directly implicated in U.S. commercial airline crashes, typical estimates of alcohol involvement by pilots in fatal *general* aviation crashes range from 10 to 30 percent (3). Third, a recent review of Coast Guard reports suggests possible alcohol involvement in 60 percent of boating fatalities (including persons who fell overboard) (4). Finally, in postaccident testing of railroad employees in 1990, 3.2 percent tested positive for alcohol or other prohibited drugs (5). The percentage of alcohol or other drug involvement may be higher when a fatality is involved (6).

Studies of Alcohol-Related Impairment

The epidemiologic evidence linking alcohol and transportation accidents is supported by experimental studies of alcohol's effect on specific driving-related skills. Although the following discussion concentrates on highway traffic safety, most of the skills involved pertain to other forms of transportation as well. These skills may be divided into cognitive skills, such as information processing, and psychomotor skills (those involving eye-brain-hand coordination). Impairment is related to alcohol in terms of its concentration in the bloodstream. For reference, a blood alcohol concentration (BAC) of 0.04 percent might be achieved by a 150-pound man consuming two drinks in 1 hour (7).

The brain's control of eye movements is highly vulnerable to alcohol. In driving, the eyes must focus briefly on important objects in the visual field and track them as they (and the vehicle) move. Low to moderate BAC's (0.03 to 0.05 percent) interfere with voluntary eye movements, impairing the eye's ability to rapidly track a moving target (8-10).

Steering is a complex psychomotor task in which alcohol effects on eye-to-hand reaction time are superimposed upon the visual effects described above. Significant impairment in steering ability may begin as low as approximately 0.035 percent BAC and rises as BAC increases (11).

Alcohol impairs nearly every aspect of information processing by the brain (3). Alcohol-impaired drivers require more time to read a street sign or to respond to a traffic signal than unimpaired drivers; consequently, they tend to look at fewer sources of information (12). Research on the effects of alcohol on performance by both auto-mobile and aircraft operators shows a narrowing of the attentional field beginning at approximately 0.04 percent BAC (13).

The most sensitive aspect of driving performance is the division of attention among component skills. Drivers must maintain their vehicles in the proper lane and direction (a tracking task) while monitoring the environment for vital safety information, such as other vehicles, traffic signals, and pedestrians. Alcohol-impaired subjects who are required to divide their attention between two tasks tend to favor one of them. Therefore, alcohol-impaired drivers tend to concentrate on steering, becoming less vigilant with respect to safety information. Results of numerous studies indicate that divided attention deficits occur as low as 0.02 percent BAC (12).

The ability to divide attention is especially critical in aviation. Morrow and colleagues (14) noted that radio communication during simulated flight was impaired significantly by divided attention deficit at BAC's as low as 0.04 percent.

The combined effects of these individual deficits on overall performance have been studied under simulated vehicle-operating conditions. A review of six ground-traffic simulator studies demonstrated consistently poorer performance at BAC's of 0.048 percent and above (15). In a typical study of the effects of pilot impairment, aircraft pilots completed eight sessions of simulated flight between San Francisco and Los Angeles in a Boeing 727-232 simulator (16). Planning and performance errors, procedural errors, and failures of vigilance each increased significantly with increasing BAC. Serious errors increased significantly at the lowest BAC, 0.025 percent, compared with performance at 0 percent BAC.

Related Resources

- [Drunk Driving](#)²
- [Alcoholism FAQ](#)³
- [What is Alcoholism?](#)⁴
- [12 Step Info](#)⁵
- [Getting Help](#)⁶
- [Alcohol Effects](#)⁷

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Results of epidemiologic and experimental studies permit certain conclusions to be drawn. First, the degree of impairment depends on the complexity of the task involved as well as the BAC (1). Second, the magnitude of alcohol-induced impairment rises as BAC increases and dissipates as alcohol is eliminated from the body. Third, at a given BAC, some skills are more impaired than others (12). Finally, investigators have not found an absolute BAC threshold below which there is no impairment of any kind. Certain skills important for driving are impaired at 0.01 to 0.02 percent BAC, the lowest levels that can be measured reliably by commonly used devices (17).

Impairment Testing

Accurate measurement of impairment is essential for traffic safety and law enforcement. Unfortunately, the devices used in the laboratory to measure impairment are not practical for roadside use. Therefore, all States have enacted *per se* laws by which a BAC above a specified limit is sufficient evidence of impairment for legal purposes. These laws are based on the assumption that BAC alone is an accurate indicator of impairment (1).

For traffic enforcement, the alcohol concentration in the subject's breath is determined by a hand-held device. When the procedure is performed correctly, the measured breath-alcohol concentration accurately reflects the BAC and can be correlated with alcohol-induced impairment without interference from alcohol vapors contaminating the mouth (18).

Objections have been raised to the validity of BAC or breath alcohol as an indicator of impairment. The degree of impairment associated with a given BAC is not constant and may vary among individuals. This may be explained in part by the phenomenon of tolerance. Tolerance is a decrease in the magnitude of an effect of a given dose of a drug after repeated exposure to the drug. Thus, more experienced drinkers show less impairment than less experienced drinkers across a range of BAC's in tests of motor coordination, sensory perception, and intellectual function (19,20).

The relationship between BAC and impairment also may vary according to the subject's age. According to Moskowitz and colleagues (17), drivers below the age of 25 and above the age of 69 would be expected to have higher crash rates at a given BAC than the remainder of the population. Laboratory data show that increasing age magnifies the adverse effect of low doses of alcohol on tracking (11); simulated flight experiments show that older pilots are more impaired than younger pilots at equal BAC's (14,20).

Alcohol poses a more serious risk for younger drivers because they have comparatively little experience with alcohol (tolerance) or with driving (2,21). Therefore, many States have established lower *per se* limits for minors (as low as **0.02** or 0.0 percent BAC versus 0.1 or 0.08 percent BAC for adults (22)).

It is not always possible to determine precisely how high a person's BAC had been when BAC measurement is delayed. For example, BAC determination often is postponed until hours after an accident or arrest, when the subject is in custody or in the hospital. The BAC may then be significantly lower than at the time of the earlier event. Common practice has been to estimate the subject's earlier BAC based on standard equations for the rate at which alcohol leaves the body. However, the factors that influence the elimination of alcohol vary greatly. Calculations based on average elimination rates for populations can give rise to considerable error when applied to individuals (23,24).

A similar problem arises when a BAC determination must be made after death (25). The interpretation of alcohol in post mortem specimens is complicated by the presence of alcohol produced by microbial fermentation. This problem is minimized by analysis of the vitreous humor, the liquid that fills the eyeball behind the lens. Because this liquid is reasonably protected from microbial activity and remains relatively constant after death, the alcohol concentration in vitreous humor is used commonly to confirm post mortem BAC determinations (26).

The above-mentioned disadvantages of BAC as a *per se* indicator of impairment have prompted research on devices that reflect impairment directly. For example, both the National Highway Transportation Safety Administration and private industry have developed ignition interlock systems that prevent use of a vehicle by an impaired person. These systems require the performance of a brief (10- to 30-second) task to test reaction time, short-term memory, visual tracking, or other measures of psychomotor coordination. Performance on these tasks has been shown to correlate reasonably well with actual (or simulated) driving performance (3) without reference to the cause of the impairment.

Alcohol-Related Impairment--A Commentary by NIAAA Director Enoch Gordis, M.D.

There are many opportunities for alcohol-impaired persons to cause injury and death to themselves and to others. Driving, flying airplanes, boating, using complicated machinery such as printing presses or other industrial equipment, performing surgical procedures, participating in recreational activities such as swimming and skiing, and many other activities become more risky when the people engaging in them are impaired by alcohol use. The substantial numbers of people who are injured or who die from alcohol-related accidents every year attest to the seriousness of the problem.

By understanding how alcohol impairs complex mental functions, we can develop ways to prevent many alcohol-related injuries by negating alcohol's ability to interfere with cognitive and motor function. As neuroscience research matures, this may become possible. We also can prevent alcohol-related injuries by developing easily deployed devices to measure impairment. Setting a legal threshold for determining impairment by BAC (*per se* laws) has disadvantages that might be avoided by use of an inexpensive, convenient field device for determining impairment directly. Such a device would have the advantage of identifying persons who are unfit to drive or engage in other potentially dangerous activity for any reason, such as extreme fatigue, illness, infirmity, emotional states, or the use of alcohol and other drugs and medications. Whether the public would endorse the use of such devices rather than the current widely accepted and supported *per se* laws is certain to be a matter of significant public policy debate.

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Information furnished by
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Previous Features⁹

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Safety Tips > Boat Handling

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Boating Under the Influence

By Randy Vance | September 10, 2012 at 2:34 PM | 2 Comments

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To exponentially reduce your chance of a boating accident, say no to boating under the influence.

There is no way to clean up your boating act once you've absorbed enough booze to reach the legal threshold for illegal blood alcohol content (BAC) and ventured into the realm of boating under the influence. In 12 states that limit is .10. In 38 states, the level is .08 — a level that can be absorbed for many in less than two cocktails with one ounce of spirits or two beers.

The danger of alcohol impairment is not just related to the embarrassment of arrest. In about half of all boating accidents, the US Coast Guard says alcohol is involved. And, dangerous as well as embarrassing, the Coasties say that in half of the boating deaths that involved alcohol, the victim died after capsizing or falling out of his boat while under the influence. An inebriated boater is 10 times more likely to become a fatality statistic. Which makes beer goggles, as they are called, a pretty stupid boating accessory.

Yet alcohol is about as ubiquitous in boating as it is at a Super Bowl party and it's still legal to drink it in moderation in most states while boating.

Most motorists would never dream of driving while under the influence, but the stigma that keeps motorists sober doesn't seem to work on the water. The relaxing nature of boating and the wide-open spaces seem to lull loopy captains into believing there is no danger. But, in reality, that nature can contribute to a much more insidious element of impairment. And impaired boaters are even less likely to recognize their condition than motorists.

While BAC must be measured using extremely technical equipment and computerized calculations, its effects on the body are simple to see or feel: reduced coordination, loss of balance, inability to make tactical decisions and loss of vision — particularly peripheral vision and loss of awareness of your surroundings.

All this is bad enough in an automobile. But, when you throw the "drunk" in a boat, he's already dealing with judgment issues thanks to the less familiar arena of boating. Most boaters only spend an average of 110 hours on the water per year. For many, it's hard enough to remember "red, right, returning" while stone cold sober. Or perhaps which boat in a crossing situation has to give way. Add a pinch of that natural unfamiliarity to a shot of alcohol and a shaker of ice and you have a witches brew for disaster.

Boaters also suffer from the impairment of an environment that is constantly in motion. Waves rock the boat and the body rocks to counterbalance the motion. Toss in wind and the stress of unbroken sunlight, and fatigue meets disorientation before too many hours have passed.

How much alcohol is too much? Many tests have shown even one drink can be fatal in boating.

Body weight plays a key role in one's ability to handle alcohol without exceeding the boating under the influence limits but there are no hard and fast rules. Estimates indicate a 120-pound individual could drink two ounces of alcohol or two beers and remain sober. Somewhere through the third shooter, that person would be legally under the influence in all 50 states.

BOATING SAFETY TIP OF THE MONTH



11 Top Causes of Boating Accidents

Boating accidents make the news for some reason — even when auto accidents don't. There seems to be something more out of the ordinary, and thus newsworthy, about encountering tragedy while having fun than, say, while driving to the grocery. But when you examine boating accidents and their causes, yo ... More >

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It would take 4 drinks to put a 200 pounder in the clink for BUI in the 38 states, which set their limit at .08. A fifth snort would finish him off in all 50 states.

Boating doesn't have to include alcohol to be fun. But to be safe it does require one to hydrate regularly. Keep the cooler stocked with a variety of drinks, sodas and thirst-hydrating liquids that contain electrolytes to balance your system.

Those who want to boat and drink in places where it's legal should know that it takes an hour to metabolize the effects of a drink in most people. But save it for the dock.

The U.S. Coast Guard is asking all boat owners and operators to help reduce fatalities, injuries, property damage, and associated healthcare costs related to recreational boating accidents by taking personal responsibility for their own safety and the safety of their passengers. Essential steps include: wearing a life jacket at all times and requiring passengers to do the same; never boating under the influence (BUI); successfully completing a boating safety course; and getting a Vessel Safety Check (VSC) annually from local U.S. Coast Guard Auxiliary, United States Power Squadrons(r), or your state boating agency's Vessel Examiners. The U.S. Coast Guard reminds all boaters to "Boat Responsibly!" For more tips on boating safety, visit www.uscgboating.org.

COMMENTS



gbglass - Sep 9, 2012
VERY GOOD INFORMATION!!



Vernon E. Foeller - Sep 9, 2012
Thank You for the corrections of my two incorrect answers. Keep up the great effort to draw attention of how dangerous drinking and boating can be. Now if only the masses who think bating and party time go hand in hand, could take this test, the world would be a safer place.

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- American Canoe Association (ACA)
- American Whitewater (AW)
- Boating Safety Resource Center
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About.com Alcoholism

By Buddy T Updated January 19, 2005

Alcohol-Related Impairment

Alcohol Alert From NIAAA¹

Alcohol consumption is associated with a wide range of accidents and injuries resulting from the impaired performance of complex mental and motor functions. The relationship between alcohol and motor vehicle crashes is well known; alcohol also has been implicated in many railroad, boating, and aircraft accidents. The subtlety and complexity of the skills required to operate these vehicles make them susceptible to impairment by low doses of alcohol (1).

This *Alcohol Alert* examines the ways in which alcohol impairs complex mental and motor functions and discusses approaches to impairment testing. The discussion is limited to the acute impairment that results from an episode of intoxication, rather than the chronic impairment that may develop after years of heavy drinking.

Extent of the Problem

Epidemiologic studies reveal the extent of alcohol's effect on transportation safety in the United States. First, 40 percent of all traffic fatalities (the leading cause of accidental death) are alcohol related (2). Second, although alcohol has not been directly implicated in U.S. commercial airline crashes, typical estimates of alcohol involvement by pilots in fatal *general* aviation crashes range from 10 to 30 percent (3). Third, a recent review of Coast Guard reports suggests possible alcohol involvement in 60 percent of boating fatalities (including persons who fell overboard) (4). Finally, in postaccident testing of railroad employees in 1990, 3.2 percent tested positive for alcohol or other prohibited drugs (5). The percentage of alcohol or other drug involvement may be higher when a fatality is involved (6).

Studies of Alcohol-Related Impairment

The epidemiologic evidence linking alcohol and transportation accidents is supported by experimental studies of alcohol's effect on specific driving-related skills. Although the following discussion concentrates on highway traffic safety, most of the skills involved pertain to other forms of transportation as well. These skills may be divided into cognitive skills, such as information processing, and psychomotor skills (those involving eye-brain-hand coordination). Impairment is related to alcohol in terms of its concentration in the bloodstream. For reference, a blood alcohol concentration (BAC) of 0.04 percent might be achieved by a 150-pound man consuming two drinks in 1 hour (7).

The brain's control of eye movements is highly vulnerable to alcohol. In driving, the eyes must focus briefly on important objects in the visual field and track them as they (and the vehicle) move. Low to moderate BAC's (0.03 to 0.05 percent) interfere with voluntary eye movements, impairing the eye's ability to rapidly track a moving target (8-10).

Steering is a complex psychomotor task in which alcohol effects on eye-to-hand reaction time are superimposed upon the visual effects described above. Significant impairment in steering ability may begin as low as approximately 0.035 percent BAC and rises as BAC increases (11).

Alcohol impairs nearly every aspect of information processing by the brain (3). Alcohol-impaired drivers require more time to read a street sign or to respond to a traffic signal than unimpaired drivers; consequently, they tend to look at fewer sources of information (12). Research on the effects of alcohol on performance by both auto-mobile and aircraft operators shows a narrowing of the attentional field beginning at approximately 0.04 percent BAC (13).

The most sensitive aspect of driving performance is the division of attention among component skills. Drivers must maintain their vehicles in the proper lane and direction (a tracking task) while monitoring the environment for vital safety information, such as other vehicles, traffic signals, and pedestrians. Alcohol-impaired subjects who are required to divide their attention between two tasks tend to favor one of them. Therefore, alcohol-impaired drivers tend to concentrate on steering, becoming less vigilant with respect to safety information. Results of numerous studies indicate that divided attention deficits occur as low as 0.02 percent BAC (12).

The ability to divide attention is especially critical in aviation. Morrow and colleagues (14) noted that radio communication during simulated flight was impaired significantly by divided attention deficit at BAC's as low as 0.04 percent.

The combined effects of these individual deficits on overall performance have been studied under simulated vehicle-operating conditions. A review of six ground-traffic simulator studies demonstrated consistently poorer performance at BAC's of 0.048 percent and above (15). In a typical study of the effects of pilot impairment, aircraft pilots completed eight sessions of simulated flight between San Francisco and Los Angeles in a Boeing 727-232 simulator (16). Planning and performance errors, procedural errors, and failures of vigilance each increased significantly with increasing BAC. Serious errors increased significantly at the lowest BAC, 0.025 percent, compared with performance at 0 percent BAC.

Related Resources

- [Drunk Driving](#)²
- [Alcoholism FAQ](#)³
- [What is Alcoholism?](#)⁴
- [12 Step Info](#)⁵
- [Getting Help](#)⁶
- [Alcohol Effects](#)⁷

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Results of epidemiologic and experimental studies permit certain conclusions to be drawn. First, the degree of impairment depends on the complexity of the task involved as well as the BAC (1). Second, the magnitude of alcohol-induced impairment rises as BAC increases and dissipates as alcohol is eliminated from the body. Third, at a given BAC, some skills are more impaired than others (12). Finally, investigators have not found an absolute BAC threshold below which there is no impairment of any kind. Certain skills important for driving are impaired at 0.01 to 0.02 percent BAC, the lowest levels that can be measured reliably by commonly used devices (17).

Impairment Testing

Accurate measurement of impairment is essential for traffic safety and law enforcement. Unfortunately, the devices used in the laboratory to measure impairment are not practical for roadside use. Therefore, all States have enacted *per se* laws by which a BAC above a specified limit is sufficient evidence of impairment for legal purposes. These laws are based on the assumption that BAC alone is an accurate indicator of impairment (1).

For traffic enforcement, the alcohol concentration in the subject's breath is determined by a hand-held device. When the procedure is performed correctly, the measured breath-alcohol concentration accurately reflects the BAC and can be correlated with alcohol-induced impairment without interference from alcohol vapors contaminating the mouth (18).

Objections have been raised to the validity of BAC or breath alcohol as an indicator of impairment. The degree of impairment associated with a given BAC is not constant and may vary among individuals. This may be explained in part by the phenomenon of tolerance. Tolerance is a decrease in the magnitude of an effect of a given dose of a drug after repeated exposure to the drug. Thus, more experienced drinkers show less impairment than less experienced drinkers across a range of BAC's in tests of motor coordination, sensory perception, and intellectual function (19,20).

The relationship between BAC and impairment also may vary according to the subject's age. According to Moskowitz and colleagues (17), drivers below the age of 25 and above the age of 69 would be expected to have higher crash rates at a given BAC than the remainder of the population. Laboratory data show that increasing age magnifies the adverse effect of low doses of alcohol on tracking (11); simulated flight experiments show that older pilots are more impaired than younger pilots at equal BAC's (14,20).

Alcohol poses a more serious risk for younger drivers because they have comparatively little experience with alcohol (tolerance) or with driving (2,21). Therefore, many States have established lower *per se* limits for minors (as low as **0.02** or 0.0 percent BAC versus 0.1 or 0.08 percent BAC for adults (22)).

It is not always possible to determine precisely how high a person's BAC had been when BAC measurement is delayed. For example, BAC determination often is postponed until hours after an accident or arrest, when the subject is in custody or in the hospital. The BAC may then be significantly lower than at the time of the earlier event. Common practice has been to estimate the subject's earlier BAC based on standard equations for the rate at which alcohol leaves the body. However, the factors that influence the elimination of alcohol vary greatly. Calculations based on average elimination rates for populations can give rise to considerable error when applied to individuals (23,24).

A similar problem arises when a BAC determination must be made after death (25). The interpretation of alcohol in post mortem specimens is complicated by the presence of alcohol produced by microbial fermentation. This problem is minimized by analysis of the vitreous humor, the liquid that fills the eyeball behind the lens. Because this liquid is reasonably protected from microbial activity and remains relatively constant after death, the alcohol concentration in vitreous humor is used commonly to confirm post mortem BAC determinations (26).

The above-mentioned disadvantages of BAC as a *per se* indicator of impairment have prompted research on devices that reflect impairment directly. For example, both the National Highway Transportation Safety Administration and private industry have developed ignition interlock systems that prevent use of a vehicle by an impaired person. These systems require the performance of a brief (10- to 30-second) task to test reaction time, short-term memory, visual tracking, or other measures of psychomotor coordination. Performance on these tasks has been shown to correlate reasonably well with actual (or simulated) driving performance (3) without reference to the cause of the impairment.

Alcohol-Related Impairment--A Commentary by NIAAA Director Enoch Gordis, M.D.

There are many opportunities for alcohol-impaired persons to cause injury and death to themselves and to others. Driving, flying airplanes, boating, using complicated machinery such as printing presses or other industrial equipment, performing surgical procedures, participating in recreational activities such as swimming and skiing, and many other activities become more risky when the people engaging in them are impaired by alcohol use. The substantial numbers of people who are injured or who die from alcohol-related accidents every year attest to the seriousness of the problem.

By understanding how alcohol impairs complex mental functions, we can develop ways to prevent many alcohol-related injuries by negating alcohol's ability to interfere with cognitive and motor function. As neuroscience research matures, this may become possible. We also can prevent alcohol-related injuries by developing easily deployed devices to measure impairment. Setting a legal threshold for determining impairment by BAC (*per se* laws) has disadvantages that might be avoided by use of an inexpensive, convenient field device for determining impairment directly. Such a device would have the advantage of identifying persons who are unfit to drive or engage in other potentially dangerous activity for any reason, such as extreme fatigue, illness, infirmity, emotional states, or the use of alcohol and other drugs and medications. Whether the public would endorse the use of such devices rather than the current widely accepted and supported *per se* laws is certain to be a matter of significant public policy debate.

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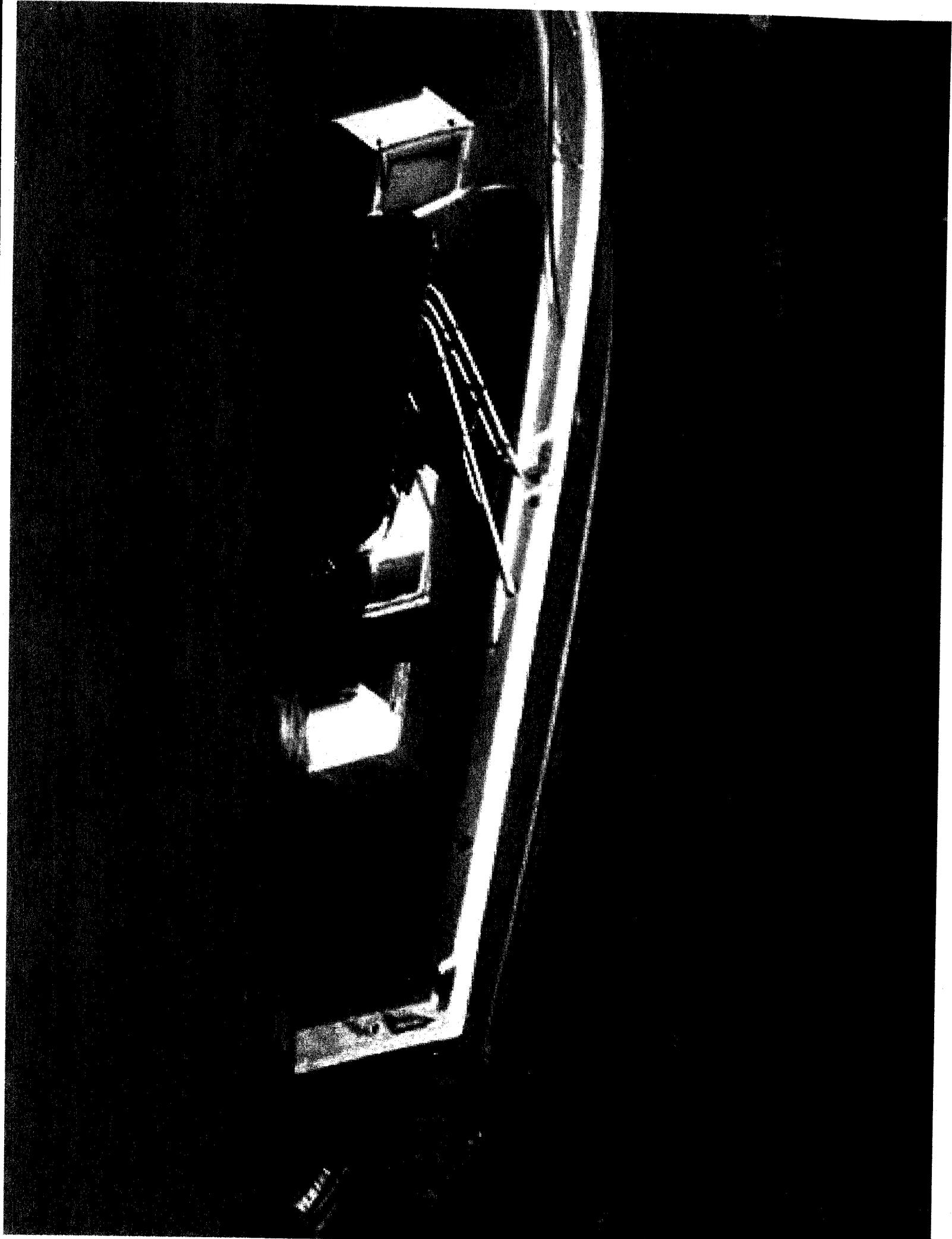
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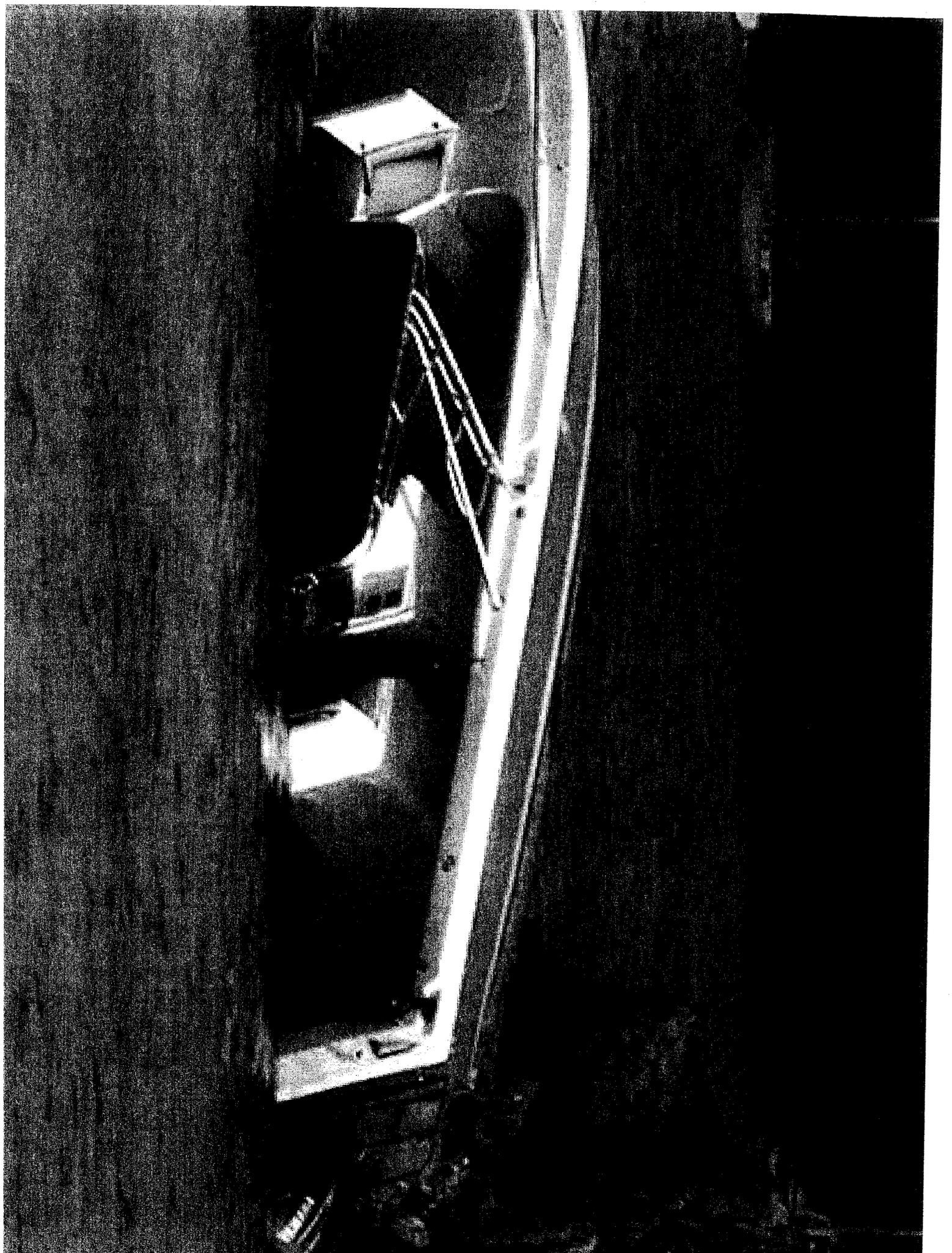
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BOATING UNDER THE INFLUENCE

Boating under the influence of drugs or alcohol, just like driving under the influence, is a dangerous and illegal activity. As with drunk driving, all 50 states consider a boater legally intoxicated when his or her blood alcohol content level reaches 0.08%.

Roughly half of all boating accidents are alcohol or drug-related. The United States Coast Guard estimates that 60,000 or more nonfatal boating accidents take place annually, with a cost of \$240 million.

Records on boating accidents have been filed since 1961. From that year through 1992, 800 lives were lost due to boating accidents. This number is higher than the amount of records regarding airplane or train fatalities.

Bodies of water are the second most common scene for accidental deaths in the United States, the first being highways. Both the Coast Guard and the United States Congress recognize drugs and alcohol as a serious problem on the water.

Alcohol use can be even more dangerous in a marine environment than on land. The motion, vibration, engine noise, sun, wind, and spray all accelerate and increase a drinker's impairment. A boater becomes fatigued more quickly than a driver, which leads to a decline in the boater's coordination, judgment, and reaction time, especially when under the influence of drugs or alcohol.

Boaters' abilities behind the wheel are also more likely to be influenced by alcohol because boaters generally spend a limited amount of time boating and are less experienced and lack confidence on the water in comparison to dry land.

Alcohol is a depressant that affects the body's central nervous system. A person's judgment, vision, balance, and coordination, among other factors, are all affected. Impairment of these abilities increases the probability that a boater will cause an accident. The most common types of boating accidents involving alcohol include boat capsizing and people falling overboard. The Coast Guard reports that passengers commonly fall into the water because they are under the influence of alcohol.

Boat operators that have a blood alcohol concentration level of 0.10% or above are estimated to be over ten times more likely to die in a boating accident than a boater who has not consumed any alcohol.

It is every boater's responsibility to be aware of the risks involved in BUI and the laws and penalties associated with such reckless activity. In every state, it is illegal to operate a boat under the influence of drugs or alcohol, regardless of the type of boat. The Coast Guard enforces a federal law prohibiting BUI. This legislation includes all watercraft, from canoes and rowboats to large ships and foreign vessels, which enter American waters as well as American ships in the high seas.

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November

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