



## National Association of State Boating Law Administrators Engineering, Reporting & Analysis Committee (ERAC)

### Human Performance Investigation in Recreational Boating Accidents: Best Practices for Gathering and Examining Human Factors Data (October 2014)

#### ERAC 2014 CHARGE C2

*Continue refining and developing more detailed guidance on the use of “HFACS-Lite”—a modified version of the Department of Defense’s Human Factors Analysis and Classification System that was developed and applied to an analysis of accident cases in the 2013 committee cycle. Use the National Transportation Safety Board’s human performance investigation tools as a starting point to assess the sorts of additional information—necessary to complete the HFACS-Lite analysis—that might reasonably be gathered in recreational boating investigations.*

#### INTENT

This charge, a carryover from the 2012 and 2013 committee cycles,<sup>1</sup> was conducted in continuing support of an improved understanding of the factors associated with human error in recreational boating accidents. In 2013, an ERAC charge team reviewed a sample of accident cases that had already been investigated in order to gauge the utility of “HFACS-Lite” as a tool for analysts in reviewing available accident data. The team concurred that it was reasonable and valid for further refinement and use as a research tool. In 2014, the team’s primary focus turned to what other factual human performance information potentially could be gathered in recreational boating accident investigations to aid such an analysis, and the implications for doing so. An NTSB white paper, developed in 2013 and containing potential investigation questions for the team’s consideration, served as a catalyst for discussion and, ultimately, served as a foundation for product development.

#### OUTCOME

The charge team completed this package, which is offered as a set of “best practices” for officers and investigators in states that wish to augment their recreational boating accident investigations, add to the body of knowledge about human factors in accidents, and use it to further evaluate their own safety programs and strategies. It includes background on the topic; considerations and cautionary notes regarding the gathering of information related to human performance; a checklist of questions and relevant documentation; a supplemental report form for collecting the relevant data and information; and detail on how best to examine, interpret and use what is collected.

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<sup>1</sup> For work conducted by ERAC in 2012 and 2013 on this topic, see [Human Factors in Recreational Boating Accident Reporting—Consideration of Analysis Strategies—Initial Report](#) (August 2012) and [Human Factors in Recreational Boating Accident Reporting—Applying a modified HFACS approach—Status Report](#) (August 2013)

# Human Performance Investigation in Recreational Boating Accidents

## *Best Practices for Gathering and Examining Human Factors Data*

### BACKGROUND

Investigations into accidents in sectors ranging from aviation and commercial shipping to railways and highways have concluded that the majority of accident causes or contributing factors are related to human failures. Can the same be said for recreational boating accidents?

There is a strong likelihood that human factors are also major causes or contributors to recreational boating accidents. But moving beyond a *strong likelihood* to arrive at *more conclusive evidence* on the contribution of various human performance factors takes time and effort. It requires quality, consistently-collected data and information that not only identify the factors that contributed to the accident, but also get at “how” and “why” failures occurred.

Over time, there have been efforts to gather some of that relevant data. For example, along with recording their accidents’ contributing factors/causes and entering detail from accident report narratives into the U.S. Coast Guard’s Boating Accident Report Database (BARD), a segment of states—with varying levels of rigor—have voluntarily coded additional descriptors under a “Human Error” tab in the database.

More recently—and in keeping with the evolution of accident reporting and capture of human factors data in other modes of transportation—a national project to update entries in the list of recreational boating accident contributing factors/causes also incorporated a set of distraction codes linked to one of the revised factors.<sup>i</sup> As those distraction codes and updated factors are implemented by states, there should be a marked increase in the overall amount and consistency of basic information available in BARD to examine human performance in accidents.

But other important investigative detail—currently gathered inconsistently or not at all—would greatly enhance the collective understanding of the nature and scope of human error in recreational boating accidents.

This package offers a set of “best practices” for officers and investigators in states that wish to augment their recreational boating accident investigations, add to the body of knowledge about human factors in accidents, and use it to further evaluate their own safety programs and strategies.

It begins with a look at the reasons for—and realities associated with—conducting more extensive and consistent investigations into human performance; provides investigative guidance and a checklist of relevant questions adapted from tools used by the National Transportation Safety Board (NTSB) Office of Marine Safety; includes a supplemental recording form that states can incorporate into their own investigations; and describes a method for examining and interpreting the collected human factors’ data.

## AN INTRODUCTION TO HUMAN PERFORMANCE INVESTIGATION

The Human Performance investigation attempts to understand the nature and extent of human error in accidents. It is an approach that recognizes operator performance is influenced by a variety of environmental, physiological, and vessel design factors, and further recognizes the importance of gathering more consistent and quality data to evaluate them.

Ultimately, the goal in collecting data on causal factors is to improve existing safety programs or develop and apply new countermeasures that will reduce fatalities, injuries, and property damage. A more detailed understanding of operator behaviors can help inform decisions about the types of knowledge, incentives, or legal restrictions that would be most effective in changing unsafe behaviors.

But currently, factors associated with human performance are not consistently recorded across the United States. There is wide variation in the performance-related data collected on recreational boating accident reports and in the quality of reporting—quality that depends greatly on the level of officer training and agency policy.

In many jurisdictions, the officer or investigator must specifically witness or be able to provide evidence of the circumstances reported in order to identify a contributing factor or report an infraction. That protocol further reduces the likelihood that an officer will document *any* information relating to distractions that might have affected the operator's performance and contributed to an accident. Moreover, the operator's self-reporting of their performance may be biased due to poor recall or efforts to avoid self-incrimination or admission of fault.

With those constraints in mind, the following is intended to serve as a guide for accident investigators who see a need to gather information related to human performance while they are seeking to determine a cause(s) or contributor(s) in a recreational boating accident. While this information may be used initially by the investigator to determine—or *rule out*—factors in an accident, it can also be used by boating safety research analysts to determine aggregate trends or overlooked factors in accident causes.

## CONSIDERATIONS FOR THE HUMAN PERFORMANCE INVESTIGATION

### Follow due process

Since all recreational boating accident investigations have the potential to result in criminal charges being placed on the vessel operator, the investigator should ensure that due process is followed in obtaining information during the investigation.

### Focus first on perishable, then less perishable information

As is the case with other investigations, the human performance investigation focuses first on the collection of "perishable" information including arranging for toxicological samples and obtaining interviewee statements. As the investigation proceeds, the investigator can focus more on the "less

perishable" information, which would include gathering general background statements and information from public records.

### Seek information in specific areas of human performance involvement

Areas of possible human performance involvement in recreational boating accidents include, but are not limited to: alcohol or drug use; potential distractions immediately prior to the accident; operator experience and training; the operator's recent work/rest history; the operator's health conditions and recent life changes; passenger wreckage materials; background information on the operator's prior violations and accidents; interactions between passengers; and equipment design and vessel maintenance issues. ***Not every area will be applicable or relevant to every recreational boating accident.***

Some of the areas of human performance involvement noted above, such as alcohol use and operator experience and training, are already familiar to investigators and, as such, are not described here. Others that have not been as widely or generally used in recreational boating accident investigations, such as distractions and recent work/rest history, *are* described below. However, the next section includes a list of related questions and guidance associated with *all* of the potential areas of human performance involvement to assist investigators in conducting interviews or identifying and gathering relevant documentation.

**Distractions immediately prior to the accident:** The investigator should consider interviewing the operator and witnesses about potential distractions that could have caused the operator to lose focus or concentration immediately before the accident occurred. These include <sup>ii</sup>

- **Onboard lighting** – Glare from lighted objects onboard the vessel, such as improperly shielded navigation lights, onboard electronics, and other similar devices.
- **Background lighting** – Lights on docks, shorelines, or other vessels.
- **Onboard electronics or equipment** – Using, attempting to use, viewing or operating onboard electronics or equipment, such as a navigation device, mobile phone, VHF radio, audio device, radar, autopilot, spotlight.
- **Operator or occupant activity** – Activity such as sightseeing, moving objects, eating, drinking, smoking, interacting with passengers, fixated on other vessels or persons being towed, or otherwise distracted by other persons or objects in or outside the vessel.
- **Other distractions** – Known distractions not otherwise captured in one of the others, and that should be described.

**Operator's work/rest history for the 72 hours prior to the accident:** For the operator and any other individuals who have been identified as important to the investigation, the investigator should try to trace their activities immediately prior to the accident. The purpose of obtaining this history is to determine the extent to which the operator, in particular, might have been fatigued at the time of committing a critical error. While the time period of 72 hours is typical, another time period might be examined at the discretion of the investigator.

Information related to the work/rest history is considered perishable since memory tends to become less accurate and less detailed over time, and some interviewees might become more

difficult to find with the passage of time. Interviewees of prime interest typically include anyone who came in contact with the operator or other persons involved in the accident as well as colleagues and friends, depending on the nature of the accident and errors that may have been committed. These individuals may provide pertinent information regarding the work/rest history and, as a result, are usually worth interviewing even if they feel their exposure was modest and that everything seemed routine. Simply knowing that everything seemed routine can be of value to the investigation. Family members of any of the deceased who had been involved in the accident typically are not interviewed until the immediate trauma associated with the loss has diminished, although even this can vary at the discretion of the investigator. Some background interviews can be completed by telephone, also at the investigator's discretion.

**Wreckage related to human performance:** The investigator should examine and document all passenger-related material that could be relevant to human performance. This includes the examination of any medications and the number of pills in such containers.

**General background information on the operator:** When human performance failures occur in an accident, the investigator may find indicators in the operator's background that could be related to problems discovered during the investigation of the accident. A human performance investigation into some types of accidents would benefit from obtaining information related to issues such as the operator's previous work history and major recent life events including health, financial, and emotional/relationship changes.

**Background records:** The investigator should examine available background records, including records of the operator's previous accidents/incidents, boating education, training, and medical records. The investigation may also include checks of Department of Motor Vehicle and other driving records, the *National Driver Register* (NDR) and checks of the *National Crime Information Center* (NCIC) records maintained by the FBI. In the case of medical records and NCIC records, there will be confidential material, the content of which may be valuable at suggesting areas for further investigation.

**Maintenance and inspection of the vessel:** If the error involves maintenance and inspection, the investigator should examine the nature of the work that was completed, including who completed the maintenance and inspection itself as that may have had an impact on the quality of performance. This could be applied to routine pre-departure checklists.

## CHECKLIST OF QUESTIONS AND RELEVANT DOCUMENTATION FOR A HUMAN PERFORMANCE INVESTIGATION

The checklist below is provided to assist the investigator with conducting human performance interviews and the collection of other relevant information and documentation. Adapted from one in use by the NTSB Office of Marine Safety, the list consists of questions (or in some areas, identification of important pieces of information or documentation) that have proven useful in covering areas of basic concern in such investigations. *The actual questions that are used, the way they are stated, and*

*the order in which the data is collected should be determined specifically for each investigation and at the discretion of the investigator.*

A **Human Performance Factors Supplement Report Form**, designed to accompany this checklist and increase the consistency of reporting, is included in **Appendix 1**. While some of the data and information resulting from the investigation will also be captured on other report forms or documents, this supplement provides a place to record all of the relevant human factors data for easier analysis. To facilitate data collection, the fields on the **Supplement Report Form** are organized into three areas—Operator-related information, Occupant-related information, and Vessel-related information. However, as noted previously, ***the actual order in which the data is collected should be determined based on the parameters of the given investigation*** at the discretion of the investigator.

#### OF NOTE:

- The investigator should start all interviews with very general questions that allow the interviewee(s) to describe what they know at length and without influence from the interviewer. As the interview progresses, more pointed questions can be asked to focus the interviewee on topics that were not fully addressed or that suggest deception.
- While the questions in the checklist cover general background areas essential to the human performance investigation, additional, pertinent questions are often suggested by the details of a specific accident. Listen closely to an interviewee's descriptions of the operator's performance in the accident, and ask simple questions to reach a "common sense" understanding of these actions.
- The circumstances and pertinent factors of each accident may differ. It may not be possible to gather all of the data and observations or reach conclusions regarding each element of the checklist for each accident. In such cases, it is important to recognize that there is a distinction between something that is "not a factor" and something that is "unknown." This distinction should be noted in the checklist responses.

#### 1. Toxicology information:

When considering alcohol or drug use as a potential human performance factor, several items can be used to make a determination on its relevance:

- Chemical test or blood draw, resulting in a BAC
- Trained Officer observation through Standardized Field Sobriety Testing (SFST)
- Reliable witness reports

Always follow state rules of Criminal Procedure to obtain this information. If drug or alcohol impairment can be documented, the local District Attorney may wish to prosecute.

## **2. Distractions immediately prior to accident:**

Consider the potential distractions that could have caused the operator to lose focus or concentration.

- What was the operator doing immediately prior to the accident?
- What electronic devices were onboard (e.g., phone, GPS, chartplotter, fish finder, VHF radio, etc.)?
- What navigation lights were on? Could glare be a factor?
- What background lights are in the vicinity of the accident? (e.g., docks, marinas, houses)
- What were the passengers doing immediately prior to the accident?
- What other activities were taking place on the body of water at the time of the accident?

## **3. Operator experience and training:**

Obtain and examine information about the operator's level of experience in the context of the vessel involved in the accident, the location, and the environmental conditions present at the time of the accident.

- Has the operator had any formal boating education training? What type of training?
- How long have they been boating?
- What type of boating have they done and how much experience do they have with each type?
- Is the boat owned, rented, or borrowed?
- Obtain criminal history and accident history (relevant to this incident) from public records.
- Question passengers about their perception of the operator's experience level.

## **4. Equipment design factors relevant to the accident:**

Look at the:

- Helm station design and layout.
- Display/instrument panel quality (for layout, display interpretability, readability, trend indication, etc.).
- Aural alert design (for interpretability, duration, initiation, volume, distinguishability from others, etc.).
- Control design (for ease of access to controls, shape, location, size, movement logic).

Gather and review the following sources of information as applicable:

- Pictures of display/control layout
- Manufacturer's pictures/drawings
- Maintenance records, books
- Wreckage

- Sister vessel

#### **5. Operator's medical condition:**

- Determine the current health and any recent changes in the operator's health (good or bad). Seek information on conditions such as diabetes, high blood pressure, cardiac conditions, etc.
- Determine any vision or hearing impairments:
  - Does the operator require corrective lenses, and were they being worn at the time of the accident?
  - Were sunglasses needed, and were they being worn at the time of the accident?
  - Does the operator need hearing aids, and were they being used at the time of the accident?

#### **6. Operator's work/rest history over the last 72 hours (prior to the accident):**

- When did the operator work during the three days previous?
- What were the operator's other activities during this period?
- When did the operator go to sleep the previous night (or previous three nights)?
- When did the operator wake up? Determine the quality of sleep.
- How long had the operator been awake prior to the accident?
- What is the operator's normal schedule? When are days off, vacations?
- Determine the activities on the day of the accident up to the time of the accident.

#### **7. Interpersonal factors (interactions and relationships among the passengers):**

- What was the mood of the other passengers before the accident? During the accident? After the accident?
- Determine the relationship between the passengers and the operator before the accident.
- Had the passengers been out on this boat together before the accident or on previous trips?
- Did the passengers get along personally? Did they see each other socially?
- What did they talk about?
- Determine the activities on board just prior to the accident.

#### **8. Life Changes for the operator in the past year:**

- Have there been any recent life changes for the operator?
- Have there been major changes in the financial situation of the operator (good or bad)?
- Have there been major changes in the personal life of the operator (e.g., separation, divorce, births, deaths)?
- Have there been changes in the health of immediate family/close friends? Any deaths?



## HUMAN PERFORMANCE FACTORS ANALYSIS: Examining, Interpreting, and Using the Collected Data and Information

### The Basics

During the analysis phase of the human performance investigation, the data and other factual information that have been gathered are examined in the context of the accident to explain the errors that may have contributed to the incident and to identify the antecedents to (what preceded) those errors. The investigator can look at the sequence of events, eliminate any irrelevant data, identify the errors, and then work backwards from the errors to identify the possible antecedents.<sup>iii</sup>

Two questions that can help an investigator establish the basic relationship between the errors and the antecedents are:

- Would the accident have occurred if the operator had not committed the error(s)? and
- Would the operator have committed the error(s) if the antecedent had not preceded it?

### A Robust System for Examining and Understanding Human Errors and Their Antecedents

The classification method called the *Human Factors Analysis and Classification System* or HFACS—originally developed for the Federal Aviation Administration, but now in use by the Department of Defense and other agencies—has been successfully used in other sectors to examine the human factors' contribution to accidents. While its four elaborate tiers would not be feasible for examining all recreational boating accidents, a simpler version, what will be referred to here as “HFACS-Lite,” focusing on just two levels in the system—***unsafe acts*** and ***preconditions for unsafe acts***—and basically corresponding to the errors and antecedents referenced above, offers a practical, meaningful option for investigators and boating safety researchers alike.

The first level, ***unsafe acts***, takes into account the ***errors*** (skill-based, judgment, misperception) and ***violations*** (e.g., violations of the Navigation Rules or other applicable laws, rules, and regulations), both of which could have occurred in an accident. Errors and violations are not mutually exclusive.

The Department of Defense's HFACS work defines errors and violations in more detail, and they are presented here for easy reference:

**Errors:** Errors are factors in an accident when the mental or physical activities of the operator fail to achieve their intended outcome as a result of skill-based, perceptual, or judgment and decision making errors, leading to an unsafe situation. Errors are unintended. Using this error analysis process, the investigator must first determine if an individual or team committed an active failure. If so, then the investigator must then decide if an error or violation occurred. Once this is done, the investigator can further define the error.

**Skill-based Errors:** Skill-based errors are factors in an accident when errors occur in the operator's execution of a routine, highly-practiced task relating to procedure, training or proficiency and result in an unsafe situation. Skill-based errors are unintended behaviors.

**Judgment and Decision Making Errors:** Judgment and decision making errors are factors in an accident when the behavior or actions of the individual proceed as intended yet the chosen plan proves inadequate to achieve the desired end-state and results in an unsafe situation.

**Misperception Errors:** Misperception errors are factors in an accident when misperception of an object, threat or situation (such as visual, auditory, proprioceptive, or vestibular illusions, cognitive or attention failures) results in human error.

**Violations:** Violations are factors in an accident when the operator violates applicable laws, rules, or regulations. For purposes of HFACS-Lite and recreational boating accidents, unlike the DOD HFACS definition, a violation would include both deliberate and inadvertent violations of applicable laws, rules, or regulations.

So, for example, a collision between two powerboats in a crossing situation (as described in Rule 15 of the Navigation Rules) might have occurred because the operator of one boat failed to see the other boat--**a perceptual error**--and, if the give-way vessel failed to “take early and substantial action to keep well clear,” also a **violation** of Rule 16. In this hypothetical accident, the investigator might also have concluded that the give-way vessel had been proceeding at an unsafe speed (a **violation** of Rule 6 and also a **judgment error**) or failed to keep a proper lookout (a **violation** of rule 5). A complete analysis from the standpoint of the Navigation Rules should also consider the actions required of the stand-on vessel. It is possible that multiple unsafe acts cause or are contributing factors to an accident.

The second level of analysis, the antecedents or ***preconditions for unsafe acts*** in HFACS-Lite terminology, recognizes that an operator’s performance is influenced by many environmental, psychological, and vessel design **factors that might have contributed to the *likelihood of the operator committing unsafe acts.***

Further investigation into the hypothetical accident described above might have revealed, for example, that the view of the operator of the give-way vessel had been impaired by the prevailing visibility, visual obstructions in the helm area, glare of shore lights, operator intoxication, or something as simple as the operator’s failure to wear corrective lenses.

Such an HFACS-Lite examination would take full advantage of the accident report data on contributing factors and causes, information extracted from the accident report narratives, the data eventually collected through implementation of the additional distraction codes, and the additional investigative detail collected through the use of the checklist of human performance questions and relevant documentation presented in the previous section.

### Things to keep in mind when interpreting the data

- The investigator’s task is to make judicious determinations about the relationships between human performance factors and the accident itself. These factors may work independently or in combination with each other. For example, operators tend to be more susceptible to illusions if they are fatigued, inexperienced, under pressure, and overworked. Similarly, errors due to

equipment design can be expected to occur more readily with operators who have more extensive experience in one vessel and little time in another.

- The investigator's work is often subject to a variety of interpretations. Because of this, the investigator must rely on substantiation to support interpretations that best "fit" the data. Research reports, journals, periodicals, and texts available at most libraries or on the Internet can provide support for conclusions drawn from the data. For example, there are many studies that have been performed to demonstrate the effects of fatigue, alcohol, and drugs on performance.

## Using the data

The data collected in the human performance investigation can be used for at least two purposes. The first purpose has already been considered—that is, for the investigator to identify the specific human factors—the *relevant unsafe acts (error and violations)* and the *preconditions for the acts (the antecedents)*—that may have caused or contributed to the accident under investigation. HFACS-Lite provides a structure and language for describing the contribution of human factors to specific accidents.

Nevertheless, it is possible that an investigator may be reluctant to draw conclusions about the role or contribution of certain preconditions identified in the investigation, such as fatigue or interpersonal factors, and thus may choose to not specifically include them in the primary written accident report. However, the data the investigator collected and recorded on the **supplement report form** can still be valuable *in the aggregate for statistical purposes*—the second use for the data. The human performance components described in the **Checklist** and presented on the **supplement report form** can serve as a useful guide for grouping findings from multiple accidents and in a way that allows the user to more easily see which factors are occurring with the most frequency.

For example, while an investigator might be reluctant to conclude that fatigue contributed to a specific accident just because the operator involved in the accident reported having only six hours of sleep the night before the event an analysis of *numerous* accidents, performed by researchers looking for patterns and trends in human factors, might indicate that operators with six or fewer hours sleep were involved in a substantial proportion of fatal accidents. As another example, analysis of aggregate accident data might indicate that violations of the Navigation Rules are common and, moreover, that certain rules (e.g., safe speed or improper lookout) are more frequently broken than others.

This information might be used to modify the content of boating safety courses and to develop targeted outreach materials. Likewise, a finding that judgment errors are frequent causes or contributing factors to accidents would underscore the need to develop outreach materials focused on risk management.

The human performance factors data collected and analyzed, then, are potentially invaluable not only to identifying causes or contributors to specific accidents under investigation, but also to the broader understanding of human factors and improvement or development of safety programs that can reduce the frequency of errors in the future.

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<sup>i</sup> The Accident Reporting Terms and Definitions Project—sponsored by the NASBLA Engineering, Reporting & Analysis Committee (ERAC) and the U.S. Coast Guard—used a multi-year, consensus-based process to update and revise terms and definitions in five accident report categories (accident types, accident contributing factors/causes, operation of the vessel at the time of the accident, activity (use of the vessel and immediate activity at the time of the accident), and vessel sub-types to be used with authorized vessel type terms). The list of revised contributing factors/causes entries was approved as a committee work product by the NASBLA membership on Sept. 11, 2012, and is included in **Appendix 2**. Along with updating and adding to the list of factors, the product includes a set of six distraction codes associated with the revised factor “Improper Lookout/Inattention” (see page 2 of list). The distraction codes were developed using information from the National Highway Transportation Safety Administration and modified to fit the marine environment.

<sup>ii</sup> These reflect the distraction codes created to get at the underlying reasons for selection of the revised contributing factor “Improper Lookout/Inattention.” See endnote 1 for additional information and **Appendix 2** for the complete list.

<sup>iii</sup> From the NTSB Office of Marine Safety, Human Factors in Marine Accident Investigations, a presentation by Barry Strauch.

## **APPENDICES**

- 1 Human Performance Factors Supplement Form**
- 2 Contributing Factors / Causes – approved list – Sept. 2012**

**BOAT ACCIDENT REPORT  
HUMAN PERFORMANCE FACTORS SUPPLEMENT**

DATE \_\_\_\_\_

INCIDENT NO. \_\_\_\_\_

**OPERATOR-RELATED INFORMATION**

**TOXICOLOGY**

Alcohol Use: ☐ No ☐ Yes

Drug Use: ☐ No ☐ Yes

If yes, justification is based on (check all that apply):

If yes, justification is based on (check all that apply):

☐ Chemical Test (BAC: \_\_\_\_\_)

☐ Chemical Test ( \_\_\_\_\_ )

☐ Trained Officer Observation

☐ Trained Officer Observation

☐ Reliable Witness Reports

☐ Reliable Witness Reports

Estimated Type/Amount \_\_\_\_\_

Description: \_\_\_\_\_

**DISTRACTION (Immediately prior to accident)**

Were any of the following electronic devices on board AND suspected/known to have caused distraction involved in the accident (check all that apply):

Were any of the following items suspected/known to have caused distraction involved in the accident (check all that apply):

☐ Phone

☐ VHF Radio

☐ Navigation Lights

☐ Possible Glare

☐ GPS

☐ Other: \_\_\_\_\_

☐ Auxiliary Lights

☐ Other: \_\_\_\_\_

☐ Sonar

☐ Unknown

☐ Background Lights

☐ Unknown

Describe Passenger Activities: \_\_\_\_\_

Describe Waterway Activities: \_\_\_\_\_

Describe the Nature and Circumstances of the Distraction: \_\_\_\_\_

**EXPERIENCE AND TRAINING**

Boating Education? ☐ No ☐ Yes ☐ Unknown

Vessel was: ☐ Rented ☐ Borrowed

Type:

☐ Owned

☐ Unknown

☐ State Course

☐ CG/Captain's License

☐ Internet Course

☐ None

☐ USCGA

☐ Unknown

☐ USPS

☐ Other: \_\_\_\_\_

Boating Experience (circle):

General Boating Experience	Experience with this Boat Type	Experience at this Location/Body of Water
0-10 hrs	0-10 hrs	0-10 hrs
>10-100 hrs	>10-100 hrs	>10-100 hrs
>100-500 hrs	>100-500 hrs	>100-500 hrs
Over 500 hrs	Over 500 hrs	Over 500 hrs
None	None	None
Unknown	Unknown	Unknown

Was this a NASBLA Certified course?

☐ No ☐ Yes ☐ Unknown

What year was the course taken? \_\_\_\_\_

Previous Violations (relevant to case; within last five years): \_\_\_\_\_

Previous Accidents (relevant to case; within last five years): \_\_\_\_\_

DATE \_\_\_\_\_

INCIDENT NO. \_\_\_\_\_

## MEDICAL

Current Health Conditions (diabetes, high blood pressure, cardiac conditions, etc.): \_\_\_\_\_

Recent Health Changes? ☐ No ☐ Yes ☐ Unknown Explain/Describe \_\_\_\_\_

Vision Were Corrective Lenses Required? ☐ No ☐ Yes ☐ Unknown Were They Being Worn? ☐ No ☐ Yes ☐ Unknown

Were Sunglasses Needed? ☐ No ☐ Yes ☐ Unknown Were They Being Worn? ☐ No ☐ Yes ☐ Unknown

Hearing Is a Hearing Aid Required? ☐ No ☐ Yes ☐ Unknown Was It Used? ☐ No ☐ Yes ☐ Unknown

## ACTIVITY IN PREVIOUS 72 HOURS

Work Schedule Day of Week: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Day of Week: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Day of Week: \_\_\_\_\_ Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Other Activities (outside of work hours): \_\_\_\_\_

Sleep Pattern - Hours of Sleep: Day 1: \_\_\_\_\_ Day 2: \_\_\_\_\_ Day 3: \_\_\_\_\_

Sleep Quality (explain): \_\_\_\_\_

## LIFE CHANGES (In past year)

Changes in Financial Situation? ☐ No ☐ Yes ☐ Unknown Explain/Describe \_\_\_\_\_

Changes in Relationships? ☐ No ☐ Yes ☐ Unknown Explain/Describe \_\_\_\_\_

Changes in Health of Family/Friends? ☐ No ☐ Yes ☐ Unknown Explain/Describe \_\_\_\_\_

Other Personal Changes? ☐ No ☐ Yes ☐ Unknown Explain/Describe \_\_\_\_\_

## OCCUPANT INFORMATION

### OCCUPANT-RELATED INFORMATION

Mood of Occupants Before, During and After Accident: \_\_\_\_\_

Relationship of Occupants to Operator: ☐ Spouse/Partner ☐ Extended Family  
(check all that apply) ☐ Children ☐ Friends  
☐ Grandchildren ☐ Other (explain): \_\_\_\_\_  
☐ Parents \_\_\_\_\_

Relationship of Occupants to One Another: ☐ Family ☐ Friends ☐ Other (explain): \_\_\_\_\_

Had Occupants Been Together on This Boat Before? ☐ No ☐ Yes ☐ Unknown If so, when: \_\_\_\_\_

Occupant Activity Prior to Accident: \_\_\_\_\_

Occupant Perception of Operator Experience: \_\_\_\_\_

Other Interpersonal Factors: \_\_\_\_\_

DATE \_\_\_\_\_

INCIDENT NO. \_\_\_\_\_

**VESSEL-RELATED INFORMATION**

**EQUIPMENT DESIGN FACTORS**

Note any relevant factors related to the accident with regard to the (check all that apply):

☐ Helm Station

☐ Design (explain): \_\_\_\_\_

☐ Layout (explain): \_\_\_\_\_

☐ Instrument Panel

☐ Readability (explain): \_\_\_\_\_

☐ Functionality (explain): \_\_\_\_\_

☐ Layout (explain): \_\_\_\_\_

☐ Audible Alerts

☐ Volume (explain): \_\_\_\_\_

☐ Duration (explain): \_\_\_\_\_

☐ Functionality (explain): \_\_\_\_\_

☐ Controls

☐ Ease of Use (explain): \_\_\_\_\_

☐ Functionality (explain): \_\_\_\_\_

Other Design Factors: \_\_\_\_\_

**OTHER HUMAN PERFORMANCE FACTORS:**





**National Association of State Boating Law Administrators  
Engineering, Reporting & Analysis Committee**

**Accident Reporting Terms and Definitions Project**

*Building consensus around standardized terms and definitions in five accident report categories  
NASBLA's Engineering, Reporting & Analysis Committee and the U.S. Coast Guard*

**CONTRIBUTING FACTORS / CAUSES – approved list – September 2012**

## **CONTRIBUTING FACTORS/CAUSES<sup>\*</sup> (grouped<sup>†</sup>) –as approved Sept. 11, 2012**

The list beginning page 2 presents the contributing factors/causes work product voted on and approved by the NASBLA membership at its annual Business Meeting conducted Tues., Sept. 11, 2012, Mobile, Alabama. Bracketed information at the end of each definition indicates whether the entry is a new one or will revise an existing term or definition currently used at the national level in BARD. All entries\* were vetted through the project review process, including the project team's refinement of items as a result of feedback received from NASBLA members during the open comment period conducted July 18-Aug. 7, 2012, and the NASBLA membership's refinement of the Distraction Codes associated with the entry "Improper Lookout/Inattention" on Sept. 10, 2012. See **History**, below, and **Overview of Process** on page 7 of this document.

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<sup>\*</sup> **History:** All entries were vetted through the process involving the project team (subgroup of NASBLA Engineering, Reporting & Analysis Committee (ERAC) and since May 2011, additional U.S. Coast Guard subject matter experts); the full ERAC; the NASBLA Executive Board; Coast Guard initial, Office-level review; broader NASBLA community via comment solicitations in July/August 2012; and discussion at the BLA Workshop, conducted as part of the 53<sup>rd</sup> Annual NASBLA Conference. Sept. 10, 2012.

This list reflects **all changes made by the project team**, including the team's resolution of feedback received (on the July 2012 proposed list) during the July 18-Aug. 7 open comment period, and resolution of feedback on the Distraction Codes for "Improper Lookout/Inattention" at the Sept. 10, 2012 BLA Workshop. Changes resulting from the feedback during the open comment period were: 1) revision of term label "Too Fast for Conditions" to include "Speed"; 2) amendment of definition for "Failure to Maintain Safe Distance" to reference "prevailing conditions" and indicate applicability to violations of distance or proximity restrictions (not solely "state-regulated" requirements as presented in earlier version); 3) complete revision of definition for "Failure to Take Adequate Evasive Action"; 4) addition of "legal" to the references to intoxication in both terms "Alcohol" and "Drugs"; 5) revision of term label "Standing/Sitting in Area Not Intended for Occupancy" to "Person in Area Not Intended for Occupancy," addition of "lying" to the definition, and clarification of its application to a vessel's "specific" operation; 6) addition of an anchor "being retrieved incorrectly" to definition for "Improper Anchoring"; 7) revision of definition for "Improper Loading" to reference "placement of any load or combination of loads"; 8) clarifying applicability of "Overloading" to include "loading beyond the manufacturer's capacity specifications"; 9) for "Machinery Failure," deletion of proposed drop-down selections regarding manufacturer/dealer or after-market installation and clarified description of drop-down item "propulsion system failure"; 10) revision of definition for "Off Throttle Loss of Steering" to include "reduced" throttle; 11) elimination of the phrase "from inadequate or improper ventilation" from the definition for "Carbon Monoxide"; 12) grammatical edit of "Weather" definition; 13) revision of definition for "Medical Condition" to clarify intent by excluding applicability to "physical impairments such as poor eyesight, hearing or mobility"; and 14) revision of definition for "Did Not Contribute" to clarify that it could be the operator, occupant(s) or vessel that did not contribute to the accident. Changes resulting from the feedback received during the Sept. 10, 2012 BLA Workshop affect the Distraction Codes for "Improper Lookout/Inattention" (see p. 2).

<sup>†</sup> Groups loosely based on categories of contributing factors/causes as presented in the annual ***Recreational Boating Statistics*** reports produced by the U.S. Coast Guard.

**Operation of Vessel Contributing Factors**  
**Operational factors associated with key aspects of the Navigation Rules**

**Navigation Rules Violation / Rules of the Road Infraction:** *Reserved for data entry use at the national level in the U.S. Coast Guard Boating Accident Report Database (BARD). Term intended solely to capture accident report information that is not or cannot otherwise be captured under one or more of the following contributing factors: Speed Too Fast for Conditions; Lack of or Improper Navigation Lights; Failure to Maintain Safe Distance; Failure to Take Adequate Evasive Action; Improper Lookout/Inattention.* [Revises definition of the existing umbrella terms (“Navigation Rules Violation” / “Rules of the Road Infraction”) to direct and describe the intended use]

**Speed Too Fast for Conditions:** *Speed above that which a reasonable and prudent person would have operated under the circumstances that existed. It is not necessarily a speed in excess of a posted limit.* [Revises existing term label (“Excessive Speed”)]

**Lack of or Improper Navigation Lights:** *Insufficient and/or improper navigation lights shown by a vessel that indicate direction of travel, position, activity, or operation.* [Revises existing term labels (“Lack of or improper boat lights” and “Inadequate on board navigation lights”) and definition]

**Failure to Maintain Safe Distance:** *Operation too close to another vessel, object, or person, whether intentionally (horseplay) or without intent, given the prevailing conditions. This may include a violation of a distance or proximity restriction.* [New term and definition]

**Failure to Take Adequate Evasive Action:** *The operator observed a potentially dangerous situation and failed to take the action(s) a reasonable and prudent person would have taken to avoid an accident.* [New term and definition]

**Improper Lookout/Inattention:** *The operator failed to perceive danger, resulting in the accident. This could have been with respect to failure(s) to perceive dangers outside or inside the vessel. May apply to violations of the requirement to maintain a proper lookout.* [Combines existing terms (“Improper Lookout” or “No proper watch” and “Operator Inattention”), creates new primary definition, and creates “distraction codes.”]

**Distraction codes for Improper Lookout/Inattention**

- **Onboard lighting** – Glare from lighted objects onboard the vessel, such as improperly shielded navigation lights, onboard electronics, and other similar devices. Specify \_\_\_\_\_
- **Background lighting** – Lights on docks, shorelines, or other vessels. Specify \_\_\_\_\_
- **Onboard electronics or equipment** – Using, attempting to use, viewing or operating onboard electronics or equipment, such as a navigation device, mobile phone, VHF radio, audio device, radar, autopilot, spotlight. Specify \_\_\_\_\_
- **Operator or occupant activity** – Activity such as sightseeing, moving objects, eating, drinking, smoking, interacting with passengers, fixated on other vessels or persons being towed, or otherwise distracted by other persons or objects in or outside the vessel. Specify \_\_\_\_\_
- **Other distraction** – Details regarding the distraction are known, but none of the specified codes is applicable. Specify \_\_\_\_\_
- **Unknown** – Insufficient facts to make any specific distraction determination.

### **Other Operation of Vessel Contributing Factors**

**Alcohol:** *In the investigating officer's judgment, use of alcohol by the operator or vessel's passengers contributed to the accident. This does not necessarily indicate legal intoxication, only that alcohol consumption contributed to the accident.* [Revises existing term label ("Alcohol use") and definition]

**Drug(s):** *In the investigating officer's judgment, use of legal or illegal drug(s) by the operator or vessel's passengers contributed to the accident. This does not necessarily indicate legal intoxication, only that use of drug(s) contributed to the accident.* [Revises existing term label ("Drug use") and definition]

**Operator Inexperience\*\*:** *Lack of experience, familiarity or knowledge regarding the vessel, environmental conditions, or location.* [Revises existing primary definition and creates additional drop-down selections]

\*\*If you entered **Operator Inexperience**, select which aspect applies:

- **This vessel** – its operation or controls
- **Environmental conditions** – prevailing conditions at the time of the accident (e.g., weather, waves, current, other types of environmental conditions)
- **Location** – the immediate area where the accident occurred (e.g., shallow water, shoals, wing dikes, other types of underwater obstructions or hazards)

**Restricted Visibility – Environmental Conditions:** *Visibility limited due to external conditions such as sun glare, fog, rain, snow, spray, limited night visibility or other environmental conditions.* [Revises existing term label ("Restricted Vision") and creates two separate entries and definitions]

**Restricted Visibility - Vessel Related:** *Visibility limited due to the vessel's bow elevation, passengers, a dirty windshield, canopy top, or other obstruction in or on the vessel.* [Revises existing term label ("Restricted Vision") and creates two separate entries and definitions]

**Sharp Turn:** *An immediate or abrupt change in the vessel's course.* [Revises existing definition]

### **Passenger or Gear Contributing Factors**

**Occupant Behavior:** *The actions, lack of experience, familiarity or knowledge of the vessel occupant(s), other than the operator, contributed to the accident.* [Reinstates previously-used term (Passenger/Skier Behavior), but revises to separate into two entries (see also **Towed Watersport Participant Behavior**). Creates new definition for each term]

**Towed Watersport Participant Behavior:** *The towed watersport participant(s)'s actions, lack of experience, familiarity or knowledge contributed to the accident.* [Reinstates previously-used term (Passenger/Skier Behavior), but revises to separate into two entries (see also **Occupant Behavior**). Creates new definition for each term]

**Person(s) in Area Not Intended for Occupancy:** *Standing, sitting, or lying in an area of a vessel not intended for occupancy during a vessel's specific operation. Examples of areas not intended for occupancy during a vessel's specific operation include, but are not limited to, the gunwale, a cabin top or other elevated platform, the bow, or the stern.* [Revises existing term labels ("Standing/Sitting on Gunwales, Bow, or Transom" and "People on gunwale, bow or transom") and definition]

**Improper Anchoring:** *Where a vessel was in the process of being anchored incorrectly, the anchor was being retrieved incorrectly, or the vessel was incorrectly held in place in the water by an anchor. Includes being improperly moored to a buoy or anchored vessel. [Revises existing definition]*

**Improper Loading:** *The placement of any load or combination of loads on or within the vessel contributed to instability or limited maneuverability. This includes but is not limited to: inadvertent distribution or redistribution of weight. [Revises existing definition]*

**Overloading:** *Excessive loading of the vessel contributed to instability, limited maneuverability, or dangerously reduced freeboard. May include loading beyond the manufacturer's capacity specifications. [Revises existing definition]*

### **Vessel or Vessel Equipment Contributing Factors**

**Equipment Failure\*\*:** *Failure of equipment, either carried or installed. This includes unsafe or improper installation. This does not include the failure to carry required equipment. [Revises existing definition and drop-down selections for which equipment failed; selections presented alphabetical order]*

\*\* If you entered **Equipment Failure**, indicate which equipment failed

- **Auxiliary or accessory equipment failure** -- Stoves, heaters, refrigerators, generators, battery chargers, hot water heaters.
- **Communication equipment failure** -- Radio, cell phones, CBs, Emergency Locator Beacons (ELBs), Emergency Position Indicating Radio Beacons (EPIRBs), Digital Selective Calling (DSC) technology.
- **Day Shapes or Flags** -- Includes correct placement, size, and visibility.
- **Fire extinguisher failure.**
- **Life jacket failure.**
- **Navigation equipment failure** – GPS, radar, depth finder
- **Navigation lights** -- Improper display; includes required intensity, arc of visibility, and placement.
- **Sail dismasting** -- Mast fell down, either onto the vessel or into the water.
- **Seat broke loose** -- Includes the back of the seat or the seat itself, or the base structure that is fixed to the area of the vessel deck supporting the seat.
- **Sound producing equipment failure.**

**Hull Failure:** *Defect or failure of the structural body of a vessel. This includes the hull material, design, or construction. It does not include the superstructure, masts, or rigging. [Revises existing definition]*

**Machinery Failure\*\*:** *Defect or failure in the machinery, material, design, construction, or any installed components involved in the mechanical propulsion of the vessel (e.g., engine, transmission, fuel system, electric system, and steering system). This does not include vessels starting in gear (see **Starting in Gear**). [Revises existing definition and drop-down selections]*

\*\*Indicate which part of the vessel's machinery failed: (**selections continue next page**)

- **Electric system failure** -- Shock hazard; system shorted out; battery failure; failure of ignition protection.
- **Engine failure** -- Engine would not start; engine stalled.
- **Fuel system failure** -- Fuel tank or fuel lines leaked; clogged fuel lines.
- **Propulsion system failure** – Failure of the propulsion system to operate properly; includes propeller, lower unit gearcase.
- **Shift failure** -- Shifting mechanism would not operate properly. Drive system would not go into gear, went into gear by itself without warning, or would not disengage.

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- **Steering system failure** -- Failure of the assembly, including all components necessary to transmit remote manual effort to the rudder, sterndrive, water jet drive or outboard engine (includes cable, pulleys, fittings, hydraulic components).
- **Throttle failure** -- Throttle mechanism would not operate properly.
- **Ventilation system failure** -- Failure of the ventilation system that exchanges air and expels gasoline vapors from the engine compartment.

**Off Throttle Loss of Steering:** *The operator released or reduced throttle, or there was loss of engine power, which resulted in little or no steering capability. This is usually associated with water jet propulsion units or airboats.* [Revises existing term label (“Off Throttle Steering”) and definition]

**Starting in Gear:** *The vessel's engine was started with the drive system in forward or reverse.* [Revises existing definition]

**Carbon Monoxide:** *The accumulation of carbon monoxide contributed to the accident.* [Creates definition for CO as a contributing factor]

**Ignition of Fuel or Vapor:** *Accidental combustion of vessel fuel or fuel vapors.* [Revises existing term label (“Ignition of Spilled Fuel or Vapor”) and definition]

**Failure to Ventilate:** *Prior to starting the engine, failure to take action to expel gasoline vapors from a machinery space or enclosed compartment.* [Revises existing term label (“Failure to Vent”) and definition]

### **Environment Contributing Factors**

**Congested Waters:** *Vessels operating in close proximity to one another as a result of high density of vessel activity in the immediate area at the time of the accident.* [Revises existing definition]

**Dam / Lock:** *A vessel(s) operated in, near, on or over a dam or lock and the structure contributed to the accident.* [Revises existing definition]

**Hazardous Waters\*\*:** *Water conditions such as currents, rapids, or rapid tidal flows, contributed to the accident.* [Revises existing primary definition and creates follow-up selections]

\*\* If you entered **Hazardous Waters**, indicate:

- **Weather-related hazardous water conditions.**
- **Inherent to location.**

**Weather:** *One or more atmospheric conditions, such as thunderstorms, lightning, wind, rain, sleet, fog or snow, created an adverse environmental situation that contributed to the accident.* [Revises existing definition]

**Wake:** *The wake created by a vessel(s) contributed to the accident.* [Revises existing term label (“Force of Wave/Wake”) and definition]

**Missing or Inadequate Navigation Aids:** *The absence of, ineffective presence of, missing, or off-station navigation aid(s).* [Revises existing definition]

### **Miscellaneous Contributing Factors**

**Language Barrier:** *A limited English proficiency with regard to understanding or comprehending navigation rules, buoys, signs, laws, regulations, or instructions contributed to the accident.* [Creates definition for a term presented on current version of the U.S. Coast Guard BAR form (expires 7/31/14)]

**Medical Condition:** *A person on a vessel or a towed watersport participant experienced a medical condition(s) that contributed to, but was not the result of the accident. This does not include physical impairments such as poor eyesight, hearing, or mobility.* [Revises existing term label (“Sudden medical condition”) and definition]

**Did Not Contribute:** *The operator, occupant(s), or vessel did not contribute to the accident.* [New term and definition]

**Other / Describe:** *Contributing factors(s) that are not described. Provide brief description.* [Creates definition]

**Unknown / Explain:** *Insufficient information to determine the contributing factor(s) of the accident. Provide brief explanation.* [Creates definition]

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**Overview of Process:** The review process for this Accident Reporting Terms and Definitions Project was accepted by the NASBLA Executive Board and the USCG Office of Auxiliary and Boating Safety in mid-June 2011. For each category of report terms:

- Achieve project team consensus on terms/definitions through series of teleconferences and interim work;
- Share team consensus list with and get feedback from full ERAC committee and NASBLA Executive Board and the U.S. Coast Guard (for initial, Office-level review);
- Share the resulting, refined list with and get feedback from the States/Territories using a structured, open comment period;
- Review responses to assess need for additional team refinements to the entries;
- Submit final consensus list to the NASBLA Executive Board for delivery to and vote by the NASBLA membership;
- Transmit to the U.S. Coast Guard for final review and clearance through its appropriate internal channels.