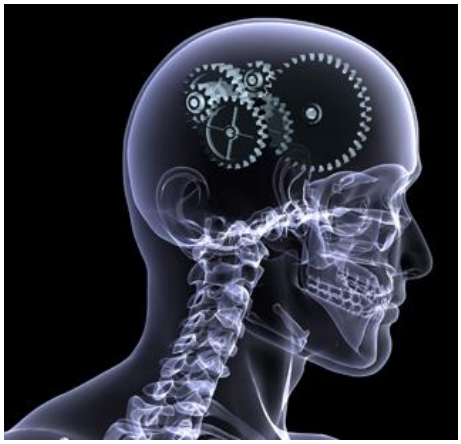
National Association of State Boating Law Administrators
Engineering, Reporting & Analysis Committee

Human Factors in Recreational Boating Accident Reporting
Applying a modified HFACS approach – Status Report (August 2013)

THE CHARGE 2013 C2

In support of an improved understanding of the factors associated with human error in recreational boating accidents, continue assessing the viability and applicability of a modified version of the Department of Defense's *Human Factors Analysis and Classification System* (HFACS).

OVERVIEW



This 2013 charge is in continuing support of a National RBS Plan strategy to examine the relevance and use of additional models of accident causation—especially related to human factors for describing fatal recreational boating accidents (2012-2016 Objective 9, Strategy 9.15).

It builds upon the committee's efforts in 2012 to identify improvements to the collection of relevant information on human factors[1] and to begin

[1] Currently, human factor descriptors—errors or violations thought to be applicable to recreational boating accidents—are recorded under a Human Error tab in the Boating Accident Report Database (BARD) by a segment of the States. This is in addition to the States' recording of the accident's contributing factors/causes. In the 2012 cycle, the ERAC "human factors" charge team compared the existing descriptors with the set of contributing factors/causes that are collected from all States and that were revised in 2012 through the efforts of another ERAC project team. That list of revised terms was approved as a committee work product by the NASBLA membership on Sept. 11, 2012. Along with updating and adding to the list of contributing factors, the product includes a set of six distraction codes associated with the revised factor "Improper Lookout/Inattention." Using the modified contributing factors list, the ERAC "human factors" charge team was able to map all of the original human error descriptor codes to one or more of the revised contributing factors or new distraction codes. The team surmised that implementation of the revised factors could effectively mean a future increase in the overall amount of information available in BARD on human error in accidents.

investigating the applicability of elements of the Department of Defense's (DOD) Human Factors Analysis and Classification System (HFACS) to recreational boating accidents.[2]

This status report summarizes the charge team's application of a modified HFACS during the 2013 committee cycle, including an assessment of its utility as a research tool for characterizing the various human factors that may have contributed to accidents, and some initial thinking about what additional factual human performance information might reasonably be collected in recreational boating accident investigations. Before describing the 2013 efforts of the team,[3] however, a brief review of the HFACS approach and the modifications made to it for purposes of this charge work is in order.

IN BRIEF: HFACS AND "HFACS-LITE" [4]

In its 2012 review of literature across several fields—including aviation where much of the original work was done— the charge team found that accident investigations had concluded the majority of causes or contributors to accidents relate to human failures. That suggested the likelihood that human factors also are a major cause or contributor to recreational boating accidents. However, the team discovered early on that it might not be easy to develop ways to analyze human factors in these accidents. In lieu of developing a new system, the team considered the potential applicability of components of the Department of Defense's (DOD) Human Factors Analysis and Classification System (HFACS).

The DOD HFACS, originally developed for the Federal Aviation Administration, characterizes human factors into four levels:

1. ***Unsafe acts***, which includes both errors and violations;
2. ***Preconditions for unsafe acts;***
3. ***Supervision***; and
4. ***Organizational influences***.

In the 2013 cycle, upon further consideration of HFACS, the team settled on the following guidance in applying elements of it to the analysis of recreational boating accidents:

1. The HFACS' levels of ***supervision*** and ***organizational influences*** were deemed not to be applicable to accidents involving recreational boats and boaters and as a result were removed from further consideration by the team;

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[2] "**Human Factors in Recreational Boating Accident Reporting – Consideration of Analysis Strategies – Initial Report (August 2012),**" contains background on the charge intent, identification of improvements to information collected about human error, the content and premise of HFACS, the approach adopted by the team to begin determining applicability of a modified HFACS to recreational boating accidents, and an extensive list of references. See www.nasbla.org/ERAC, **2012 Documents and Projects**.

[3] The ERAC C2 charge team members in 2012-2013 included (in alphabetical order): Larry Bowling, Chris Edmonston, Gary Haupt, Eleanor Mariani, L. Daniel Maxim (charge team leader and primary author of this status report), Fred Messmann, Eugene Molteni, Glenn Moates, Dick Snyder, Karen Steely, Bob Sweet, Tammy Terry, Susan Tomczuk, Cindy Wall, and ERAC staff, Deborah Gona.

[4] For more detail and references on HFACS, see pages 4-9 of the ERAC 2012 report "**Human Factors in Recreational Boating Accident Reporting – Consideration of Analysis Strategies – Initial Report (August 2012)**." See www.nasbla.org/ERAC, **2012 Documents and Projects**.

2. The first two levels of HFACS – ***unsafe acts*** and ***preconditions for unsafe acts*** – with some modification, ***were*** identified as being relevant to the analysis of human factors in recreational boating accidents;

3. The categories of **errors** associated with ***unsafe acts***—skill-based errors, misperception errors and judgment /decision-making errors—were deemed to be not mutually exclusive—that is, an ***unsafe act*** may include more than one type of error;

4. The DOD HFACS taxonomy identifies **violations** associated with ***unsafe acts*** as being deliberate or willful disregard for rules (notably, Navigation Rules), the assumption being that operators (or crew) have knowledge of the applicable rules. Those assumptions may not be valid for operators of recreational boats;

5. As such, for purposes of the team's analysis of recreational boating accidents, **violations** associated with ***unsafe acts, include both deliberate and inadvertent violations of the rules,*** making it possible that both errors and violations contributed to an accident;

6. Several of the accident contributing factors/causes in the list revised by a separate ERAC project team in 2012, and particularly the distraction codes associated with the revised, combined factor of "Improper Lookout/Inattention,"[5] apply directly to and can be used in the ***unsafe acts*** typology;

7. The DOD HFACS typology of ***preconditions for unsafe acts*** includes three broad categories—environmental, condition of the individuals, and personnel—with a detailed list of factors, many of which are not applicable to boating and several of which are unlikely to have data that can be easily acquired in the investigation of a typical recreational boating accident;

8. For application to recreational boating accidents, then, a modified grouping of ***preconditions of unsafe acts*** into two broad categories with relevant subcategories within each seems more appropriate: ***environmental factors*** (physical and technological environment) and ***condition of individuals*** (adverse physiological states, psycho-behavioral factors, knowledge or experience factors)

The charge team's modifications to the HFACS system were intended to both simplify and enhance its potential application to recreational boating accidents. The result was given the working label of "HFACS-Lite."

PROOF OF CONCEPT: *ANALYSIS OF CASES USING HFACS-LITE*

Toward the end of the 2012 committee cycle, the ERAC "human factors" charge team had begun reviewing a sample of cases that had already been investigated and for which accident reports had already been completed. The intent was to determine whether the components of HFACS-Lite held potential as a tool for analyzing and more fully describing the role of human factors in recreational boating accidents.

[5] For more detail, see footnote 1.

In 2013, the team continued its case review and expanded the work to include a collection of redacted BARD narratives. The cases reviewed included:

- Two recreational vessel collision cases provided by Glenn Moates of the Tennessee Wildlife Resources Agency [6]
- Capsizing of U.S. small passenger vessel *Taki-Tooo*, Tillamook Bay Inlet, Oregon [7]
- Collision of unnamed recreational vessel with uninspected towing vessel *Little Man II* , Ponte Vedra Beach, Florida [8]
- Grounding of the tankship *World Prodigy* in 1989, off the coast of Rhode Island (a commercial ship accident, but one where fatigue was addressed and was of interest for that reason) [9]
- Collision of two recreational vessels on St. Croix River near Bayport, Minnesota, [10] and
- A collection of approximately 40 redacted BARD narratives provided by Susan Tomczuk, U.S. Coast Guard, solely for purposes of this analysis (see **Appendix A** of this report [11]).

Using draft templates developed by the charge team leader to organize the HFACS-Lite model and its components, the team considered 1) whether the definitions were clear, 2) whether any changes or additions should be made to the illustrations for each, and 3) whether it was really possible to evaluate the sample cases and place them in the context of ***unsafe acts*** and ***preconditions for unsafe acts***.

Table 1 on page 6 of this report summarizes the definitions of ***unsafe acts***, illustrations, and examples from the cases as reviewed by the charge team; Table 2 on page 7 presents the same for ***preconditions***.

RESULTS and FUTURE WORK

Although it was not possible for the team to characterize every accident in human factors terms because of limited information in some of the sample cases, the team still concurred that HFACS-Lite was reasonable and valid for further refinement and use as a research tool. Different raters within the team

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[6] These cases are referred to as **TN 083173** and **TN 053139**, respectively, in the **Examples** presented in Tables 1 and 2 of this report. Tennessee Wildlife Resources Agency, Boat Accident Brief Case No. 083173 (2008); Tennessee Wildlife Resources Agency, Boating Accident Report Case No. 053139 (2005).

[7] This case is referred to as **Taki-Tooo** in the **Examples** presented in Tables 1 and 2 of this report. Marine Accident Report, 2005. Capsizing of U.S. Small Passenger Vessel Taki-Tooo, Tillamook Bay Inlet, Oregon June 14, 2003, NTSB/MAR-05-02, National Transportation Safety Board, Washington, DC 20594.

[8] This case is referred to as **Little Man** or **DCA-09-MM-013** in the **Examples** presented in Tables 1 and 2 of this report. Marine Accident Brief, 2010. Vessel No. 1: Unnamed recreational vessel (state registration FL 8258 MN), 22.5 feet long, Vessel No. 2: Uninspected towing vessel (push boat) Little Man II (state registration FL 5101 JB), 25.9 feet long, DCA-09-MM-013/MAB-10/01, National Transportation Safety Board, Washington, DC 20594.

[9] This case is referred to as **World Prodigy** in the **Examples** presented in Tables 1 and 2 of this report. Marine Accident Report, 1991. Grounding of the Greek Tankship WORLD PRODIGY off the Coast of Rhode Island, June 23, 1989, NTSB/MAR-91/01, National Transportation Safety Board, Washington, DC 20594.

[10] This case is referred to as **MAB DCA 99MM024** in the **Examples** presented in Tables 1 and 2 of this report. Marine Accident Brief, 1999. Collision of Two Recreational Motorboats on the St. Croix River near Bayport, MN, July 3, 1999, DCA-99-MM-024/MAB-01-01, National Transportation Safety Board, Washington, DC 20594.

[11] The narratives presented in **Appendix A** are those that have been referenced (by their **BARD ID)** in the **Examples** sections in Tables 1 and 2 of this report. They have been edited to remove sensitive or confidential information. They have not been edited for content or grammar.

arrived at similar conclusions based on data available from accident reports, including the narratives in BARD. As such, while the team envisions that HFACS-Lite could eventually be used by accident investigators in actually gathering and coding the accident data, it could also be used in the near-term by analysts reviewing available accident data.

With initial testing of the tool indicating its viability, the charge team proposes to carry this work forward in the 2014 committee cycle, focusing on providing more detailed guidance on use of this system. Further, initial conversation has already begun regarding the development of an on-site data collection tool and preliminary consideration of the sorts of additional factual human performance information that might reasonably be collected in recreational boating accident investigations.

Key to this ongoing work is partnership with and input from the National Transportation Safety Board (NTSB), which has done seminal work in the area of human factors for many years. The NTSB continues to be represented on this charge team and has been instrumental in providing detailed documentation on NTSB data collection and assessment tools already in use for this purpose. **Appendix B** contains a document prepared by NTSB personnel that will become part of the discussions for the coming year. By starting with preexisting and established work on the topic, the team will be in a better position from which to proceed. The key question before the ERAC "human factors" charge team is how this human performance material can be modified for use in the analysis of recreational boat accidents as many of the key components used in the existing NTSB tool are not typically collected in boating accident investigations.

TABLE 1. UNSAFE ACTS in HFACS-Lite

Broad topic	Definition, specific examples, issues
Violations	**Definition:** Violations are factors in an accident when the actions of the operator are not in compliance with COLREGS or other applicable laws and regulations and lead to an unsafe situation. Violations may be deliberate or inadvertent. **Illustrations:** Failure to comply with COLREGS or other State or Federal laws, such as safe speed, failure to give way, and excessive alcohol use. Some violations (e.g., excessive alcohol use) also qualify as judgment and decision-making errors. **Examples:** TN 083173, TN 053139, MAB DCA 99MM024, GA-2010-0025, NC-2009-0064, NY-2011-0183, NM-2012-0008
Skill-based errors	**Definition:** 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. **Illustrations:** Allisions with docks resulting from failure to compensate for wind and current conditions and failure to understand operating characteristics of the boat (see narratives). Other illustrations include paddling from the wrong seat in a kayak or canoe, standing up in a canoe or small boat, shifting gear into forward instead of reverse or the converse, wakeboarder choosing wrong path, and filling water tank with gasoline (misfueling). **Examples:** FL-2012-0118, KS-2009-0008, MT-2012-0007, OH-2009-0007, AZ-2008-0003, NC-2011-0023, OK-2011-0061
Misperception errors	**Definition:** Misperception errors are factors in an accident when misperception of an object, threat or situation (such as visual, auditory, cognitive or attention failures) results in human error. **Illustrations:** Distracted lookout as possible cause of collision. Other examples include failure to see unmarked cables beneath bridge, unlighted mooring buoy, breakwall or dock. **Examples:** Little Man, TN 083173, IN-2009-0021, OH-2005-0072, FL-2006-0405, RI-2007-0023, NJ-2012-0076, NY-2011-0046, RI-2012-0041, and TX-2011-0028.
Judgment and decision-making errors	**Definition:** Judgment and Decision-making errors are factors in an accident when 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. **Illustrations:** Departing on a voyage when weather (e.g., visibility) or sea conditions are unfavorable, proceeding at too great a speed in poor visibility conditions and striking submerged object. Overloading, failure to wear a life jacket (when legally required), navigation errors, 'dancing on the bow of the boat,' wakeboarder choosing wrong path, and excessive alcohol use are other illustrations. **Examples:** Taki Tooo, World Prodigy, TN 053139, MAB DCA 99MM024, AR-2010-0011, MA-2010-0023, NC-2009-0064, NY-2011-0183, OH-2005-0072, FL-2012-0413, NC-2011-0023, NM-2012-0008, TX-2011-0028

TABLE 2. PRECONDITIONS FOR UNSAFE ACTS in HFACS-Lite

Broad topic	Definition, specific examples, issues
Environmental factors	**Definition:** Environmental factors are factors in an accident if physical or technological factors affect practices, conditions and actions of an individual and result in human error or an unsafe situation. Environmental factors include: **Physical Environment:** Physical environment are factors in an accident if environmental phenomena such as weather, climate, white-out or dust-out conditions affect the actions of individuals and result in human error or an unsafe situation. **Illustrations from cases included:** Fog/other atmospheric impairment to visibility, effect of wake or water action, presence of submerged hazard to navigation **Technological Environment:** Technological environment are factors in an accident when cockpit/vehicle/workspace design factors or automation affect the actions of individuals and result in human error or an unsafe situation. **Illustrations from cases included:** Inability of radar to detect target when set on proper range, buoy lights extinguished or not easily distinguishable from shore lights, presence of unmarked cable or unlighted buoy, **Examples:** RI-2012-0041, TN 053139, ID-2009-0078, IN-2009-0021, TN-2012-0142, TX-2010-0001, RI-2007-0023, TX-2011-0028, VA-2011-0061.
Adverse physiological states	**Definition:** Adverse physiological states are factors when an individual experiences a physiologic event that compromises human performance and this decreases performance resulting in an unsafe situation. This subcategory would include (1) use of alcohol or illegal drugs, (2) use of prescription or legitimate over-the-counter drugs that may impair performance, (3) fatigue, (4) lack of or failure to use corrective aids (e.g., glasses or hearing aids), (5) pre-existing physical illness/injury, and (6) motion sickness. Several of these categories are captured in the revised contributing factors/causes (e.g., alcohol, drugs, medical condition), but others, specifically fatigue and physical impairments, currently are not. **Illustrations from cases included:** Alcohol impairment, boater fatigue **Examples:** MAB DCA 99MM024, TN 083173, DCA-09-MM-013, ID-2009-0078, ME-2011-0074, NY-2011-0183, OH-2005-0072, MA-2010-0023.
Psycho-behavioral factors	**Definition:** Included within this subcategory would be such categories as (1) overaggressive or overconfident behavior, (2) complacency, (3) emotional state/stress, and (4) perceived pressures to complete mission/ voyage resulting from expectations of passengers or crew. **Illustrations from cases included:** Passengers expected fishing boat operator to complete voyage rather than cancel because of sea conditions, vessel owners wanted master to complete paperwork in critical phase of voyage, vessel operator engaged in argument prior to departure, failure to wear life jacket on PWC because victim claimed to be good swimmer, 'dancing on the deck' of small moving boat. **Examples:** Taki Tooo, World Prodigy, AL-2010-0059, NC-2009-0064, FL-2012-0413, NM-2012-0008, MA-2010-0023.
Knowledge or experience factors	**Definition:** Lack of knowledge or experience relative to vessel operation, weather, NAVRULES, etc. **Illustrations from cases included:** Lack of knowledge of stability of small boat, inexperience of 'relief operator' when operator was alcohol impaired, unfamiliarity with operating characteristics of newly purchased boat, sitting in wrong seat of paddlecraft. **Examples:** AR-2010-0011, DCA-09-MM-013, KS-2009-0008, MT-2012-0007, OH-2009-0007.

Appendix A
Redacted Case Narratives

This appendix contains redacted case narratives from BARD records (pages A-4 through A-14). These cases were selected at random from the entries. The only editing was to eliminate text or data to preserve confidentiality. The narratives were spell checked, but not edited for grammar or style and are thus representative of actual contents of the narrative section of the BARD report.

In some cases, the narrative provides a description and analysis that is unequivocal. For example, GA-2010-0025 contains the following:

> "In reviewing victim's and witness statements along with the physical evidence, transfer marks, skeg tracks, and propeller damage from the boating incident on Lake Russell occurring the 8th, day of May, 2010 at around 1900 hrs. The evidence clearly indicates the operator in vessel #1 failed to follow "the rules of the road". In conjunction with scene diagram figures 1-4, vessel #1 in an overtaking situation, failed to keep out of the way of vessel #2. This indicates that the operator of vessel #1 failed to follow rule 13, according to updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland. It is also clear from witness statements, vessel #1 failed to use safe speed in the congested area of the Elbert ramp, a violation of rule 6, according to updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland."

And later in the same narrative:

> "The impacting vessel #1 passenger from the impacting vessel #1 was ejected from the vessel #1 clear of the collision. Rule 13, overtaking a vessel was broken by vessel #1 while overtaking vessel #2 causing the two boats to collide. By operating in a manner causing collision of vessel #1 with vessel #2, the operator of vessel #1 failed to adhere to rule 8 of the updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland. After reviewing all of the evidence and information in this case, the vessel collision could have been completely avoided had the operator of vessel #1 followed the "rules of the road". The operator of vessel #1 is at fault causing the boating incident on May 8, 2010 on Lake Russell."

These comments clearly indicate multiple violations of the Navigation Rules contributed to the accident. The narrative is insufficient to determine if there were perception, skill-based, or decision-making errors in this case. The narrative does not enable identification of any possible preconditions for this accident.

Another clear example is from NY-2011-0183, which states:

> "The operator of v1 was cruising n/b on the Hudson River with 5 other persons on board a 19-foot open motorboat. They were travelling within 100 feet of shore, at speeds estimated over 30 mph when the vessel struck a cement abutment attached to the shore. All 6 were thrown from the vessel, killing four of them, and severely injuring the other two. The vessel itself was demolished. The operator of the vessel was found to have a blood alcohol content of .235, nearly three times the legal limit. None of the victims were wearing a life jacket."

"**Unsafe acts**" in this case include a violation (alcohol in excess of legal limit) and a judgment or decision-making error, as well as an adverse physiological state among the "**preconditions for unsafe acts**."

MA-2010-0023 illustrates another point about the classification system. The redacted narrative reads:

> "Preliminary information is that operator/owner/deceased had been going through a lot of stress in his life recently such as work related issues and his daughter had been committed for drug abuse and according to his wife he liked to drink. On the day of the accident the deceased went out with a friend for lunch and had a few beers with lunch. They went out in his boat down the river to the 'Tipsy Seagull - an establishment that serves alcohol' and had some more beers. They were waiting to pick-up the victim's son from a camp that was being held nearby. After they picked up the son the victim's friend piloted the boat to approximately 1 1/2 -2 miles upriver to the house because he said the victim had too much to drink. They arrived back at around 8pm and the victim decided to go back out because he had some engine troubles that he wanted to work out. Victim's friend advised him not to go out but he went anyway. When asked if he knew how many drinks his friend had he said he did not know but that he left with a small cooler on board containing beer. Around 11:00pm a witness saw a small boat collide with an adjacent wall. A call was placed to 911 and various agencies responded. The boat with significant damage to its bow washed up ashore without the operator onboard. When the victim's did not return home the victim's wife sent their son to look for him. The son took out their other boat and found his father's drifting up the shoreline, with all the damage and emergency responders were arriving to the scene. The body of the victim was recovered on 8/10/10. Alcohol will likely be a factor but tox results have not come back as of yet. Still ongoing investigation preliminary report at this time on 9/17/10."

In this case, the **unsafe act** description would include a judgment or decision-making error because alcohol was involved; however, because the description does not contain a BAC it is not possible to determine whether there was a specific violation. The **preconditions** would include adverse physiological states (alcohol consumption) and possible psycho-behavioral factors (stress).

2009-IN-0021 involves different causes/contributing factors:

> "…When I arrived on scene, I was informed that the victim, victim 1 and his friend, operator 2 were riding their jet skis down the Maumee River. Victim 1 was riding about 40 yards ahead of operator 2, and attempted to pass under the Tecumseh Street Bridge. As victim 1 passed under the bridge traveling 30 to 40 miles per hour, he hit a steel cable that the Pioneer Associate's construction crew had left strung between the pillars of the bridge 34.5 inches above the surface of the water. He was flipped off of the jet ski and fell into the water. He died instantly from the trauma of the cable hitting his neck.
>
> I then got into a boat with the ft. Wayne fire department and the Allen county coroner's office and went to the center bay of the three bay bridges where the accident happened. We could see nothing in the water, on the cable, or on the front of the bridge that marked the area as a construction zone, or the cable as being a hazard. We were able to identify exactly where victim 1 hit the cable by a piece of blue cloth from his life jacket that was stuck on the cable. We measured from the surface of the water to the cable, and got a reading of 34.5 inches. Deputy coroner took several pictures of the bridge, and the cable. There were also cables strung across the bay to the north, that had a barge tied to it, and a second cable in the middle bay, that was mostly under water, and out of the way of the jet skis. The only bay that did not have a cable was the south bay, but that bay was partially blocked by a floating log, and would appear to be impassable to boaters. We marked the cable with several pieces of white cloth to prevent any further accidents that night, and returned to shore."

In this case, the operator of the PWC apparently failed to see the steel cable (perception error) with a **precondition** being the physical environment in which the cable was not marked and not readily visible. The narrative does not permit drawing a conclusion as to whether or not there were judgment errors in this case.

The case narratives presented in this appendix were written using the guidance available at the time to accident investigators, which was not necessarily optimized to address human factors or, more specifically, to employ the HFACS-Lite terminology. The task of coding accidents investigated by the NTSB using the HFACS-Lite terminology was much easier because the NTSB includes human factors analyses in each of its accident investigations.

Nonetheless, several of the BARD narratives contain information that is consistent with the HFACS descriptions of **unsafe acts** or **preconditions for unsafe acts**. Should the HFACS-Lite analysis tool move forward into implementation in the future, it will be necessary to further refine the definitions of the terms presented in Tables 1 and 2 of this report and develop additional training materials to standardize analysis.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
AL-2010-0059	According to witnesses, victims had gone to Kokomo's bar and grill to eat but departed prior to ordering because they began arguing with each other and the operator was upset. Victims got back in boat, pulled away from marina dock, located next to the restaurant, planed off, and struck the second piling on long bridge. Operator's station received the most damage. Operator was airlifted to Columbus medical center in critical condition. The passenger was carried by ambulance to the medical center and is in critical condition. ***update on 08/04/2010 the operator passed away at the hospital.***
AR-2010-0011	Survivors stated that all three men were fishing in a 12' flat bottom boat when victim stood up in the boat trying to start the motor. While trying to start the motor, water started coming in v1 causing it to overturn. Two occupants were able to get to the shore but the operator/victim was not. Victim was located about an hour and a half later, still holding onto his tackle box. Occupants weight as noted on driver's licenses: victim 190lbs, occupant 2 190lbs, occupant 3 185lbs (565lbs total). Also onboard was an ice chest with ice, food, drinks, 2 bags of minnows, tackle box, 3 pfds, 2 paddles, 3 fishing poles and a 9.9 outboard motor with gas tank; therefore it is believed the cause of the accident was due to overloading.
AZ-2011-0161	Vessel #1 was traveling westbound on lake Havasu in the area of site 5 at 50-60 miles per hour. Investigation shows that the port side drive gimbal ring failed causing the drive to separate from the transom housing. The port side drive was pulled into the water which in turn caused the starboard drive to be pulled hard to the port side. The drives are connected together by a tie rod. This action caused vessel #1 to turn hard to port. Vessel #1 then spun around several times ejecting all occupants.
Fl-2012-0118	On March 23, 2012 a fatal accident involving a 23' vessel (v-1) occupied by five adults and one juvenile occurred. V-1 was being docked at a private residence on the St. John's river, Putnam county, Florida. A 23 year old female operator was attempting to dock v1; she placed it into forward gear accidentally, while attempting to put it in reverse, causing the bow portion to go underneath the dock. This action resulted in the juvenile female, who was seated in the port bow, to be crushed between the dock and v-1's passenger side console. The juvenile succumbed to her injuries at the hospital. Preliminary cause of death Atlanto-occipital dislocation.
Fl-2010-0252	Victim was observed to be operating a PWC at a high rate of speed traveling on a straight path east to west when the PWC encountered a residual wake possibly from his own PWC. The operator was ejected to starboard while the PWC continued briefly in a straight line. When the operator did not surface within approximately 15 seconds, the shoreline witness then launched his own PWC and began an unsuccessful search, both on the water and underwater for the operator.
GA-2010-0025	I, rfc, member of the CERT, was contacted by Sgt while off duty on May 8, 2010, at 1949 hrs. In reference to a boating incident on Lake Russell involving two bass boats. The incident occurred around 1900 hrs. Local, that day; Sgt briefed me on the situation and told me Cpl. was on the scene. I contacted Cpl. who briefed me further on the case, he relayed to me the boats would be held as evidence at the us army corps of engineers impound yard at Richard B. Russell dam. I arrived at the corps impound yard on May 9, 2010 at 1300 hrs. I met with Cpl. at the boats; we inspected vessels, witness statements, and safety equipment. We set the impacting vessel as vessel #1; we set the impacted vessel as vessel #2. From there we separated each vessel into quadrants and surveyed all possible damage from the collision. We then took measurements and photographs of the damage and transfer marks of each vessel, from there we accounted all necessary safety equipment was onboard each vessel. I then diagramed the damage on each vessel and we completed a photograph log. From there I went over the scene field notes Cpl. had obtained and began entering information of vessels and victims onto the Georgia boating incident form.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
	In reviewing victim's and witness statements along with the physical evidence, transfer marks, skeg tracks, and propeller damage from the boating incident on Lake Russell occurring the 8th, day of May, 2010 at around 1900 hrs. The evidence clearly indicates the operator in vessel #1 failed to follow "the rules of the road". In conjunction with scene diagram figures 1-4, vessel #1 in an overtaking situation, failed to keep out of the way of vessel #2. This indicates that the operator of vessel #1 failed to follow rule 13, according to updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland. It is also clear from witness statements, vessel #1 failed to use safe speed in the congested area of the Elbert ramp, a violation of rule 6, according to updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland. Vessel #1 engaged vessel #2 at the port side rub rail just behind the passenger seat. Vessel #1 advanced onto vessel #2 traveling across vessel #2 from the port passenger seating location causing extensive damage to both vessels before exiting the starboard side of vessel #2 forward of the operator console location. During the collision vessel #2 passenger and operator suffered serious injuries' from the direct impact of vessel #1 hull. The passenger of vessel #2 suffered a broken left clavicle, broken facial bones, teeth knocked from the sockets, a bruised back, and a laceration to the forehead, broken ribs and collapsed lung. The operator of vessel #2 suffered a broken left clavicle and bruising. The impacting vessel #1 passenger from the impacting vessel #1 was ejected from the vessel #1 clear of the collision. Rule 13, overtaking a vessel was broken by vessel #1 while overtaking vessel #2 causing the two boats to collide. By operating in a manner causing collision of vessel #1 with vessel #2, the operator of vessel #1 failed to adhere to rule 8 of the updated COMDTINST M16672.2d, US Dept. of Homeland Security, United States Coast Guard, Navigation Rules, International-Inland. After reviewing all of the evidence and information in this case, the vessel collision could have been completely avoided had the operator of vessel #1 followed the "rules of the road". The operator of vessel #1 is at fault causing the boating incident on May 8, 2010 on Lake Russell.
2009-ID-0078	Vessel 1, 1961 Larson with an outboard motor was operating upriver (east) on the Spokane River from Johnson Park at mill river with a passenger sitting in the passenger seat. At the same time, operator of vessel 2 was sitting in the operator's seat of his 1998 blue water on the south side of the river across from the mill river condos and his passenger was in the bow of the boat fishing facing the south shoreline. Vessel 1 hit a large wake which caused him to lurch forward pushing the throttle lever down even more causing the vessel to accelerate more. Vessel 1 turned suddenly to the right possible due to the wake or steering control issues and within approx. 2 seconds vessel 1 struck vessel 2 in the bow area approx. 4' back from the tip of the bow on the port side. Vessel 1 struck vessel 2 between 240 degree and 250 degree angle. When the two boats collided, vessel 1 pushed down on vessel 2 and started to rotate vessel 2 in a clockwise direction. Vessel 1 continued to ride up on vessel 2 and the outboard engine, skeg and propeller struck the gunwale of vessel 2. The boats then separated and vessel 1 continued in the water and struck the shoreline approx. 10-15 feet away. Vessel 2 rotated approx. 180 degrees as a result of the accident. The passenger in vessel 2 who was in the bow was struck by vessel 1 in the back of the head and thrown into the water. The victim sustained massive head injuries and a fractured skull as a result of the accident, causing his death. The operator of vessel 1 was arrested for operating a vessel under the influence of alcohol.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
2009-IN-0021	On 10/25/09, I conservation officer was contacted by dispatch and informed of a personal watercraft accident that had occurred on the Maumee river in Allen county. I was able to depart for the accident scene at approximately 1730, and arrived on scene at approximately 1800. Already at the scene were Indiana conservation officer district 2 Lieutenant, Indiana conservation officer 1, Indiana conservation officer investigation section Sgt. 1, the Fort Wayne city police department, Fort Wayne fire and rescue, and the Allen county coroner. When I arrived on scene, I was informed that the victim, victim 1 and his friend, operator 2 were riding their jet skis down the Maumee river. Victim 1 was riding about 40 yards ahead of operator 2, and attempted to pass under the Tecumseh street bridge. As victim 1passed under the bridge traveling 30 to 40 miles per hour, he hit a steel cable that the pioneer associate's construction crew had left strung between the pillars of the bridge 34.5 inches above the surface of the water. He was flipped off of the jet ski and fell into the water. He died instantly from the trauma of the cable hitting his neck. I then got into a boat with the ft. Wayne fire department and the Allen county coroner's office and went to the center bay of the three bay bridges where the accident happened. We could see nothing in the water, on the cable, or on the front of the bridge that marked the area as a construction zone, or the cable as being a hazard. We were able to identify exactly where victim 1hit the cable by a piece of blue cloth from his life jacket that was stuck on the cable. We measured from the surface of the water to the cable, and got a reading of 34.5 inches. Deputy coroner took several pictures of the bridge, and the cable. There were also cables strung across the bay to the north, that had a barge tied to it, and a second cable in the middle bay, that was mostly under water, and out of the way of the jet skis. The only bay that did not have a cable was the south bay, but that bay was partially blocked by a floating log, and would appear to be impassable to boaters. We marked the cable with several pieces of white cloth to prevent any further accidents that night, and returned to shore. The fire department then towed the jet ski that victim 1was riding back to the Johnny Appleseed park boat ramp, where his truck was parked. The jet ski was loaded onto the trailer, and hooked to lt. 1's truck, and then taken to the district 2 post and locked inside. Operator 2 was interviewed at the scene by Detective Sgt. 1, then escorted by officer 1 back to Albion to make the notification of death to victim 1's wife. Sgt. 1 and I went to the residence of witness 1 and witness 2, who were on a putting green next to the river, and witnessed the accident. They said that they had looked at the construction on the bridge and discussed it before the jet skis came down the river, and never saw the cables strung across the water. They said that the cables were not marked in any way. They said that they were putting and heard the two men coming down the river. They turned to see what was coming, and watched victim 1drive into the cable. Witness 2 said that she heard the sound of something getting tight, like a twang, and saw victim 1flip backward off of the jet ski and land face down in the water. She said that operator 2 then stopped and pulled up beside victim 1and pulled him to shore. She then ran to a sts security car that was parked on top of the bridge and used his phone to call 911. She said that emergency personnel arrived within 5 minutes of her making the call. Witness 1 said that he ran down to the bank where operator 2 and victim 1were, and held on to operator 2 as he tried to pull victim 1onto the steep bank. Victim 1was already deceased

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
2009-KS-0008	At approximately 2230 hours I was contacted by nro in brown county. Nro advised me that he believed there had been a drowning in Nemaha County earlier in the evening. Nro advised that brown county dispatch had contacted him reference the event. I ended my conversation with nro and contacted Nemaha County sheriff's office. Dispatch put me in contact with one of the deputies at the scene. The deputy advised that a person had possibly drowned in a farm pond approximately ½ miles south the intersection of 116th road and v rd. I advised Nemaha county I would be en route to the location to assist in any way that I could. At approximately 1145 hours I arrived on scene and made contact with sheriff. Sheriff advised me that he believed that victim 1 had possibly drowned in the farm pond. Sheriff advised me victim 1's boat was capsized and that no one had seen victim 1 since earlier in the afternoon. While speaking with sheriff, brown county rescue squad towed the small flat bottom boat to shore. Sheriff asked if I would be willing to help drag for the body. I advised that I would assist in the dragging for the victim. At approximately midnight we started dragging for the body. I advised the operator of the boat that I wanted to concentrate on a small area where the boat had been located before the rescue squad had removed it. Approximately 0035 hours I caught a small portable fish finder from the bottom of the pond. I advised the operator of the boat to continue going back and forth in the area where we had located the fish finder. At approximately 0045 hours I was able to catch victim 1 and bring his body to the surface of the pond. Once his body was on the surface of the pond I held onto the body by holding onto the victims' sweatshirt. I advised the operator of the boat to back slowly toward the shore where we would remove the hook and then remove the body from the water. Once we made it to the shore emergency personnel removed the body from the water and placed the body in a body bag. During this time it was noted that the hook had snagged on the right thigh of the victim. A knife was used to cut loose the hook from the victim's denim jeans. After the body was removed from the scene sheriff and I looked the boat over for damage. The boat was a 14 foot flat bottom Jon boat; the boat had a tiller style 7.5 horse power mercury motor attached to the transom. The throttle had been broken off and was lying in the boat. When the boat was retrieved it was drug completely onto shore with the motor dragging on the bottom. During this time the transom and motor would have been dragging on the bottom which was consistent with the tiller handle being broken off of the boat. Upon further inspection it was found that the gear shift was in a forward position, which is not consistent with a boat being pulled to shore. One possible explanation is that the victim could have been operating the boat motor, tried to turn too sharp and possibly overturned the boat. This would be consistent with someone that had just purchased the boat and was unfamiliar with how the boat would handle when the boat was under power. It was noted that the victim had purchased the boat the day before and had spent the morning of the incident working on the boat. No life jackets were located at the scene.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
MA-2010-0023	Preliminary information is that operator/owner/deceased had been going through a lot of stress in his life recently such as work related issues and his daughter had been committed for drug abuse and according to his wife he liked to drink. On the day of the accident the deceased went out with a friend for lunch and had a few beers with lunch. They went out in his boat down the river to the "Tipsy Seagull - an establishment that serves alcohol" and had some more beers. They were waiting to pick-up the victim's son from a camp that was being held nearby. After they picked up the son the victim's friend piloted the boat to approximately 1 1/2 -2 miles upriver to the house because he said the victim had too much to drink. They arrived back at around 8pm and the victim decided to go back out because he had some engine troubles that he wanted to work out. Victim's friend advised him not to go out but he went anyway. When asked if he knew how many drinks his friend had he said he did not know but that he left with a small cooler on board containing beer. Around 11:00pm a witness saw a small boat collide with an adjacent wall. A call was placed to 911 and various agencies responded. The boat with significant damage to its bow washed up ashore without the operator onboard. When the victim's did not return home the victim's wife sent their son to look for him. The son took out their other boat and found his father's drifting up the shoreline, with all the damage and emergency responders were arriving to the scene. The body of the victim was recovered on 8/10/10. Alcohol will likely be a factor but tox results have not come back as of yet. Still ongoing investigation preliminary report at this time on 9/17/10.
2009-MD-0120	On the return trip from Rockhold Creek, subject 1 was operating. Once they entered herring bay and cleared the crab pot line, subject 1 turned the helm over to subject 2 and stepped outside of the cabin on to the back deck of the boat. Approx. One minute later, subject 1 said the boat had a violent impact and rose up in the air. The vessel had come to rest on top of the stone jetty just to the right of red day marker #2 at the mouth of Rockhold Creek. Subject 1 estimates that at the time of impact, the vessel was travelling at approx. 20 knots; subject 2 suffered blunt force trauma injuries; subject 1 uninjured. Paramedics responded to the scene and removed both men from the vessel. Subject 2 died as a result of injuries sustained in the impact. Subject 1 was interviewed and gave a written statement concerning the accident. The vessel was retrieved from the jetty by Tow Boat U.S, and put on a trailer at a ramp in Rockhold Creek. It was transported by nrp personnel for storage at Matapeake facility.
ME-2011-0074	Owner / operator of vessel 1 and passenger had been cruising south on Schoodic Lake in the Cherryfield portion of the lake. The owner /operator of vessel claimed that the boat tossed both occupants out and owner was knocked unconscious and came-to in the water. Owner/operator unsure what had occurred at the time. As owner/operator treaded water and tried to keep boat from hitting him, noticed boat hit something and came to a stop. Owner / operator then swam to boat and looked for the passenger and could not find him. Warden service called and after extensive search found passenger in 30 feet of water with injuries caused by prop strike. Owner / operator did admit that both had consumed alcohol. Owner /operator bac taken approx. 5 hrs. later indicated 0.07. Owner / operator claimed passenger was operating at time of crash.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
MT-2012-0007	On July 7, 2012, a boating accident occurred on the Clark fork river in the albert on gorge whitewater section that resulted in the death of a man. The following report was compiled by warden from eye witnesses and people involved to include the passenger who was in the boat with the victim when the incident took place. The victim and passenger were floating the albert on river gorge on July 7th. In addition to the raft the victim was floating in, the passenger also brought, and intermittently used a whitewater river kayak. Witness 2, claimed that he had encountered the passenger and the victim at sandy beach fishing access site earlier in the day. Witness 2 said that the victim was switching his rower's seat frame from a middle row position on the raft to a stern position. The victim told witness 2 that he thought the new position might be better for the whitewater section, specifically tumble weed rapid, which is a class iii/iv rapid. Witness 2 said he thought that was an unusual position for a rower in whitewater without having at least two paddlers in the raft to help maneuver the boat. Witness 2, having experience in white water situations, says that you lose much of your control over the raft in a stern rower's seat, especially if you have not rowed from that position before. The victim and passenger continued downstream and began to enter tumble weed rapid. At that point, the victim was rowing from the stern position and passenger was sitting in the bow of the boat. They entered into tumble weed rapid river right. This portion of the rapid is known to be the most difficult to maneuver. At the time of entry into the rapid, photographs show that the passenger was wearing an approved personal floatation device (pfd) and the victim was not wearing a pfd. The victims raft entered the rapid bow first but then capsized on the starboard side. Both the victim and passenger fell overboard along with dry boxes, the victim's pfd and the passenger's kayak that was on the raft. The raft corrected itself and came back down right side up. During an interview with the passenger, he claimed that he saw the victim moments after they were in the water. He said that the victim looked very distraught and asked the passenger to throw him the bow line. The passenger said that he tried to get the bow line to the victim but it was tied to the inside of the boat. At that time he lost sight of the victim and did not see him again until later when he was brought to shore. During the interview with the passenger, I asked if alcohol was involved and the passenger claimed that he and the victim may have had one 12 oz. Beer a piece. Photographs were taken of the incident by witness 1 owner and photographer of Montana river photography. Witness 1 photographs people going through tumble weed rapid and then offers them on his website. Witness 1 photographs show the raft entering the rapid and the events that took place afterward. The photograph of when the subjects fell over board was taken at 14:08, according to camera. Two of the photographs show victim just downstream from where he went overboard. He was facing downstream and alert. His pfd was in the water behind him approximately 20 yards. Those were the last photographs taken of the incident in the water. The victim's position showed that he still had more white water to go through downstream before reaching calmer water. Another witness that was actively involved in the rescue was witness 3. During an interview with witness 3, he claimed that he was kayaking Surfer Joe rapid just below Tumble Weed rapid on river right. He said that he saw an unmanned raft on river left and yelled out, "unmanned boat!" Witness 3 said he then ferried across into the large eddy in the middle of the river where the water was flat. He said he then saw a man, the victim, with his head just above water. ...

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
2009-NC-0064	Three subjects had spent the night around oriental after the croaker festival. All three had met and stayed up all night on the edge of the Neuse river while friends and family slept in a tent. Near daybreak but not yet sunrise, victim wanted to ride the PWC. The keys and safety lanyard were in the console of the PWC. The PWC was tied to a pole about 20 feet from the shore. The operator put on a pfd as did passengers. The second passenger, victim was handed a pfd by operator; to which victim replied he didn't need one because he could swim. Occupant2 also tried to get victim to wear the pfd and again he refused. The three waded out to the post to get on the PWC with operator operating, victim sitting in the middle and occupant2 sitting on the rear. Operator increased the speed from idle to about 20 mph and moved in a southwesterly direction away from the bulkhead area. They rode around the Neuse river in front of oriental for a few minutes. The river had a chop less than 1 foot from a southwesterly breeze of less than 10 mph. The PWC had travelled a short distance with operator varying the throttle speed to what he gauged to be between 20-30 mph. Operator turned the PWC sharply to the left and all three passengers were thrown off the right side of the PWC. Occupant2 remarked that all three passengers were in the air at the same time. The PWC continued forward from its momentum 10-15 feet away from the people in the water. Occupant2 stated at first that he could touch bottom with the water being right at his chin level. Within seconds however, victim could no longer touch bottom and began pulling strongly on occupant2's pfd. Confused at first, occupant2 did not understand what was happening as victim kept tugging at and trying to pull himself up on top of occupant2. Victim was unable to communicate what was happening but occupant2 quickly realized that victim was drowning and was doing what he could to keep himself and victim above the water. Both were struggling strongly and occupant 2 tried to get victim to settle down. During this time, operator swam towards the PWC to reboard and bring it back to the struggling duo. Occupant2 was still struggling with victim but victim was tiring. When operator returned with the PWC, occupant2 had lost contact with victim. Operator asked occupant2 where victim was and occupant2 said he didn't know, that he was right there a second ago. Operator removed his pfd and jumped into the water, diving under the surface several times in search for victim. After a brief attempt at surface diving search attempts, occupant2 and operator reboarded the PWC and sped to shore, turning the craft over just before the shoreline. Occupant2 and operator approached a parked car that had two people in it. Occupant2 opened the door but was unable to tell person what had happened but operator was able to tell person that "he's dead, he's dead!" person was able to understand that victim was missing and found victim's cell phone and placed a call to 911 to Pamlico so dispatch at 6:05am sheriff's deputies were sent and arrived on scene at 6:20am, other rescue assets were also paged for in the following few minutes. Confusion about the type of call started as a drowning without having any PWC involved. A search area had been established just east of the entrance to oriental harbor. USCG was on scene along with a couple of rescue boats, a side viewing sonar team, a dive team, and a sheriff deputy in his personal boat assisting in the search. Recreational boats were transiting the area n
NY-2011-0183	The operator of v1 was cruising n/b on the Hudson river with 5 other persons on board a 19-foot open motorboat. They were travelling within 100 feet of shore, at speeds estimated over 30 mph when the vessel struck a cement abutment attached to the shore. All 6 were thrown from the vessel, killing four of them, and severely injuring the other two. The vessel itself was demolished. The operator of the vessel was found to have a blood alcohol content of .235, nearly three times the legal limit. None of the victims were wearing a life jacket.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
2009-OH-0007	Vessel #1, with three persons on board, was launched onto the little maim river at Loveland, Ohio and began travelling downstream. Approximately 20 yards from shore, occupant #3 (the fatality) began rocking the canoe, then fell off the starboard side of vessel #1. Occupant #3 then stood up in the river and attempted to reboard vessel #1, causing vessel #1 to capsize, and putting the two remaining occupants into the water. Occupant #1 swam to the shore with no assistance; occupant #2 remained with vessel #1 and was able to reboard vessel #1 downstream. Occupant #3 was not seen again until his body was retrieved by divers at approximately 2032 hours.
OK-2010-0049	Vessel 1 was engaged in recreational fishing in remote area approx., 2 mi ne of rocky point and 1.5 south of big hollow. Operator was on cell phone with wife when passenger announced he was hot and going to cool off. Passenger entered water approx. 10' - 12' deep. Operator noticed passenger was nowhere to be seen. Operator put on pfd and entered water in attempt to locate passenger. All attempts failed. Operator then acquired phone service after several attempts because of remote location and called 911, while marking location of last sighting. After responding unit arrived on scene, he was assisted by local rural fire department. Toppers volunteer fire department started a dragging operation in the marked area. At 20:36 hrs., recovery was made in marked location. Troop c headquarters was notified of recovery time. Notification to me was given and victim transported by funeral home. Also notification of next of kin was performed by this trooper.
TN-2012-0142	A passenger in the fatal boating accident, was interviewed and is the only witness to this incident. Operator, driver of the 15 ft. Reelfoot lake boat and the only vessel involved in this incident, lost his life during this incident as described by occupant, at the onset of the accident, occupant was sitting directly in front of operator, as the only passenger while the two were headed in from a fishing trip. They were cruising at the boat's absolute lowest speed and ran up on a stump that was barely submerged beneath the water. According to occupant, the ultra-slow careful speed caused the boat to "stick" (stop) on the stump instead of "jump over" and continue forward movement. Occupant said this slow careful speed was the main reason for the boat sinking. When the boat stopped it was tilted to the port side and when occupant looked back operator was slumped over the side of the boat. With all of the weight of operator on the port side of the boat, the boat began to take on water. At that point, operator rolled over the boat side into the water and occupant jumped into the water in an attempt to keep the boat from getting any more water inside the hull. During the commotion, operator managed to grab a cooler lid and occupant was holding on to a type ii pfd. Neither the operator nor the occupant was wearing a pfd when the incident occurred. A type ? Pfd was used by occupant to help support him while in the water. With both passengers in the water, occupant recalled that operator was spinning around in a circle with the cooler lid and would not respond when his name was yelled by occupant. Occupant then noticed that operator took a big breath and passed out. Occupant grabbed operator and held him up using a stump for support. As far as occupant knows, head never went underwater and operator did not drown. Occupant supported operator's body on the closest stump with the suspenders worn by operator. Occupant noticed at this point that operator's lips and face were a deep purple in color. The boat ultimately sank with only the bow showing while the two were in the waters of half-moon basin and being supported by only a stump. Approximately 30 minutes after the incident described occurred, someone headed in from a day of fishing in the area, heard occupant yelling for help.

REDACTED CASE NARRATIVES

BARDID	Redacted narrative
	Good Samaritan helped occupant get into the boat and the both of them pulled operator's unconscious body into the boat. Upon arrival at the nearest boat ramp near the twra Reelfoot office, EMTs of the Lake Co. EMS met the parties involved. EMT made the comment that, in his opinion, the victim had a massive heart attack. Occupant noted that during the incident while in the water or during the boat ride to the boat ramp he never felt cold. When the incident was over and he was in his truck he started to feel cold and started to shiver. Occupant indicated that he refused to go to the hospital and Brent EMT insisted that he go. Occupant ultimately was admitted to the Union City Baptist hospital and treated for hypothermia. Occupant had undergone 2 heart surgeries in the previous years and began to have "enzyme complications" when his heart started to slow down from the commotion of the incident. Occupant was in the hospital for two days before being released. No blood EMT or autopsy was done on operator. The Lake Co. Coroner indicated that on his report the cause of death was noted to be "pending". The medical examiner for lake co indicated that the cause of death was acute mi.
TX-2010-0001	Ro's gathered facts indicate victim's trauma to the skull in the boat's collision either killed victim on impact or knocked him unconscious to drown after being thrown in the water. Victim's boat was found around midnight impaled on partially sunken debris that is resting on the bottom of the Lavaca river. Due to a low tide, after investigation by tpwd officers, it was determined that victim had struck the partially submerged debris and was ejected. A search of the area the next morning by game wardens and local sheriff's deputies discovered the body. Victim had a severe laceration to his skull. Cause of death will be pending an autopsy. Report filed by captain game warden.
2009-WY-0009	At approximately 1500 on 6/26/2009, a group of 10 boy scouts and leaders were navigating the snake river canyon in Wyoming. All were in the same inflatable raft, and wearing life jackets. The raft entered "Three Oar Deal" a large recirculating ledge feature that appears at water levels about approx. 15,000 CFS. While in the feature, two adult leaders were washed out to the raft. One adult was able to swim away from the recirculating water, while the victim was caught in the feature. The victim surfaced multiple times while trying to swim free. After multiple minutes stuck in the feature, the victim's life jacket floated free from his body. The victim's body floated free of the feature soon after. His party was able to retrieve him and get him to shore where CPR was attempted after being in the water approx. 5-10 minutes. Passing parties secured the victim to a craft that CPR could be performed on, and transported him to an area where he could be more easily extracted to the highway. Crews continued CPR with an automatic external defibrillator (AED) until an ambulance arrived. The victim was put on a backboard and taken uphill to the ambulance. The victim was pronounced dead at St. John's hospital after transport to Jackson, Wyoming. No alcohol or drug use was suspected. This report is pending.

ADDITIONAL REDACTED CASE NARRATIVES REVIEWED

BARDID	Redacted narrative
2008-AZ-0003	Both vessels in area of Cholla ramp preparing to exit the water. Vessel 1 operator and boat were behind vessel 2. Operator 1 attempted to change direction to reverse away from vessel 2, mistakenly went forward quickly, jumping bow out of water then landing on top of vessel 2 engine/cowling. No injuries to either parties.
FL-2012-0413	V1 was operating at above the slow/idle speed but not on plane. 2 of the 5 occupants were dancing on the bow of the boat. One of the dancers fell over the bow, was struck by the propeller and sustained two lacerations, one on head and one on right foot. Injuries were not life threatening; victim: received ten staples in scalp on back of head received eleven stitches to close laceration on top of right foot
2006-FL-0405	V1 was traveling south on the ICW from St Augustine inlet area. As V1 was traveling south near marker 39, the operator steered his vessel straight instead of turning to the starboard to follow the channel. V1 was then traveling on a sandbar on the east shoreline. Once the operator realized he was outside the channel, the operator of v1 then turned to the starboard and began a course toward a dock that extended out from the ocean palms neighborhood. V1's starboard bow struck the dock and continued underneath the dock and resting b/w the next dock to the south and the dock v1 initially hit.
NC-2011-0023	Operator was operating his boat in the cove on Falls Lake where the Purnell Rd bridge crosses. He was towing victim on a wakeboard. Victim is a very experienced wakeboarder and the two men frequently use this area of the lake for wakeboarding. Operator was heading north into the cove. As he approached the end of the cove, he began to make a right turn to head back out of the cove. During the turn, victim swung out wide to the outside of the boat instead of staying behind the boat like he stated he normally does. He said he saw he was getting close to shore but didn't think he would hit it and could turn away. He could not turn in time and hit a stump, then a tree, breaking his leg. Victim was taken to upper Barton Creek access where an ambulance picked him up and took him to wake med. This accident was a result of an error in judgment by the person wakeboarding. Victim admitted that it was his mistake and the operator of the boat was doing a normal maneuver and was not at fault.
NJ-2012-0076	The operator of vessel #1 was drift fishing outside the channel. The operator of vessel #2 was traveling north also outside the channel. Operator #2 stated that he was using the serpentine method in order to maintain a proper look out. Operator #2 lost sight of vessel #1 and vessel #2 struck vessel #1 on the port side. The operator of vessel #1 had a minor contusion but refused treatment.
NM-2012-0008	Vessel operator was with a passenger on board on the front access deck (dancing on the deck) Went to make an abrupt turn after seeing a perceived obstruction in the water. The passenger fell overboard went under the boat and was struck by the prop across the left temple and left chest. This victim in the boat accident was airlifted in a coma to a hospital in Texas. Charges were filed on the operator for violations of the boat act and the operator and passengers on board were charged with varying counts of selling or giving alcoholic beverages to a minor and counts for contributing to the delinquency of a minor.
NY-2011-0046	Vessel 1 cruising westbound, failed to see vessel 2 - town pumpout vessel- which was drifting. V2 thought V1 was approaching for pumping, so did not take evasive action. Port bow of V1 struck port bow of V2, causing damage.
2005-OH-0072	The operator and several friends decided to take a cruise after leaving the Barnacle Tavern when it closed. They cruised out into the lake then turned the engine of and drifted for about an hour. On returning to shore the operator made an error in navigation. He thought he was returned to Anchor Point Marina where they started. Instead he was heading for Wards Canal at Metzger's Marsh. Wards Canal has a breakwall that extends into the lake with an aid to navigation lighted daymark with green flashing light, on the west side of the entrance there is a red flashing light. The operator failed to see the breakwall and struck it about 35 yards from the green light. All of

ADDITIONAL REDACTED CASE NARRATIVES REVIEWED

BARDID	Redacted narrative
	the passengers struck various points inside the vessel. All of the passengers and the operator were transported to local hospitals. Alcohol was a factor, none of the persons on board were wearing a PFD.
OK-2011-0061	Vessel 1 was docked at Newberry Creek marina gas dock. Vessel operator stated he had gassed up the vessel and pushed away from the dock. When he started the vessel, it blew up. The motor cowling blew off burning 3 people. The fire was out and the injured had been transported to the hospital by the time the investigator arrived. The investigator found gasoline in the vessel's fresh water holding tank. The investigator asked the operator if he might have mistakenly put gasoline in the fresh water tank and the operator replied that thought he might have. The event occurred approx 150 feet north of the shoreline and 12 feet SW of the NW edge of the Newberry Creek marina gas dock.
RI-2012-0041	A boating accident occurred in the vicinity of Pt. Judith between a charter boat and sailboat. USCG responded to the scene and reported that the accident occurred southeast of the gap of the Harbor of Refuge in heavy fog. EPO reported that Operator1 of the sailing vessel was transiting from Norwalk, CT to Cuttyhunk, Mass with 4 people on board. Operator1 stated that he was traveling 7-8 knots when his vessel was struck by a motor vessel operated by V2 w/8 passengers on board (charter boat/Priority Too). Operator1 reported that visibility was poor due to heavy fog. He also reported that the power vessel took evasive action and turned east towards the sailing vessel's bow and collided at a 45 degree angle. There were no injuries. Operator2 stated that he was under power at about 12 knots. The running lights and radar were on and the radar was set to 1 mile. He stated that suddenly a sailboat appeared on his starboard bow and a collision was imminent so he took evasive action by reducing speed and turning port. The power vessel had limited damage to a cracked bulkhead and scratched paint. Operator2 was administered a DOT alcohol test which was negative and a post accident drug test which was also negative. Operator2 reported that the sailing vessel did not show up on his radar but other targets did. He continued on to take his customers fishing. Cause of accident was severely reduced visibility due to thick fog, failure of radar to show ON a target, and improper lookout.
2007-RI-0023	While heading to a favorite fishing spot, Vessel 1 struck an unlighted mooring buoy being used by a working dredge. The vessel was destroyed the passenger had minor injuries.
TX-2011-0028	We were returning from dinner from the Pier and headed back to Waterford Marina around 10:30. All boat lights were in proper order. I was traveling at moderate speed and being very cautious since it was very dark. As we were coming around the Point Venture peninsula I was carefully watching the buoy lights and the lights on shore and felt confident that I was in the proper channel since I had just maneuvered this channel the previous two weekends and paid very close attention to the markers. Unfortunately, I was mistaken and since the buoy light seems to be dim and I believe some not even lit, i misjudged and ran aground. About a millisecond prior to hitting the sand bar I saw it and pulled back in the throttle, but it was too late and the boat stop suddenly and thru the passengers forward. Three passengers were thrown from the boat and only one was cut from something on the boat prior from departing the vessel. One other passenger was throw in the galley of the boat and sustained minor injuries to their body. All other persons on the vessel were uninjured. The vessel was removed from the sand bar several days later. Operator Completed Report
VA-2011-0061	Operator of a PWC was approaching a ski boat to speak with friends. The operator of the PWC hit a wake from another vessel and accidentally activated the throttle causing the PWC to strike the ski boat.

Appendix B

Potential Human Performance Investigation Questions for future consideration by NASBLA ERAC in its "human factors" charge work

National Transportation Safety Board Office of Marine Safety

OUTLINE OF THE HUMAN PERFORMANCE INVESTIGATION

Preface

The Human Performance investigation serves as a mechanism for understanding the nature and scope of human error in accidents. The methodology for conducting the investigation requires the application of information from the different psychological sub disciplines, as needed.

Essentially, human factors are the study of the interaction of the person and the machine he or she was operating. The operation of the machine, in this case, a vessel, includes not only the actual maneuvering of the vessel but its maintenance and inspection, and any other critical safety-related action as well.

Because errors may be due to inadequacies in training, training and training-related issues often predominate as areas of concern during accident investigations. Therefore, a section on selection, training, and experience is included for use on those occasions when such issues require greater attention than might otherwise be the case. It is important to recognize that different areas of training related issues might be more or less applicable, depending on the circumstances of each particular case.

Activities of the Human Performance Investigator

Like other investigators, the human performance investigator focuses at first on the collection of "perishable" information that require arranging for toxicological samples and collection of information and interviewee statements regarding work/rest history. As the investigation proceeds, the human performance investigator can focus more on the "less perishable" information which would include general background statements and information from public records. Specific areas of human performance involvement would include the following:

1. Obtaining information for the work/rest history. An important part of the human performance investigation is to trace the activities prior to the accident of individuals of importance to the investigation. The purpose of this history is to determine the extent to which the person may have been fatigued at the time he or she committed a critical error. The time period of 72 hours is typical, but other time period are examined at the discretion of the investigator.

Information related to the 72-hour history is considered "perishable" since memory tends to become less accurate and less detailed over time (and since some interviewees become difficult to locate with the passage of time). Those interviewees who are of prime interest would include anyone in who came in contact with the individual as well as colleagues, supervisors, instructors, and friends, depending on the nature of the accident and errors that the person may have committed. These individuals may provide information regarding the 72-hour history and as a result, it is usually worth interviewing them even if they feel their exposure was modest and they indicate that everything seemed routine. Simply knowing that everything seemed routine can be of value to the investigation. When individuals are deceased, the family members are normally not interviewed until the immediate trauma associated with the loss of family members has dissipated although this can vary at the discretion of the interviewer. Some background interviews can be completed by the telephone at the discretion of the investigator.

2. Examining wreckage related to human performance. The human performance investigator should examine and document all material related to the crewmembers that are found in the wreckage with relevance to human performance, including paperwork, personal effects, and any medications (including the number of pills in the container in the case of medication).

3. Obtaining general background information on the individual. When human performance failures occur in an accident, it is often possible to find precursors in the individual's background that may be related to problems discovered in the accident. A human performance investigation would develop information related to issues such as previous work history and major recent life events including medical, economic, and emotional changes.

4. Background records. A human performance investigation would normally include examining available background records. These include records of previous accidents/incidents, and personnel, training, and medical records from the employer. 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 may be confidential material, which is not appropriate for public reports but is valuable at suggesting areas for further investigation.

5. Management, Oversight, and Procedures. Human performance investigation should examine the quality of the oversight and management of the persons of interest. This includes detailing the structure and quality of the management of the person of interest, the frequency of oversight inspections or examinations, the data collected in oversight, and the nature and quality of work-related procedures used to guide the persons of interest in the performance of their jobs.

6. Maintenance and Inspection. If the error involves maintenance and inspection, the human performance specialist must examine the nature of the work that was completed, the training, procedures and oversight related to job performance, and potential impediments in the maintenance and inspection itself that may have affected the quality of performance. This includes

such issues as physical obstacles to job performance, deficiencies in tool design, and parts labeling and storage.

Checklists of Human Performance Factors

All interviews investigators conduct should start with very general questions that allow the interviewees to describe what they know at length and without influence from the interviewer. As the interview progresses, more pointed questions would normally be asked to focus the interviewee on topics that were not fully addressed.

A “short checklist” is provided to assist with conducting human performance interviews and consists of questions that have proved useful in covering areas of basic concern in a human performance investigation. A second section, "investigation outlines" provides a more extensive overview of the human performance area that may inspire the interviewer with areas of questioning important to a specific investigation. The actual questions used and the way they are stated should be determined specifically for each investigation at the discretion of the investigator.

It should be noted that these questions concern general background areas that are essential to the human performance investigation. However, additional excellent questions are often suggested by the details of the specific accident. By listening closely to interviewee descriptions of an individual's performance in the accident, and by asking simple questions to reach a "common sense" understanding of these actions, the investigator can often generate additional areas for greater human performance attention.

Human Performance Short Checklist

1. Activities in last 72 hours

- When was the last time you worked before the accident?
- When did you work during the three days previous? What were your other activities during this period?
- When did you go to sleep the previous night (or previous three nights)? When did you wake up? Describe the quality of your sleep.
- How long have you been awake?
- What is your normal work schedule? When are days off, vacations? (Should be obtained from personnel records)
- Describe your activities on the day of the accident up to the accident.

2. Accident history

- (Should be obtained from personnel records)

3. Life Changes

In the past year:

- Describe your current health and any recent changes in your health (good or bad)?
- Have there been major changes in your financial situation (good or bad)?
- Have there been major changes in your personal life (eg. separation, divorce, birth, death)?
- Have there been changes in the health of immediate family/close friends? Any deaths?

4. Medical/drugs

- Describe your current health and any recent changes in your health (good or bad)?
- What is the name/address of your personal doctor?
- How is your vision? Do you wear corrective lenses? Name of doctor, prescription?
- How is your hearing? Do you wear a hearing aid? Name of doctor?
  How would you describe the pace of work at the time of interest?

5. Environmental

- (Should not be assessed from subjective opinion of the operator-rather objectives data from other sources should be used)

6. Interpersonal

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

7. Background

- How did you get interested in boating? If individual had formal training, where was it obtained?
- Did any passengers ever complain about your operation of the vessel?

B. Investigative outline

1. Experience Factors:

Look for:
- Type of training/education
- Quality and recency of training
- Experience in emergencies
- Operational experience

Source of Information:
- Personal records, certificates, licenses
- Training records
- Frequent passengers

2. Equipment Design Factors:

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

Source of Information:
- Pictures of display/control layout
- Manufacture's pictures/drawings
- Maintenance records, books
- Wreckage
- Sister vessel

3. Team Factors:

Look for:
- Team size
- Team members
- Duties and assignments of team members
- Team structure
- Training in team performance
- Team member experience transcripts (if available)
- Operational communications requirements
- Operational procedures training

Sources of Information:
- Certificates
- Personal records, licenses
- Logbooks

Fellow operators
Company training instructors
Company records
Simulator training system records
Operator manuals voice transcript (if available)
Company training
Company manuals
Company oversight

4. Physiological and Medical Factors:

Look for:	Overall health Medical history Rest levels Pharmaceutical and illegal drug use Alcohol use
Source of Information:	Post-Mortem Examination Toxicological Analysis Personal Medical Records Personal physician Family members and friends

Human Performance Analysis

During the analysis phase of an investigation, factual information is examined in order to explain of the errors that may have contributed to the mishap and identify the antecedents to those errors. The task of the human performance investigator is to make judicious determinations about the relationships between human performance factors and the accident itself. These factors or human performance parameters 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 longer experience in one vehicle and little time in another.

The work of the human performance investigator 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. A large body of research reports, journals, periodicals, and texts available at most libraries to provide the needed support for conclusions drawn from the data. For example, there are many studies that have been performed to demonstrate the effects of fatigue, drugs and alcohol, on performance.