MLA Inland Waters & Towing Committee Meeting

May 2, 2018, 11:00 a.m.

Cell Phone Use, Liability, and Cell Phone Policies for Marine Operators

MATERIALS PACKET

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a. Coast Guard Marine Safety Advisory
b. Excerpt from Subchapter M Operational Rules, 46 C.F.R. Part 140
c. Excerpt from Federal Register, 46 CFR Parts 1, 2, 15, et al.; Inspection of Towing Vessels: 81 FR 40041 (June 20, 2016).

UNITED STATES COAST GUARD

U.S. Department of Homeland Security

MARINE SAFETY ADVISORY

Assistant Commandant for Marine Safety, Security and Stewardship

October 29, 2010 Advisory 01-10
Washington, DC

DISTRACTED OPERATIONS
Don't let it be you!

Throughout the United States, and across all transportation modes, safety initiatives are being established to address issues related to Distracted Operations. The Coast Guard recognizes the importance of this issue, understands the potential consequences caused by increased operational risk in marine operations, and is supportive of the goals and objectives of the U.S. Department of Transportation and other distracted driving safety initiatives.

With respect to vessel operations, the bridge team management approach to safe navigation is an essential element of risk management and safe vessel operations. The team approach to safe navigation requires the clear, frequent and accurate exchange of information between all crewmembers relative to the safe operation of the vessel. In other evolutions, such as discharging cargo, loading fuels, etc., full attention is required by all involved in order to prevent casualties or pollution incidents. Additionally, when mariners are navigating or working alone, the use of cellular or other devices unrelated to the operation at hand could impede the exchange of vital operational information, delay reaction time, or cause attention lapses of those involved which could result in unwanted circumstances having very serious consequences causing injuries and fatalities, material damage, and environmental impact.

NTSB findings in investigations involving other transportation modes have found that the use of cellular telephones and other wireless devices can degrade performance, slow response times, and increase attention lapses of those in safety-sensitive positions. A recent executive order signed by President Obama prohibits text messaging by federal employees, including contractors, when driving government vehicles or their privately owned vehicles on government business. Most states and the District of Columbia (DOC) have recognized the risk and banned texting while driving. Nine states and the DOC have banned the use of handheld cellular telephones while driving. Lastly, the United States Department of Transportation has established a national initiative focusing on Driving Distracted. (More information is available at http://distraction.gov.)

The potential risk associated with improper use of cellular telephones and other devices in the marine environment while navigating or performing other vessel functions should be apparent to vessel owners and operators.

Consequently, the Coast Guard **strongly recommends** vessel owners and operators to develop and implement effective operational policies outlining when the use of cellular telephones and other devices is appropriate or prohibited.

This advisory is for informational purposes only and does not relieve any domestic or international safety, operational or material requirement. Developed by the Headquarters Office of Investigations and Analysis. Questions may be forwarded to HQS-PF-fldr-G-PCA@uscg.mil.

SUBCHAPTER M—TOWING VESSELS

PART 140—OPERATIONS

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AUTHORITY: 46 U.S.C. 3103, 3301, 3306, 3308, 3316, 8104, 8904; 33 CFR 1.05; DHS Delegation 0170.1.

SOURCE: USCG–2006–24412, 81 FR 40101, June 20, 2016, unless otherwise noted.

Subpart A—General

§ 140.100 Purpose.

This part contains the health, safety, and operational requirements for towing vessels and the crewmembers serving onboard them.

§ 140.105 Applicability and delayed implementation for existing vessels.

This part applies to all towing vessels subject to this subchapter.

(a) With the exception § 140.500, which has a later implementation date, an existing towing vessel must comply with the requirements in this part no later than either July 20, 2018 or the date the vessel obtains a Certificate of Inspection (COI), whichever date is earlier.

(b) The delayed implementation provisions in paragraph (a) of this section do not apply to a new towing vessel.

Subpart B—General Operational Safety

§ 140.205 General vessel operation.

(a) A vessel must be operated in accordance with applicable laws and regulations and in such a manner as to afford protection against hazards to life, property, and the environment.

(b) Towing vessels with a Towing Safety Management System (TSMS) must be operated in accordance with the TSMS applicable to the vessel.

(c) Vessels must be manned in accordance with the COI. Manning requirements are contained in part 15 of this chapter.

(d) Each crewmember that is required to hold a Merchant Mariner Credential (MMC) must have the credential on board and available for examination at all times when the vessel is operating.

(e) All individuals who are not required to hold an MMC permitted onboard the vessel must have and present on request a valid personal identification that meets the requirements set forth in 33 CFR 101.515.

§ 140.210 Responsibilities of the master and crew.

(a) The safety of the towing vessel is the responsibility of the master and includes:

(1) Adherence to the provisions of the COI;

(2) Compliance with the applicable provisions of this subchapter;

(3) Compliance with the TSMS, if one is applicable to the vessel; and

(4) Supervision of all persons onboard in carrying out their assigned duties.

(b) If the master or officer in charge of a navigational watch believes it is unsafe for the vessel to proceed, that an operation endangers the vessel or crew, or that an unsafe condition exists, he or she must ensure that adequate corrective action is taken and must not proceed until it is safe to do so.

(c) Nothing in this subpart may be construed in a manner which limits the master or officer in charge of a navigational watch, at his or her own responsibility, from diverting from the route prescribed in the COI or taking such steps as deemed necessary and prudent to assist vessels in distress or for other emergency conditions.

(d) It is the responsibility of the crew to:

(1) Adhere to the provisions of the COI;

(2) Comply with the applicable provisions of this subchapter;

(3) Comply with the TSMS, if one is applicable to the vessel;

(4) Ensure that the master or officer in charge of a navigational watch is made aware of all known aspects of the condition of the vessel, including:

(i) Those vessels being pushed, pulled, or hauled alongside; and

(ii) Equipment and other accessories used for pushing, pulling, or hauling alongside other vessels.

(5) Minimize any distraction from the operation of the vessel or performance of duty; and

(6) Report unsafe conditions to the master or officer in charge of a navigational watch and take effective action to prevent accidents.

Subpart C—[Reserved]

Subpart D—Crew Safety

§ 140.400 Personnel records.

(a) The master of each towing vessel must keep an accurate list of crewmembers and their assigned positions and responsibilities aboard the vessel.

(b) The master must keep an accurate list of individuals to be carried as persons in addition to the crew and any passengers.

(c) The date and time that a navigation watchstander, including master, officer in charge of a navigational watch, and lookout assumes a watch and is relieved of a watch must be recorded in the towing vessel record (TVR), official logbook, or in accordance with the TSMS applicable to the vessel. If an engineering watch is maintained, comparable records documenting the engineering watch are required.

§ 140.405 Emergency duties and duty stations.

(a) Crewmembers must meet the requirements in §§ 15.405 and 15.1105 of this chapter, as appropriate.

(b) Any towing vessel with alternating watches (shift work) or overnight accommodations must identify the duties and duty stations of each person onboard during an emergency, including:

(1) Responding to fires and flooding;

(2) Responding to emergencies that necessitate abandoning the vessel;

(3) Launching survival craft;

(4) Taking action during heavy weather;

(5) Taking action in the event of a person overboard;

(6) Taking action relative to the tow;

(7) Taking action in the event of failure of propulsion, steering, or control system;

(8) Managing individuals onboard who are not crewmembers;

(9) Managing any other event or condition which poses a threat to life, property, or the environment; and

(10) Responding to other special duties essential to addressing emergencies as determined by the TSMS applicable to the vessel, if a TSMS is used.

(c) The emergency duties and duty stations required by this section must be posted at each operating station and in a conspicuous location in a space commonly visited by crewmembers. If posting is impractical, such as in an open boat, they may be kept onboard in a location readily available to the crew.

§ 140.410 Safety orientation.

(a) Personnel must meet the requirements in §§15.405 and 15.1105 of this chapter, as appropriate.

(b) Prior to getting underway for the first time on a particular towing vessel, each crewmember must receive a safety orientation on:

(1) His or her duties in an emergency;

(2) The location, operation, and use of lifesaving equipment;

(3) Prevention of falls overboard;

(4) Personal safety measures;

(5) The location, operation, and use of Personal Protective Equipment;

(6) Emergency egress procedures;

(7) The use and operation of watertight and weathertight closures;

(8) Responsibilities to provide assistance to individuals that are not crewmembers;

(9) How to respond to emergencies relative to the tow; and

(10) Awareness of, and expected response to, any other hazards inherent to the operation of the towing vessel which may pose a threat to life, property, or the environment.

(c) The safety orientation provided to crewmembers who received a safety orientation on another vessel may be modified to cover only those areas unique to the other vessel on which service will occur.

(d) Safety orientations and other crew training must be documented in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel. The entry must include:

(1) The date of the safety orientation or training;

(2) A general description of the safety orientation or training topics;

(3) The name(s) and signature(s) of individual(s) providing the orientation or training; and

(4) The name(s) of the individual(s) receiving the safety orientation or training.

§ 140.415 Orientation for individuals that are not crewmembers.

Individuals, who are not crewmembers, on board a towing vessel must receive a safety orientation prior to getting underway or as soon as practicable thereafter, to include:

(a) The location, operation, and use of lifesaving equipment;

(b) Emergency procedures;

(c) Methods to notify crewmembers in the event of an emergency; and

(d) Prevention of falls overboard.

§ 140.420 Emergency drills and instruction.

(a) *Master's responsibilities.* The master of a towing vessel must ensure that drills are conducted and instructions are given to ensure that all crewmembers are capable of performing the duties expected of them during emergencies. This includes abandoning the vessel, recovering persons from the water, responding to onboard fires and flooding, or responding to other threats to life, property, or the environment.

(b) *Nature of drills.* Each drill must, as far as practicable, be conducted as if there was an actual emergency.

(c) *Annual instruction for each crew member*. Unless otherwise stated, each crewmember must receive the instruction required by this section annually.

(d) *Instructions and drills required*. The following instruction and drills are required:

(1) Response to fires, as required by §142.245 of this subchapter;

(2) Launching of a skiff, if listed as an item of emergency equipment to abandon ship or recover a person-overboard;

(3) Instruction on the use of davit-launched liferafts, if installed.

(4) If a rescue boat is installed, instruction on how it must be launched, with its assigned crew aboard, and maneuvered in the water as if during an actual man-overboard situation.

(5) Credentialed mariners holding an officer endorsement do not require instruction in accordance with paragraphs (d)(1), (3), and (4) of this section.

(e) *Alternative forms of instruction*. (1) Instruction as required by this section may be conducted via an electronic format followed by a discussion and demonstration by a competent individual. This instruction may occur either on board or off the vessel but must include the equipment that is the subject of the instruction.

(2) Instruction as required by this section may be performed in accordance with the TSMS applicable to the vessel, provided that it meets the minimum requirements of this section.

(f) *Location of drills, full crew participation, and use of equipment*. As far as practicable, drills must take place on board the vessel. They must include:

(1) Participation by all crewmembers; and

(2) Actual use of, or realistic simulation of the use of, emergency equipment.

(g) *Recordkeeping*. Records of drills and instruction must be maintained in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel. The record must include:

(1) The date of the drill and instruction;

(2) A description of the drill scenario and instruction topics;

(3) The personnel involved.

§140.425 Fall overboard prevention.

(a) The owner or managing operator of a towing vessel must establish procedures to address fall overboard prevention and recovery of persons in the water, including, but not limited to:

(1) Personal protective equipment;

(2) Safely working on the tow;

(3) Safety while line handling;

(4) Safely moving between the vessel and a tow, pier, structure, or other vessel; and

(5) Use of retrieval equipment.

(b) The owner, managing operator, or master must ensure that all persons on board comply with the policies and procedures in this section.

§140.430 Wearing of work vests.

(a) Personnel dispatched from the vessel or that are working in an area on the exterior of the vessel without rails and guards must wear a lifejacket meeting requirements in 46 CFR 141.340, an immersion suit meeting requirements in 46 CFR 141.350, or a work vest approved by the Commandant under 46 CFR subpart 160.053. When worn at night, the work vest must be equipped with a light that meets the requirements of 46 CFR 141.340(g)(1). Work vests may not be substituted for the lifejackets required by 46 CFR part 141.

(b) Each storage container containing a work vest must be marked ''WORK VEST''.

§140.435 First aid equipment.

Each towing vessel must be equipped with an industrial type first aid cabinet or kit, appropriate to the size of the crew and operating conditions. Each towing vessel operating on oceans, coastwise, or Great Lakes routes must have a means to take blood pressure readings, splint broken bones, and apply large bandages for serious wounds.

Subpart E—Safety and Health

§140.500 General.

(a) No later than July 22, 2019, the owner or managing operator must implement a health and safety plan. The health and safety plan must document

compliance with this part and include recordkeeping procedures.

(b) The owner, managing operator, or master must ensure that all persons on board a towing vessel comply with the health and safety plan.

§ 140.505 General health and safety requirements.

(a) The owner or managing operator must implement procedures for reporting unsafe conditions and must have records of the activities conducted under this section. The owner or managing operator must maintain records of health and safety incidents that occur on board the vessel, including any medical records associated with the incidents. Upon request, the owner or managing operator must provide crewmembers with incident reports and the crewmember's own associated medical records.

(b) All vessel equipment must be used in accordance with the manufacturer's recommended practice and in a manner that minimizes risk of injury or death. This includes machinery, deck machinery, towing gear, ladders, embarkation devices, cranes, portable tools, and safety equipment.

(c) All machinery and equipment that is not in proper working order (including missing or malfunctioning guards or safety devices) must be removed; made safe through marking, tagging, or covering; or otherwise made unusable.

(d) *Personal Protective Equipment (PPE).* (1) Appropriate Personal Protective Equipment (PPE) must be made available and on hand for all personnel engaged in an activity that requires the use of PPE.

(2) PPE must be suitable for the vessel's intended service; meet the standards of 29 CFR part 1910, subpart I; and be used, cleaned, maintained, and repaired in accordance with manufacturer's requirements.

(3) All individuals must wear PPE appropriate to the activity being performed;

(4) All personnel engaged in an activity must be trained in the proper use, limitations, and care of the PPE specified by this subpart;

(e) The vessel, including crew's quarters and the galley, must be kept in a sanitary condition.

§ 140.510 Identification and mitigation of health and safety hazards.

(a) The owner or managing operator must implement procedures to identify and mitigate health and safety hazards, including but not limited to:

(1) Tools and equipment, including deck machinery, rigging, welding and cutting, hand tools, ladders, and abrasive wheel machinery found on board the vessel;

(2) Slips, trips, and falls;

(3) Working aloft;

(4) Hazardous materials;

(5) Confined space entry;

(6) Blood-borne pathogens and other biological hazards;

(7) Electrical;

(8) Noise;

(9) Falls overboard;

(10) Vessel embarkation and disembarkation (including pilot transfers);

(11) Towing gear, including winches, capstans, wires, hawsers and other related equipment;

(12) Personal hygiene;

(13) Sanitation and safe food handling; and

(14) Potable water supply.

(b) As far as practicable, the owner or managing operator must implement other types of safety control measures before relying on Personal Protective Equipment. These controls may include administrative, engineering, source modification, substitution, process change or controls, isolation, ventilation, or other controls.

§ 140.515 Training requirements.

(a) All crewmembers must be provided with health and safety information and training that includes:

(1) Content and procedures of the owner or managing operator's health and safety plan;

(2) Procedures for reporting unsafe conditions;

(3) Proper selection and use of PPE appropriate to the vessel operation;

(4) Safe use of equipment including deck machinery, rigging, welding and cutting, hand tools, ladders, and abrasive wheel machinery found onboard the vessel;

(5) Hazard communication and cargo knowledge;
(6) Safe use and storage of hazardous materials and chemicals;
(7) Confined space entry;
(8) Respiratory protection; and
(9) Lockout/Tagout procedures.
(b) Individuals, other than crewmembers, must be provided with sufficient information or training on hazards relevant to their potential exposure on or around the vessel.
(c) Crewmember training required by this section must be conducted as soon as practicable, but not later than 5 days after employment.
(d) Refresher training must be repeated annually and may be conducted over time in modules covering specific topics. Refresher training may be less comprehensive, provided that the information presented is sufficient to provide employees with continued understanding of workplace hazards. The refresher training of persons subject to this subpart must include the information and training prescribed in this section.
(e) The owner, managing operator, or master must determine the appropriate training and information to provide to each individual permitted on the vessel who is not a crewmember, relative to the expected risk exposure of the individual.
(f) All training required in this section must be documented in owner or managing operator's records.

Subpart F—Vessel Operational Safety

§ 140.600 Applicability.

This subpart applies to all towing vessels unless otherwise specified. Certain vessels remain subject to the navigation safety regulations in 33 CFR part 164.

§ 140.605 Vessel stability.

(a) Prior to getting underway, and at all other times necessary to ensure the safety of the vessel, the master or officer in charge of a navigational watch must determine whether the vessel complies with all stability requirements in the vessel's trim and stability book, stability letter, COI, and Load Line Certificate, as applicable.
(b) A towing vessel must be maintained and operated so the watertight integrity and stability of the vessel are not compromised.

§ 140.610 Hatches and other openings.

(a) All towing vessels must be operated in a manner that minimizes the risk of down-flooding and progressive flooding.
(b) The master must ensure that all hatches, doors, and other openings designed to be watertight or weathertight function properly.
(c) The master or officer in charge of a navigational watch must ensure all hatches and openings of the hull and deck are kept tightly closed except:
(1) When access is needed through the opening for transit;
(2) When operating on rivers with a tow, if the master determines the safety of the vessel is not compromised; or
(3) When operating on lakes, bays, and sounds, without a tow during calm weather, and only if the master determines that the safety of the vessel is not compromised.
(d) Where installed, all watertight doors in watertight bulkheads must be closed during the operation of the vessel, unless they are being used for transit between compartments; and
(e) When downstreaming, all exterior openings at the main deck level must be closed.
(f) Decks and bulkheads designed to be watertight or weathertight must be maintained in that condition.

§ 140.615 Examinations and tests.

(a) This section applies to a towing vessel not subject to 33 CFR 164.80.
(b) Prior to getting underway, the master or officer in charge of a navigational watch of the vessel must examine and test the steering gear, signaling whistle, propulsion control, towing gear, navigation lights, navigation equipment, and communication systems of the vessel. This examination and testing does not need to be conducted more than once in any 24-hour period.
(c) The results of the examination and testing must be recorded in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel.

§ 140.620 Navigational safety equipment.

(a) This section applies to a towing vessel not subject to the requirements of 33 CFR 164.82.

(b) The owner, managing operator, or master of each towing vessel must maintain the required navigational-safety equipment in a fully-functioning, operational condition.

(c) Navigational safety equipment such as radar, gyrocompass, echo depth-sounding or other sounding device, automatic dependent surveillance equipment, or navigational lighting that fails during a voyage must be repaired at the earliest practicable time. The owner, managing operator, or master must consider the state of the equipment (along with such factors as weather, visibility, traffic, and the dictates of good seamanship) when deciding whether it is safe for the vessel to proceed.

(d) The failure and subsequent repair or replacement of navigational safety equipment must be recorded. The record must be made in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel.

§ 140.625 Navigation underway.

(a) At all times, the movement of a towing vessel and its tow must be under the direction and control of a master or mate (pilot) properly licensed under subchapter B of this chapter.

(b) The master or officer in charge of a navigational watch must operate the vessel in accordance with the conditions and restrictions stated on the COI and the TSMS applicable to the vessel.

Note to § 140.625. Certain towing vessels subject to § 140.625 are also subject to the requirements of 33 CFR 164.78.

§ 140.630 Lookout.

(a) Throughout the trip or voyage the master and officer in charge of the navigational watch must assess the requirement for a lookout, consistent with 33 CFR 83.05. A lookout in addition to the master or mate (pilot) should be added when necessary to:

(1) Maintain a state of vigilance with regard to any significant change in the operational environment;

(2) Assess the situation and the risk of collision/allision;

(3) Anticipate stranding and other dangers to navigation; and

(4) Detect any other potential hazards to safe navigation.

(b) In determining the requirement for a lookout, the officer in charge of the navigational watch must take full account of relevant factors including, but not limited to: state of weather, visibility, traffic density, proximity of dangers to navigation, and the attention necessary when navigating in areas of increased vessel traffic.

§ 140.635 Navigation assessment.

(a) The officer in charge of a navigational watch must conduct a navigation assessment for the intended route and operations prior to getting underway. The navigation assessment must incorporate the requirements of pilothouse resource management of § 140.640, assess operational risks, and anticipate and manage workload demands. At a minimum, this assessment must consider:

(1) The velocity and direction of currents in the area being transited;

(2) Water depth, river stage, and tidal state along the route and at mooring location;

(3) Prevailing visibility and weather conditions and changes anticipated along the intended route;

(4) Density (actual and anticipated) of marine traffic;

(5) The operational status of pilothouse instrumentation and controls, to include alarms, communication systems, variation and deviation errors of the compass, and any known nonconformities or deficiencies;

(6) Air draft relative to bridges and overhead obstructions taking tide and river stage into consideration;

(7) Horizontal clearance, to include bridge transits;

(8) Lock transits;

(9) Navigation hazards such as logs, wrecks or other obstructions in the water;

(10) Any broadcast notice to mariners, safety or security zones or special navigation areas;

(11) Configuration of the vessel and tow, including handling characteristics, field of vision from the pilothouse, and activities taking place onboard;

(12) The knowledge, qualifications, and limitations of crewmembers who are assigned as members on watch and the experience and familiarity of crewmembers with the towing vessels particulars and equipment; and

(13) Any special conditions not covered above that impact the safety of navigation.

(b) The officer in charge of a navigational watch must keep the navigation assessment up-to-date to reflect changes in conditions and circumstances. This includes updates during the voyage or trip as necessary. At each change of the navigational watch, the oncoming officer in charge of the navigational watch must review the current navigation assessment for necessary changes.

(c) The officer in charge of a navigational watch must ensure that the navigation assessment and any updates are communicated to other members of the navigational watch.

(d) A navigation assessment entry must be recorded in the TVR, official log, or in accordance with the TSMS applicable to the vessel. The entry must include the date and time of the assessment, the name of the individual making the assessment, and the starting and ending points of the voyage or trip that the assessment covers.

Note to §140.635. Certain towing vessels subject to §140.635 are also subject to the voyage planning requirements of 33 CFR 164.80.

§140.640 Pilothouse resource management.

(a) The officer in charge of a navigational watch must:

(1) Ensure that other members of the navigational watch have a working knowledge of the navigation assessment required by §140.635, and understand the chain of command, the decision-making process, and the fact that information sharing is critical to the safety of the vessel.

(2) Ensure that the navigation assessment required by §140.635 is complete, updated, communicated and available throughout the trip.

(3) Ensure that watch change procedures incorporate all items listed in paragraph (a)(1) of this section.

(4) Take actions (to include delaying watch change or pausing the voyage) if there is reasonable cause to believe that an oncoming watchstander is not immediately capable of carrying out his or her duties effectively.

(5) Maintain situational awareness and minimize distractions.

(b) Prior to assuming duties as officer in charge of a navigational watch, a person must:

(1) Complete the navigation assessment required by §140.635;

(2) Verify the operational condition of the towing vessel; and

(3) Verify that there are adequate personnel available to assume the watch.

(c) If at any time the officer in charge of a navigational watch is to be relieved when a maneuver or other action to avoid any hazard is taking place, the relief of that officer in charge of a navigational watch must be deferred until such action has been completed.

§140.645 Navigation safety training.

(a) Prior to assuming duties related to the safe operation of a towing vessel, each crewmember must receive training to ensure that they are familiar with:

(1) Watchstanding terms and definitions;

(2) Duties of a lookout;

(3) Communication with other watchstanders;

(4) Change of watch procedures;

(5) Procedures for reporting other vessels or objects; and

(6) Watchstanding safety.

(b) Crewmember training must be recorded in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel.

(c) Credentialed mariners holding Able Seaman or officer endorsements will be deemed to have met the training requirements in this section.

§140.650 Operational readiness of lifesaving and fire suppression and detection equipment.

The owner, managing operator, or master of a towing vessel must ensure

that the vessel's lifesaving and fire suppression and detection equipment complies with the applicable requirements of parts 141 and 142 of this subchapter and is in good working order.

§ 140.655 Prevention of oil and garbage pollution.

(a) Each towing vessel must be operated in compliance with:

(1) Applicable sections of the Federal Water Pollution Control Act, including section 311 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1321);

(2) Applicable sections of the Act to Prevent Pollution from Ships (33 U.S.C. 1901 *et seq.*); and

(3) Parts 151, 155, and 156, of 33 CFR, as applicable.

(b) Each towing vessel must be capable of preventing all oil spills from reaching the water during transfers by:

(1) Pre-closing the scuppers/freeing ports, if the towing vessel is so equipped;

(2) Using fixed or portable containment of sufficient capacity to contain the most likely spill, if 33 CFR 155.320 does not apply; or

(3) Pre-deploying sorbent material on the deck around vents and fills.

(c) No person may intentionally drain oil or hazardous material into the bilge of a towing vessel from any source. For purposes of this section, ''oil'' has the same meaning as ''oil'' defined in 33 U.S.C. 1321.

§ 140.660 Vessel security.

Each towing vessel must be operated in compliance with:

(a) The Maritime Transportation Security Act of 2002 (46 U.S.C. Chapter 701); and

(b) 33 CFR parts 101 and 104, as applicable.

§ 140.665 Inspection and testing required when making alterations, repairs, or other such operations involving riveting, welding, burning, or like fire-producing actions.

(a) The inspections and issuance of certificates required by this section must be conducted in accordance with the provisions of NFPA 306 (incorporated by reference, see §136.112 of this subchapter) before alterations, repairs, or other operations involving riveting, welding, burning, or other fire producing actions may be made aboard a vessel.

(b) Until an inspection has been made to determine that such operation can be undertaken with safety, no alterations, repairs, or other such operations involving riveting, welding, burning, or like fire-producing actions must be made:

(1) Within or on the boundaries of cargo tanks which have been used to carry combustible liquid or chemicals in bulk;

(2) Within or on the boundaries of fuel tanks; or,

(3) To pipe lines, heating coils, pumps, fittings, or other appurtenances connected to such cargo or fuel tanks.

(c) Such inspections must be made and evidenced as follows:

(1) In ports or places in the United States or its territories and possessions the inspection must be made by a marine chemist certificated by the National Fire Protection Association. However, if the services of such certified marine chemist are not reasonably available, the Officer in Charge, Marine Inspection (OCMI), upon the recommendation of the vessel owner and his or her contractor or their representative, must select a person who, in the case of an individual vessel, must be authorized to make such inspection. If the inspection indicated that such operations can be undertaken with safety, a certificate setting forth the fact in writing and qualified as may be required, must be issued by the certified marine chemist or the authorized person before the work is started. Such qualifications must include any requirements as may be deemed necessary to maintain the safe conditions in the spaces certified throughout the operation and must include such additional tests and certifications as considered required. Such qualifications and requirements must include precautions necessary to eliminate or minimize hazards that may be present from protective coatings or residues from cargoes.

(2) When not in such a port or place, and a marine chemist or such person authorized by the OCMI, is not reasonably available, the inspection must be made by the master or person in charge

and a proper entry must be made in the vessel's logbook.

(d) The master or person in charge must secure copies of certificates issued by the certified marine chemist or such person authorized by the OCMI. The master or person in charge must maintain a safe condition on the vessel by full observance of all qualifications and requirements listed by the marine chemist or person authorized by the OCMI in the certificate.

§ 140.670 Use of auto pilot.

Except for towing vessels in compliance with requirements in 33 CFR 164.13(d), when an automatic pilot is used in areas of high traffic density, conditions of restricted visibility, or any other hazardous navigational situations, the master must ensure that:

(a) It is possible to immediately establish manual control of the ship's steering;

(b) A competent person is ready at all times to take over steering control; and

(c) The changeover from automatic to manual steering and vice versa is made by, or under, the supervision of the officer in charge of the navigational watch.

Subpart G—Navigation and Communication Equipment

§ 140.700 Applicability.

This subpart applies to all towing vessels unless otherwise specified. Certain towing vessels are also subject to the navigation safety regulations in 33 CFR part 164.

§ 140.705 Charts and nautical publications.

(a) This section applies to a towing vessel not subject to the requirements of 33 CFR 164.72.

(b) A towing vessel must carry adequate and up-to-date charts, maps, and nautical publications for the intended voyage, including:

(1) Charts, including electronic charts acceptable to the Coast Guard, of appropriate scale to make safe navigation possible. Towing vessels operating on the Western Rivers must have maps of appropriate scale issued by the Army Corps of Engineers or a river authority;

(2) ''U.S. Coast Pilot'' or similar publication;

(3) Coast Guard light list; and

(4) Towing vessels that operate the Western Rivers must have river stage(s) or Water Surface Elevations as appropriate to the trip or route, as published by the U.S. Army Corps of Engineers or a river authority, must be available to the person in charge of the navigation watch.

(c) Extracts or copies from the publications listed in paragraph (b) of this section may be carried, so long as they are applicable to the route.

§ 140.710 Marine radar.

Requirements for marine radar are set forth in 33 CFR 164.72.

§ 140.715 Communications equipment.

(a) Towing vessels must meet the communications requirements of 33 CFR part 26 and 33 CFR 164.72, as applicable.

(b) Towing vessels not subject to the provisions of 33 CFR part 26 or 33 CFR 164.72 must have a Very High Frequency-Frequency Modulated (VHF–FM) radio installed and capable of monitoring VHF–FM Channels 13 and 16, except when transmitting or receiving traffic on other VHF–FM channels, when participating in a Vessel Traffic Service (VTS), or when monitoring a channel of a VTS. The VHF–FM radio must be installed at each operating station and connected to a functioning battery backup.

(c) All towing vessels must have at least one properly operating handheld VHF–FM radio in addition to the radios otherwise required.

§ 140.720 Navigation lights, shapes, and sound signals.

Each towing vessel must be equipped with navigation lights, shapes, and sound signals in accordance with the International Regulations for Prevention of Collisions at Sea (COLREGS) or 33 CFR part 84 as appropriate to its area of operation.

§ 140.725 Additional navigation equipment.

Towing vessels must be equipped with the following equipment, as applicable to the area of operation:

(a) Fathometer (except Western Rivers).

(b) Search light, controllable from the vessel's operating station and capable of illuminating objects at a distance of at least two times the length of the tow.

(c) Electronic position-fixing device, satisfactory for the area in which the vessel operates, if the towing vessel engages in towing seaward of the navigable waters of the U.S. or more than 3 nautical miles from shore on the Great Lakes.

(d) Illuminated magnetic compass or an illuminated swing-meter (Western Rivers vessels only). The compass or swing-meter must be readable from each operating station.

Note to §140.725. Certain towing vessels subject to §140.725 are also subject to the requirements of 33 CFR 164.72 and Automatic Identification System requirements of 33 CFR 164.46.

Subpart H—Towing Safety

§ 140.800 Applicability.

This subpart applies to all towing vessels unless otherwise specified. Certain vessels are also subject to the navigation safety regulations in 33 CFR parts 163 and 164.

§ 140.801 Towing gear.

The owner, managing operator, master or officer in charge of a navigational watch of a towing vessel must ensure the following:

(a) The strength of each component used for securing the towing vessel to the tow and for making up the tow is adequate for its intended service.

(b) The size, material, and condition of towlines, lines, wires, push gear, cables, and other rigging used for making up a tow or securing the towing vessel to a tow must be appropriate for:

(1) The horsepower or bollard pull of the vessel;

(2) The static loads and dynamic loads expected during the intended service;

(3) The environmental conditions expected during the intended service; and

(4) The likelihood of mechanical damage.

(c) Emergency procedures related to the tow have been developed and appropriate training provided to the crew for carrying out their emergency duties.

§ 140.805 Towing safety.

Prior to getting underway, and giving due consideration to the prevailing and expected conditions of the trip or voyage, the officer in charge of the navigational watch for a towing vessel must ensure that:

(a) The barges, vessels, or objects making up the tow are properly configured and secured;

(b) Equipment, cargo, and industrial components on board the tow are properly secured and made ready for transit;

(c) The towing vessel is safely and securely made up to the tow; and

(d) The towing vessel has appropriate horsepower or bollard pull and is capable of safely maneuvering the tow.

§ 140.820 Recordkeeping for towing gear.

(a) The results of the inspections required by 33 CFR 164.76 must be documented in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel.

(b) A record of the type, size, and service of each towline, face wire, and spring line, used to make the towing vessel fast to her tow, must be available to the Coast Guard or third-party auditor for review. The following minimum information is required in the record: The dates when examinations were performed, the identification of each item of towing gear examined, and the name(s) of the person(s) conducting the examinations.

Subpart I—Vessel Records

§ 140.900 Marine casualty reporting.

Each towing vessel must comply with the requirements of part 4 of this chapter for reporting marine casualties and retaining voyage records.

§ 140.905 Official logbooks.

(a) A towing vessel of the United States, except one on a voyage from a port in the United States to a port in Canada, is required by 46 U.S.C. 11301 to have an official logbook if the vessel is:

(1) On a voyage from a port in the United States to a foreign port; or

(2) Of at least 100 gross tons and on a voyage between a port in the United States on the Atlantic Ocean and one on the Pacific Ocean.

(b) The Coast Guard furnishes, without fee, to masters of vessels of the United States, the official logbook as Form CG–706B or CG–706C, depending on the number of persons employed as crew. The first several pages of this logbook list various acts of Congress governing logbooks and the entries required in them.

(c) When a voyage is completed, or after a specified time has elapsed, the master must file the official logbook containing required entries with the cognizant OCMI at or nearest the port where the vessel may be.

§ 140.910 Towing vessel record or record specified by TSMS.

(a) This section applies to a towing vessel other than a vessel operating only in a limited geographic area or a vessel required by § 140.905 to maintain an official logbook.

(b) A towing vessel subject to this section must maintain a TVR or in accordance with the TSMS applicable to the towing vessel.

(c) The TVR must include a chronological record of events as required by this subchapter. The TVR may be electronic or paper.

(d) Except as required by §§ 140.900 and 140.905, records do not need to be filed with the Coast Guard, but must be kept available for review by the Coast Guard upon request. Records, unless required to be maintained for a longer period by statute or other federal regulation, must be retained for at least 1 year after the date of the latest entry.

§ 140.915 Items to be recorded.

(a) The following list of items must be recorded in the TVR, official logbook, or in accordance with the TSMS applicable to the vessel:

(1) Personnel records, in accordance with § 140.400;

(2) Safety orientation, in accordance with § 140.410;

(3) Record of drills and instruction, in accordance with § 140.420;

(4) Examinations and tests, in accordance with § 140.615;

(5) Operative navigational safety equipment, in accordance with § 140.620;

(6) Navigation assessment, in accordance with § 140.635;

(7) Navigation safety training, in accordance with § 140.645;

(8) Oil residue discharges and disposals, in accordance with § 140.655;

(9) Record of inspection of towing gear, in accordance with § 140.820; and

(10) Fire-detection and fixed fire-extinguishing, in accordance with § 142.240.

(b) For the purposes of this subchapter, if items are recorded electronically in a TVR or other record as specified by the TSMS applicable to the towing vessel, these electronic entries must include the date and time of entry and name of the person making the entry. If after an entry has been made, someone responsible for entries determines there is an error in an entry, any entries to correct the error must include the date and time of entry and name of the person making the correction and must preserve a record of the original entry being corrected.

Note to § 140.915. For towing vessels subject to 46 U.S.C. 11301, there are statutory requirements in that U.S. Code section for additional items that must be entered in the official logbook. Regarding requirements outside this subchapter, such as requirements in 33 CFR 151.25 to make entries in an oil record book, § 140.915 does not change those requirements.

Subpart J—Penalties

§ 140.1000 Statutory penalties.

Violations of the provisions of this subchapter will subject the violator to the applicable penalty provisions of Subtitle II of Title 46, and Title 18, United States Code.

§ 140.1005 Suspension and revocation.

An individual is subject to proceedings under the provisions of 46 U.S.C. 7703 and 7704, and part 5 of this chapter with respect to suspension or revocation of a license, certificate, document, or credential if the individual holds a license, certificate of registry, merchant mariner document, or merchant mariner credential and:

(a) Commits an act of misconduct, negligence or incompetence;

(b) Uses or is addicted to a dangerous drug; or

(c) Violates or fails to comply with this subchapter or any other law or regulation intended to promote marine safety; or

(d) Becomes a security risk, as described in 46 U.S.C. 7703.

PART 141—LIFESAVING

Subpart A—General

Subpart B—General Requirements for Towing Vessels

Subpart C—Lifesaving Requirements for Towing Vessels

AUTHORITY: 46 U.S.C. 3103, 3301, 3306, 3308, 3316, 8104, 8904; 33 CFR 1.05; DHS Delegation 0170.1.

SOURCE: USCG–2006–24412, 81 FR 40101, June 20, 2016, unless otherwise noted.

Subpart A—General

§ 141.100 Purpose.

This part contains requirements for lifesaving equipment, arrangements, systems, and procedures on towing vessels.

§ 141.105 Applicability and delayed implementation for existing vessels.

(a) This part applies to all towing vessels subject to this subchapter.

(1) An existing towing vessel must comply with the requirements in this part no later than either July 20, 2018 or the date the vessel obtains a Certificate of Inspection (COI), whichever date is earlier.

(2) The delayed implementation provisions in paragraph (a)(1) of this section do not apply to a new towing vessel.

(b) A towing vessel on an international voyage, subject to SOLAS (incorporated by reference, see § 136.112 of this subchapter), must meet the applicable requirements in subchapter W of this chapter.

(c) Towing vessels in compliance with SOLAS Chapter III will be deemed in compliance with this part.

Subpart B—General Requirements for Towing Vessels

§ 141.200 General provisions.

(a) Unless otherwise specified, all lifesaving equipment must be approved by the Commandant under the approval series specified in each section. Lifesaving equipment for personal use which is not required by this part need not be approved by the Commandant.

(b) A listing of approved equipment and materials may be found at *https://cgmix.uscg.mil/equipment*. Each cognizant Officer in Charge, Marine Inspection (OCMI) may be contacted for information concerning approved equipment and materials.

(c) Equipment requirements are based on the area in which a towing vessel is operating, not the route for

FEDERAL REGISTER

Vol. 81 Monday,
No. 118 June 20, 2016

Part II

Department of Homeland Security

Coast Guard

46 CFR Parts 1, 2, 15, et al.
Inspection of Towing Vessels; Final Rule

One commenter felt that if the language in § 140.210(d) is intended for crew members who are responsible for maintaining a vessel's COI, then the Coast Guard should require that the vessel's TSMS contain a provision requiring that crew members receive training on how to complete the tasks assigned to them by the TSMS and how to comply with the COI.

The Coast Guard proposed in § 138.220(b)(2)(ii) that the TSMS contain a policy relating to training personnel in ''duties associated with the execution of the TSMS.'' The Coast Guard believes that this requirement is sufficient to ensure that crew members are aware of their duties under the TSMS. We have made no changes from the proposed rule based on this comment.

A company suggested that the term ''pilot'' would be more appropriate instead of ''mate'' in § 140.210(c). Another commenter suggested that ''mate (pilot)'' be deleted from § 140.210(c) because its current use suggested that the mate and master were equal, rather than the master having the ultimate authority on the ship. Alternatively, the commenter suggested that language be added to § 140.210(c) stating that the mate must inform the master before deviating from the COI if time and circumstances permit.

The Coast Guard recognizes that throughout the diverse towing industry there are differences in terminology, including in the use of ''pilot'' or ''mate.'' For purposes of consistency with other sections, the Coast Guard has chosen to use the terms ''master or mate (pilot)'' in this rule, or ''officer in charge of a (or the) navigational watch'' as appropriate, as they are the most common currently applied terms in related regulations and policy, including manning regulations in 46 CFR part 15. The Coast Guard does not agree with the comment about ''mate (pilot)'' because we are simply referring to the responsibility of the person in charge of the navigational watch. The Master retains overall responsibility for the safety of the towing vessel as prescribed in § 140.210(a). We have made no changes from the proposed rule based on this comment.

We received two comments suggesting the development of a policy to restrict the use of cell phones and other non-essential electronic devices by pilothouse watchstanders.

The Coast Guard has added language in § 140.210(d) requiring the crew to minimize distractions when performing duties. This amendment is intended to prevent the non-essential use of cell phones and other distractions that take away from a crewmember's situational awareness. Given the commenters' focus on pilothouse watchstanders, we have amended § 140.640 to expressly require the officer in charge of a navigational watch to maintain situational awareness and minimize distractions.

We received two comments suggesting that either the word ''lookout'' be deleted from § 140.400(c), or that the word be changed to the phrase ''supplemental lookout.'' They argued that the term ''lookout'' was superfluous because the master or mate serves as his or her own lookout.

The Coast Guard is requiring in § 140.400 that a record be maintained for all watchstanders going on and off watch. Lookouts are added by the master or mate (pilot) under the provisions of § 140.630. This does not preclude the Master or Mate (Pilot) from acting as a lookout, when appropriate. Section 140.400 requires that lookouts and all other members of the navigation watchstanding team must have times of service entered and recorded. Our addition of ''officer in charge of a navigational watch'' to the list of watchstanders does not change our need to include lookouts.

We received comments from an individual and an association who recommended that the Coast Guard should require that any mariner, engineer, or watchstander that works in the engine room, or near machinery, be provided with initial safety training and additional training on the operation and maintenance of installed machinery prior to beginning work in these areas.

In §§ 140.410(b)(10) and 140.515, the Coast Guard specifically requires safety orientation training on the awareness of and expected response to any hazards inherent to the operation of the towing vessel which may pose a threat to life, property, or the environment. Section 15.405 of 46 CFR requires that crewmembers be familiar with the relevant characteristics of the vessel prior to assuming their duties and responsibilities, including the main propulsion and auxiliary machinery, such as steering gear systems and controls. We have amended §§ 140.405 and 140.410 to note that personnel must meet the requirements in §§ 15.405 and 15.1105 as appropriate. In § 140.405, we also added threats to the environment during an emergency as situations when the duties and duty stations of each person onboard must be identified; this amendment is consistent with general vessel operation objectives stated in § 140.205(a).

Under §§ 140.510 and 140.515, it is the responsibility of the owner or managing operator to identify the unique training required to mitigate the risk to the specific machinery and operating equipment aboard each particular towing vessel.

Several commenters suggested that proposed § 140.415 include the following text in the ''reserved'' paragraph: ''A safety orientation need not be provided to an individual that is not a crewmember if that individual is accompanied while on board the towing vessel by a crewmember who is familiar with the items specified in § 140.415(a).''

The Coast Guard does not agree. The Coast Guard believes it is unreasonable to assume that during an emergency the escorting crewman would have no other responsibilities or duties other than escorting the individual at all times while aboard the vessel. The Coast Guard believes that a safety orientation for individuals visiting the vessel would not place an undue burden in terms of time or distraction. The Coast Guard has made no changes from the proposed rule based on these comments. However, note that for simplicity we have removed the ''reserved'' paragraph, made the previous paragraph (a) into introductory text, and made the previous subparagraphs of (a) into paragraphs (a) through (d), as appropriate.

One commenter asked for clarity regarding specific drills and training that would be required in § 140.420(a), and thought that the requirement of drills to respond to ''other threats to life, property, or the environment'' was too ambiguous. Another noted that additional requirements for first-aid trainings should be included in the regulation.

The Coast Guard in § 140.420(a) provided specific emergency drills that must be performed. This includes abandoning the vessel, recovering persons from the water, responding to onboard fires and flooding, or responding to other threats to life, property, or the environment. The owner or managing operator is responsible for identifying any other additional training and drills required in addition to the above identified requirements based on the specific intended service of their vessels. This may be covered by the required risk assessment for TSMS vessels.

The Coast Guard has made no changes from the proposed rule based on these comments.

We received a recommendation for text additions to proposed § 140.420 that included the option for ''e-learning'' for emergency drills and trainings. The commenters suggested that the Coast Guard not require follow-

II. Accident Investigations

a. NTSB Investigation – USCG Vessel *CG 33118* and Sea Ray Recreational Vessel
b. NTSB Investigation – Tugboat/Barge *Caribbean Sea/The Resource* with Amphibious Passenger Vehicle *DUKW 34*

Collision Between U.S. Coast Guard Vessel *CG 33118* and Sea Ray Recreational Vessel CF 2607 PZ San Diego Bay, California December 20, 2009

Accident Report

NTSB/MAR-11/03
PB2011-916403

National Transportation Safety Board

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NTSB/MAR-11/03
PB2011-916403
Notation 8193A
Adopted July 12, 2011

Marine Accident Report

Collision Between U.S. Coast Guard Vessel *CG 33118*
and Sea Ray Recreational Vessel CF 2607 PZ
San Diego Bay, California
December 20, 2009

National Transportation Safety Board

490 L'Enfant Plaza, SW
Washington, DC 20594

National Transportation Safety Board. 2011. *Collision Between U.S. Coast Guard Vessel* CG 33118 *and Sea Ray Recreational Vessel CF 2607 PZ, San Diego Bay, California, December 20, 2009*. Marine Accident Report NTSB/MAR-11/03. Washington, DC.

Abstract: This report discusses the December 20, 2009, collision on San Diego Bay, California, between the 33-foot-long U.S. Coast Guard special purpose craft – law enforcement (SPC-LE) *CG 33118* and an unnamed 24-foot-long Sea Ray recreational boat with California registration CF 2607 PZ. As a result of the accident, an 8-year-old passenger on board the Sea Ray died. Safety issues identified in this accident include the speed of the *CG 33118*, Coast Guard oversight of small boat operations, SPC-LE forward visibility, Coast Guard monitoring of small boat operational data, and Coast Guard use of personal cell phones while under way. On the basis of its findings, the NTSB made recommendations to the Coast Guard.

Contents

Figures

Acronyms and Abbreviations

ABYC	American Boat and Yacht Council
AIS	automatic identification system
AOR	area of responsibility
BCEB	boat crew examination board
CBL	cutter boat large
CPR	cardiopulmonary resuscitation
DGPS	differential global positioning system
DHS	U.S. Department of Homeland Security
FAA	Federal Aviation Administration
GAR	green-amber-red (risk assessment)
HF-SSB	high frequency-single sideband
IAP	incident action plan
ISO	International Organization for Standardization
JHOC	Joint Harbor Operations Center
MAIT	Multidisciplinary Accident Investigation Team
MARB	marine assistance radio broadcast
MISLE	Marine Information for Safety and Law Enforcement
nm	nautical mile
OIC/OINC	officer-in-charge
RBS	response boat small
RFO	Ready for Operations
SINS	scalable integrated navigation system
SDHP	San Diego Harbor Police
SPC-LE	special purpose craft – law enforcement
STAN	Coast Guard Standardization
TCT	team coordination training
UCSD	University of California San Diego
USCG	U.S. Coast Guard
UHF	ultra high frequency

UTB	utility boat big
UTL	utility boat light
VHF	very high frequency

Executive Summary

On Sunday, December 20, 2009, about 1744 Pacific standard time,[1] the 33-foot-long Coast Guard vessel *CG 33118*, designated by the Coast Guard as a "special purpose craft – law enforcement" or SPC-LE, with five crewmembers on board, collided with a 24-foot-long Sea Ray recreational vessel with state registration number CF 2607 PZ, carrying 13 people, on San Diego Bay, California. The collision occurred during the city's annual holiday boat parade, the Parade of Lights. The Sea Ray was headed west near the main shipping channel[2] to enable the occupants to watch the boat parade. The *CG 33118*, on patrol in the bay, was also headed west, its crew responding to a reported grounding. The *CG 33118* struck and overran the Sea Ray's stern near the west end of Harbor Island. As a result of the collision, an 8-year-old boy on board the Sea Ray was fatally injured and four other people on board sustained serious injuries. No *CG 33118* crewmembers were injured in the accident.

Following the collision, drug and alcohol testing was performed on *CG 33118* crewmembers, and all results were negative. The Sea Ray operator voluntarily submitted to drug and alcohol testing, and the results of his tests were negative as well.

The National Transportation Safety Board determines that the probable cause of the collision between the *CG 33118* and the Sea Ray was the failure of the *CG 33118* crew to see and avoid the Sea Ray because of the excessive speed at which the coxswain operated the *CG 33118*, given the prevailing darkness, background lighting, and high vessel density, and the U.S. Coast Guard's lack of effective oversight of its small boat operations both nationally and at Coast Guard Station San Diego.

Safety issues in this accident include the speed of the *CG 33118*, Coast Guard oversight of small boat operations, Coast Guard monitoring of small boat operational data, SPC-LE forward visibility, and Coast Guard use of personal cell phones while under way. As a result of this investigation, the NTSB makes recommendations to the Coast Guard.

[1] Unless noted otherwise, all times in this report are Pacific standard time (universal time coordinated –8 [UTC-8]) based on the 24-hour clock.

[2] The main shipping channel runs roughly east-west and is marked by lighted red and green buoys.

1 Factual Information

1.1 Parade of Lights

Each December, the on-water holiday event Parade of Lights takes place on San Diego Bay. The event attracts hundreds of boaters who watch the festivities from their vessels, ranging from small dinghies, kayaks, and canoes to large yachts and commercial vessels. Vessel traffic during the Parade of Lights is typically higher than on almost any other night on San Diego Bay, except perhaps July 4th. The Parade of Lights is held on successive Sunday nights, and the 38th annual event was scheduled for December 13 and 20, 2009. Both days' events featured a fireworks display at 1730 followed by a parade of more than 80 decorated boats on San Diego Bay. The event organizer had obtained a marine event permit, issued by the U.S. Coast Guard Sector San Diego, which authorized the festivities.[3] In addition to the boats participating in the parade, organizers estimated an additional 100 spectator vessels. The Coast Guard's captain of the port for San Diego issued a notice of enforcement for a "special local regulation"[4] for the Parade of Lights.

The parade was to begin at the south end of Shelter Island on the west side of the bay, then turn northeast and east and run parallel to Harbor Island to the east side of the bay and then south along the downtown waterfront. The trackline was about 5 miles long and ran along the shores of Shelter, Harbor, and North islands (**figure 1**). A Coast Guard Local Notice to Mariners[5] warned boaters to use "due caution" when transiting near the designated parade area.

[3] Sector San Diego has authority, including captain of the port authority, for safety within the southern California coast that includes San Diego Bay (33 *Code of Federal Regulations* [CFR] 3.55-15). Several Coast Guard stations, including Station San Diego, are responsible to Sector San Diego for certain duties, including operation of small boats. Coast Guard small boats are vessels less than 65 feet in length.

[4] The special local regulation area for the parade included most of San Diego Bay. The notice contained no spectator craft viewing areas or operating restrictions other than to not impede the parade.

[5] A Local Notice to Mariners may be issued to specify a temporary safety zone for marine events and other on-water operations for safety or environmental purposes.

Figure 1. Aerial photo of San Diego Bay. The yellow line shows the Parade of Lights trackline.

The Coast Guard established an incident action plan (IAP) for the Parade of Lights, which stated in part that Coast Guard vessels assigned to the event would "provide for an overt and aggressive waterborne presence" between 1730 and 2000 on both days of the parade. This was to keep boaters clear of the fireworks barge and to avoid their interfering with the lighted boats in the parade. Several Coast Guard Auxiliary[6] vessels also were assigned to assist in the event. The 87-foot-long Coast Guard cutter *Haddock* was the first vessel in the parade. San Diego Harbor Police (SDHP), which normally had two vessels patrolling the bay at all times, had four boats on patrol that night. The SDHP and the Coast Guard shared law enforcement activities on San Diego Bay. The IAP also stated that any injuries were to be reported to the Joint Harbor Operations Center (JHOC).[7]

1.2 Accident Narrative

1.2.1 Sea Ray

About 1715, the 24-foot-long Sea Ray recreational boat (**figure 2**) left its berth at the Harbor West Marina located at the west end of Harbor Island. On board were three families: the operator, his wife, and three children; and two other couples with two children each. In total, 13 people were on board. After departing the marina, the Sea Ray operator proceeded along Harbor

[6] The Coast Guard Auxiliary is an incorporated civilian volunteer component of the U.S. Coast Guard.

[7] The JHOC is a command and control facility staffed by contingents of the Coast Guard, U.S. Navy, San Diego Harbor Police, and, on occasion, other Federal, state, and local government agencies. The JHOC communicates with and coordinates government vessel operations on San Diego Bay.

Island's south shore toward the east end of the island. There, he stopped the boat to watch the fireworks, which were scheduled to begin at 1730.

Figure 2. A 24-foot-long Sea Ray recreational boat similar to the one involved in the accident. Photo by Sea Ray, Inc.

After the fireworks display ended, the Sea Ray operator headed west in the bay at idle speed (about 2–4 knots) toward the west end of Harbor Island to position the vessel for viewing the boat parade. According to a passenger, the families decided that, because several young children were on board and because it was a Sunday night with school the next day, they would position themselves close to the Harbor West Marina, thus shortening the time needed to return and dock the boat after the parade.

Both the Sea Ray operator and a passenger told NTSB investigators that the boat's navigation lights, including the port and starboard running lights and the all-around light, were illuminated. The operator, SDHP officers, and other witnesses confirmed that all the children on board were wearing lifejackets.[8]

The Sea Ray operator said that when he was about three-quarters of the way to the west end of Harbor Island he heard what sounded like an engine running at high speed behind him. He estimated that about 20 other boats were within 50 yards of his location, primarily to the north, and that the other boats were drifting, idling, or at anchor. On hearing the engine sound, he looked back over his shoulder and noted that the engine sound seemed to be coming closer and that the vessel that was producing the sound had not appreciably changed course. The Sea Ray operator told investigators that, shortly before the collision, he saw the approaching vessel with red and green running lights illuminated and three people silhouetted in the pilothouse. The

[8] California state boating law requires that all children 11 years of age or younger wear a Type I, II, III, or V Coast Guard-approved lifejacket while on board a vessel that is 26 feet or less in length while the vessel is under way (<http://www.dbw.ca.gov/Pubs/Pfd/PFDs.pdf> accessed January 4, 2011). According to San Diego Harbor Police, the Sea Ray also carried lifejackets for all persons on board, as required by law.

Sea Ray operator told investigators that he saw that the approaching vessel's hull was "on the plane,"[9] and that the vessel was "dead center" off his stern. He said that he thought he needed to move his boat out of the way to avoid being struck by the oncoming vessel. He "slammed" the throttle forward and turned to starboard, but as he was starting to make the starboard turn, the oncoming vessel struck the Sea Ray's stern. The Sea Ray operator told investigators that there was no time for his boat to reach any kind of speed between the time that he accelerated and the collision. He said that his boat "did not move more than five feet, if that," and that the other vessel was closing in "very rapidly, like almost at us and then maybe a second passed and then it hit us. It was just very fast." The Sea Ray operator said that the colliding vessel had "such high speed … it literally [shot] right over the top of us."

1.2.2 *CG 33118*

The *CG 33118* (**figure 3**), which the Coast Guard designates a "special purpose craft – law enforcement" or SPC-LE, and its crew were not assigned to the Parade of Lights. The IAP for the event stated that the patrol commander could call on a station asset (such as the *CG 33118*) to support law enforcement activity; however, one was not requested.

Figure 3. SPC-LE *CG 33118*. Photo by the Coast Guard.

[9] Planing occurs when a boat's speed and hull shape generate sufficient lift to support a portion of the craft above the water. See section "Vessel Forward Visibility" for more detail.

Although Sector San Diego did not request a station asset to assist in the event, Station San Diego's operations petty officer scheduled a patrol that evening. About 1645, the five *CG 33118* crewmembers met for a briefing before their anticipated 1700 departure and patrol. The boat crew included the coxswain,[10] a second qualified boat crewmember, the boat's engineer, a crewmember-in-training, and Station San Diego's officer of the day (OOD),[11] who had elected to join the patrol. (For more information on the crew, see section "Personnel Information.") The crewmember-in-training told NTSB investigators that the coxswain led the meeting and informed the crewmembers that they might be on patrol for 3 or 4 hours. He said that although they were not officially assigned to the Parade of Lights, their stated purpose was "just going out, making sure everything's good, making sure there's no DUIs, making sure—just having an asset in the area for…general safety overall." The boat engineer told NTSB investigators that the station's "boat assignment board" assigned the *CG 33118* a patrol mission to assist the *Haddock* that night. The boat engineer told NTSB investigators that a crew meeting was held before getting under way and that it included a green-amber-red (GAR) risk assessment[12] for that mission. He said that the results of the GAR were "green" (also see section on Management/Coast Guard Operational Information, Crew Brief).

At 1723, the *CG 33118* crew notified the JHOC of its departure from Station San Diego. When the fireworks display began at 1730, the crew stopped the vessel to watch. When the display ended about 5 minutes later, the *CG 33118* proceeded toward Shelter Island on the west side of the bay where the boat parade was to start. When the *CG 33118* reached that location, the crewmembers radioed the *Haddock*'s crew, stating that they had no specific assignment related to the parade but would be nearby and could provide assistance if requested. **Figure 4** shows the approximate route of the *CG 33118* across San Diego Bay.

[10] The Coast Guard assigned coxswains the responsibility for, in order of priority, the safety and conduct of passengers and crew, safe operations and navigation of the boat, and completion of the mission. Coxswains were also to respond to hazards to life and property, violations of laws or regulations, and discrepancies to aids to navigation.

[11] At Coast Guard stations, the OOD is the direct representative of the station's officer in charge, and ensures compliance with the station's regulations and policies. Except for the executive petty officer and the engineering petty officer, all personnel at the station are subordinate to the OOD. Normally, the officer in charge assigns the senior coxswain in the duty section as OOD to oversee security, order, and supervision of personnel. Nonetheless, while underway the OOD's status is no different than that of the other crewmembers in being subordinate to the coxswain.

[12] The GAR safety risk assessment determines whether a mission should be deemed green (0–22 points, low risk), amber (23–43, medium risk, caution), or red (44–60 points, high risk).

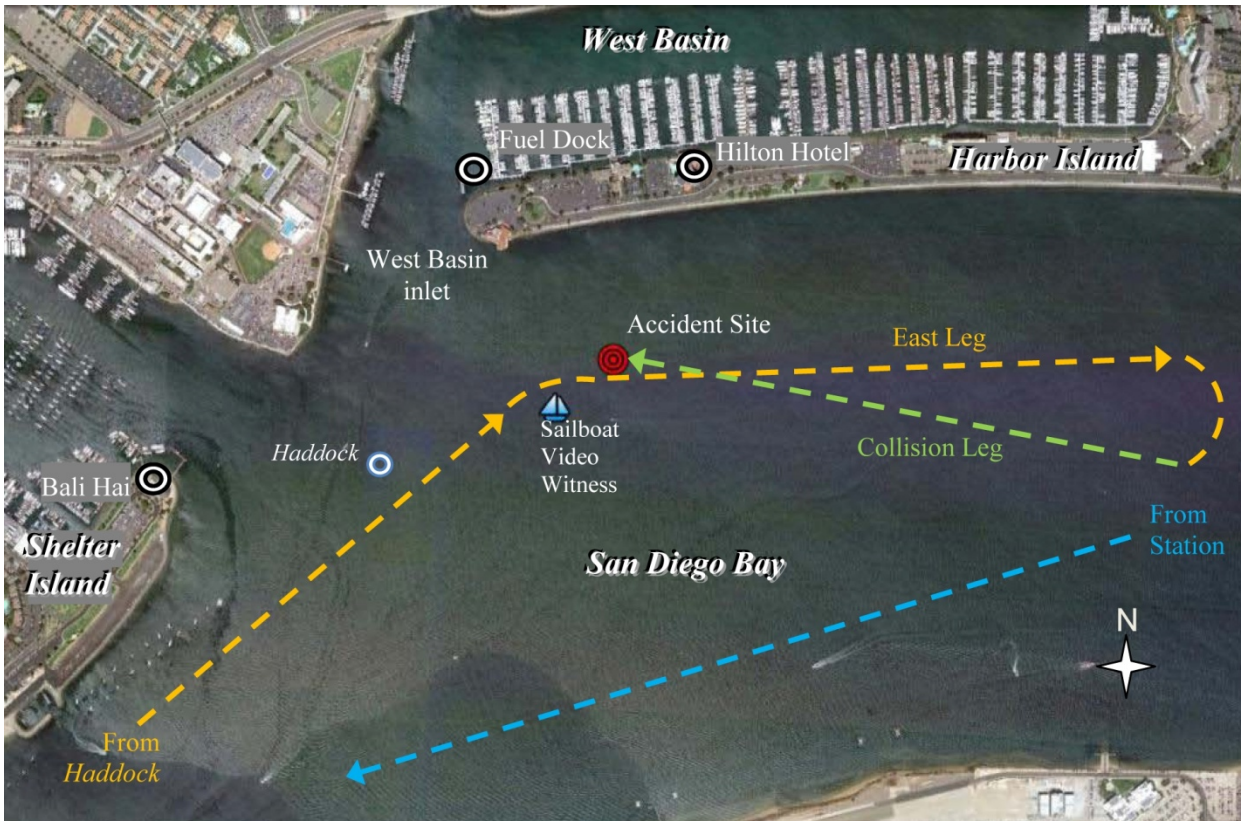


Figure 4. The path of the *CG 33118* from Station San Diego to the *Haddock*, then northeast and east across the bay, and then returning west to the accident site. Also indicated are the locations of the Coast Guard cutter *Haddock* at the time of the accident, the sailboat from which a witness filmed a video that the NTSB later used for video and sound analysis, and the Hilton Hotel from which witness photographs were taken of the accident scene.

According to the crewmember-in-training, a few minutes after communicating with the *Haddock*, the *CG 33118* crew heard a marine assistance radio broadcast (MARB),[13] transmitted by the JHOC,[14] that stated that a 25-foot Catalina sailboat was aground. The Catalina operator advised the JHOC that he and his passengers were not in distress and that he was going to wait for high tide to refloat his vessel. The MARB provided the sailboat's estimated coordinates, and added that the vessel was located "within view" of the Sheraton Hotel on Harbor Island. The MARB included a request for other boaters or a private towing company to assist. On hearing the MARB, the *CG 33118* crew radioed the JHOC and asked for permission to respond to the call.[15] The JHOC watchstander told NTSB investigators that he granted the permission, and that he informed the *CG 33118* crew that the grounded vessel, "wasn't in any immediate danger, wasn't

[13] According to Commandant Instruction M16130.2E, National Search and Rescue Supplement, a MARB is made to solicit voluntary response from anyone who can assist the mariner. If the Coast Guard does not receive a response to the MARB within a reasonable period of time, typically 10 minutes, Coast Guard resources and/or auxiliary vessels may be directed to respond.

[14] The JHOC transmitted the MARB at 1738. However, because the Catalina was not equipped with a GPS, JHOC personnel had to estimate its position coordinates for the MARB.

[15] According to Coast Guard search-and-rescue operating procedures, a small boat such as the *CG 33118* must have the sector's permission to respond to a search-and-rescue situation.

taking on water, and that we weren't asking them or tasking them to go there." The *CG 33118* crew then headed east to look for the sailboat along the south shore of Harbor Island. However, the sailboat was actually on the north side of Harbor Island, in the West Basin.[16] When the *CG 33118* crewmembers could not locate the sailboat, they radioed the JHOC for clarification. The information was corrected, and, according to the crewmember-in-training, the coxswain turned the *CG 33118* around and headed west toward the West Basin inlet.

The crewmember-in-training told NTSB investigators that, leading up to the collision, he was not paying attention to the speed of the vessel. He said that the engine sound seemed commensurate with traveling about 20–25 knots. Neither the crewmember-in-training nor the boat engineer recalled hearing any crewmember voice concern about the speed of the *CG 33118*. Both of them told investigators that the radar on board the *CG 33118* was operating. The boat engineer told investigators that, just before the *CG 33118* impacted the Sea Ray, he heard one of the crewmembers shout "oh god."

Following the accident, the *CG 33118* coxswain told SDHP that, at the time of the collision, he was proceeding at about 3000 rpm[17] about 200–300 yards south of Harbor Island, close to the main shipping channel. He stated that, as the *CG 33118* was en route, it suddenly "shot straight up in the air." He told police, "I knew I hit a boat," and that he had not seen it. The coxswain stated that when he "landed" he turned the *CG 33118* around and came alongside the boat. He then handed the controls to the OOD. The coxswain declined to be interviewed by NTSB investigators.

1.2.3 Witness Reports

Witnesses interviewed after the accident indicated that the *CG 33118* was moving at a higher speed than other vessels in the area that night, and that the speed was about the same on both the eastbound and westbound legs. They also indicated that the vessel was on a plane both before and during the accident leg. The witnesses stated that the *CG 33118* approached the slower-moving boat from astern. Witnesses (including boat crew) reported that the sound of the engine pitch did not decrease before the collision.

A recreational boater witnessed the sequence of events from an estimated 70-yard distance. He told investigators that he saw blue flashing lights on top of a fast-moving vessel (he estimated a speed of about 25 knots) headed west toward his location. As the vessel approached, he could see that it had an orange hull with a high aluminum cab. He did not hear a siren nor see the vessel slow down before it collided with the stern of a smaller boat, which had its running lights on and was also traveling to the west. When the faster vessel struck the smaller boat, the stern of the smaller boat moved down and the bow of the faster vessel was projected up and momentarily into the air above the other boat. The witness said that he could see some of the occupants on the smaller boat and that they seemed to be ducking as the faster vessel came over the top of their boat. The faster vessel landed on the smaller boat, rolled off its port side onto the

[16] The West Basin is a protected area north of Harbor Island, primarily containing marinas and recreational boat slips.

[17] About 19 knots on SPC-LE vessels.

water, and then continued to "coast" toward the west. The smaller boat righted itself and remained afloat but was rotating in a clockwise rotation. The noise of the collision alerted boaters in the immediate area, and some began directing their spotlights in that direction.

Another witness, a guest at the Hilton hotel located on the south shore of Harbor Island, observed the events from the sixth floor of the hotel, about 240 yards from the accident site. He told investigators that he saw what appeared to be a law enforcement vessel with its blue lights activated. The witness stated that the vessel first passed his location in an eastbound direction. It then stopped and was motionless for about a minute before turning and traveling back. He estimated the vessel's speed at 25–30 knots.

A second witness on the south shore of Harbor Island told investigators that he saw a Coast Guard vessel traveling to the east and then back again to the west at high speed until it struck a boat on the starboard quarter, about 300 yards off the island. He described the Coast Guard vessel as "running flat" (that is, planing), with its bow fairly level with the water and not high in the air. A witness on Shelter Island said that the *CG 33118* was traveling at "a high rate of speed." Another witness said that after the *CG 33118* turned around, it appeared to be traveling at a "higher rate of speed, dangerously close to the anchorage."

According to automatic identification system[18] (AIS) data obtained from Sector San Diego, the *Haddock* was southwest of the west end of Harbor Island when the accident occurred. The *Haddock*'s officer of the deck[19] told NTSB investigators that he saw the *CG 33118* approach the Sea Ray and wondered if the Coast Guard vessel would avoid the Sea Ray. He estimated the *CG 33118*'s speed as 25 knots, the same speed he estimated the vessel had been traveling when it departed the *Haddock* and headed east in the bay. The *Haddock*'s commanding officer reported that the collision occurred about 100 yards off the *Haddock*'s bow. NTSB investigators determined the approximate position to be latitude 32°43'18.8" N and longitude 117°12'38.2" W.

1.3 Injuries

The injuries sustained in this accident are categorized in the table below according to the injury criteria of the International Civil Aviation Organization. The NTSB uses these injury criteria in all its accident reports, regardless of transportation mode.

[18] An AIS is a maritime communications system that automatically transmits vessel information, including a vessel's name, type, position, course, speed, navigational status, and other safety-related information, to appropriately equipped shore stations, other vessels, and aircraft. The AIS also automatically receives such information from similarly fitted vessels. Also see sections 1.15.3, Other Information, Automatic Identification System, and 2.7, AIS Use.

[19] On Navy and Coast Guard vessels, the officer of the deck is the direct representative of the commanding officer and is responsible for the safe operation of the vessel.

Type of Injury	*CG 33118*	Sea Ray	Total
Fatal	0	1	1
Serious	0	4	4
Minor	0	6	6
None	5	2	7

Title 49 *Code of Federal Regulations* (CFR) Section 830.2 defines a fatal injury as any injury that results in death within 30 days of an accident. It defines serious injury as that which requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; results in a fracture of any bone (except simple fractures of fingers, toes, or nose); causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third- degree burns, or any burn affecting more than 5 percent of the body surface.

1.4 Damage

1.4.1 *CG 33118*

The *CG 33118* sustained minor damage. As of the date of this report, the cost of the damage to the *CG 33118* had not been determined.

1.4.2 Sea Ray

The Sea Ray was destroyed in the accident. Its value was estimated at $30,000.

1.5 Personnel Information

1.5.1 *CG 33118*

Coxswain. The coxswain, age 21, was seated in the forward starboard seat, and was operating the *CG 33118* at the time of the accident. According to Coast Guard records, he obtained his qualifications as follows:

- Utility boat big (UTB) boat crewmember, October 2007
- UTB tactical crewmember, September 2008
- SPC-LE pursuit crewmember, November 2008
- SPC-LE boat crewmember, December 2008
- UTB coxswain, January 2009
- SPC-LE coxswain, February 2009
- UTB and SPC-LE tactical coxswain, June 2009
- SPC-LE pursuit coxswain, July 2009

From April to June 2007, the coxswain attended and satisfactorily completed the Coast Guard's Boatswain's mate "A" School, which included testing on navigation rules. He also completed a search-and-rescue coordination and execution course in January 2009.

The coxswain was involved in an incident about 2 months before the accident. He was on board another SPC-LE close to a concrete pier at a maintenance facility in San Diego Bay and was trying to hold the vessel's position. However, the SPC-LE and its outboard engines made contact with the pier, causing damage to the lower portion of the engines. The incident was considered minor and no action was taken against the coxswain.

Boatswain's mate third class. The boatswain's mate third class, age 24, was seated in the forward port seat at the time of the accident. According to Coast Guard training records, she obtained the following qualifications:

- Cutter boat large (CBL) crewmember, March 2009
- Utility boat light (UTL) crewmember, March 2009
- UTB and SPC-LE crewmember, October 2009

Boatswain's mate second class. The boatswain's mate second class, age 27, was Station San Diego's OOD on the day of the accident and the highest-ranked crewmember on board the *CG 33118*. He was seated in the aft port seat at the time of the accident. According to Coast Guard training records, he obtained the following qualifications:

- Response boat small (RBS) 20 crewmember, May 2007
- SPC-LE crewmember, October 2007
- SPC-LE pursuit crewmember, December 2007
- UTB crewmember, November 2007
- UTB and SPC-LE coxswain, July 2008
- UTB and SPC-LE tactical crewmember, December 2008
- UTB and SPC-LE tactical coxswain, March 2009
- SPC-LE pursuit coxswain, July 2009

Boat engineer. The boat engineer, a machinery technician third class, age 29, was seated in the aft starboard seat at the time of the accident. According to Coast Guard training records, he obtained the following qualifications:

- UTB crewmember, May 2007
- UTB engineer, October 2007
- SPC-LE pursuit crewmember, October 2007
- SPC-LE tactical crewmember, December 2007

Crewmember-in-training. The crewmember-in-training, a machinery technician third class, age 20, was standing next to the starboard bench seat at the rear of the cabin at the time of the accident. He attained the rank of machinery technician third class in April 2009 and had served on board the Coast Guard cutter *Chase* before his assignment to Station San Diego.

[20] A response boat small, or RBS, is similar in design to the 33-foot-long SPC-LE; however, the RBS is 25 feet long.

According to Coast Guard training records, he had not yet obtained any boat-related qualifications.

Work/rest history. Only the two *CG 33118* crewmembers who agreed to be interviewed by NTSB investigators provided their work-rest schedules. However, the work record of the crew indicates that all five crewmembers maintained the same work schedule in the 72 hours preceding the accident. Crewmembers reported for duty at 0700 on Friday, December 18, 2009, and remained at the station in duty status until 0700 Saturday, December 19. They then entered day-worker status until 1600 on Saturday, December 19. On weekends they would ordinarily be relieved an hour later and as a result, the crew reported for duty at 0800 on Sunday, December 20, the day of the accident. During the duty periods, the crew was expected to be readily available to respond to Coast Guard situational needs. When not responding to these needs, sleep facilities were available to crewmembers and they were expected to use these facilities as needed. The facilities were three-person bedrooms, each with its own bathroom.

The boat engineer told investigators that the night before the accident he had stayed out late. He estimated that he fell asleep about 0300 and woke about 0630 on the morning of the accident. He worked a 12-hour shift that day, beginning at 0700. He told investigators that he took an afternoon nap that day. About 1630, a station petty officer told him to report to the armory to prepare for patrol.

The boat engineer told investigators that, the day before the accident, Saturday, December 19, he worked from 0600 to 1600. The day before that, Friday, December 18, he worked from 0700 to 1600. He stated that he had a good night's rest Thursday night into Friday, but his amount of sleep that night was not known, nor was his amount of sleep Friday night into Saturday.

The crewmember-in-training told investigators that on the day of the accident he arrived at work at 0800 and began preparing for patrol in the bay about 1645. His work schedule in the days prior was not known. He told investigators that, during the weekend of the accident, he went to sleep about 2130 or 2200 and woke about 0630.

1.5.2 Sea Ray

The Sea Ray operator, age 44, had more than 100 hours of experience as a boat operator. He had no formal operating training and had not taken a boating safety course, nor was he required to do so under California boating law.

1.6 Vessel Information

1.6.1 *CG 33118*

The *CG 33118* was manufactured in February 2007 by SAFE Boats International in Port Orchard, Washington,[21] and ultimately delivered to Station San Diego later that same year. The

[21] The vessel is a configuration of the 33-foot-long "Defender Class" SAFE Boat.

SPC-LE is a multimission[22] boat, purchased by the U.S. Department of Homeland Security (DHS) for use by both the Coast Guard and U.S. Customs and Border Protection with minor equipment differences.[23] As of 2010, the Coast Guard operated 58 SPC-LE vessels. Several other agencies and municipalities also operate 33-foot SAFE Boats. The admiral in charge of the Eleventh Coast Guard District, which includes San Diego, told NTSB investigators that the *CG 33118* was assigned to national border units for border-related missions[24] and that the vessel had very good seakeeping and far-off-shore capability.

The SPC-LE Boat Operator's Handbook stated that the vessel's cruise speed was 35 knots at 4200 engine rpm, and its range at this speed was 250 nautical miles (nm) on one tank of fuel.[25] The handbook also stated that the vessel could operate up to 50 nm offshore, in wind up to 30 knots, and in rolling seas of up to 8 feet.[26] In reply to the contract solicitation, SAFE Boats asserted that the vessel would be able to have a zero-to-plane time under 3 seconds, turn in a radius of less than one boat length, and stop in less than 13 seconds, all while vessel controllability was being maintained.

The *CG 33118*, like all SPC-LEs, had a deep-vee rigid monohull constructed of welded marine grade aluminum with a watertight, self-bailing deck and a blended polyurethane membrane collar reinforced with a woven polyester base cloth. The vessel had an enclosed cabin with shock-absorbing seating for four crewmembers (**figure 5**) and a small bench seat aft on each side. The vessel's operating controls were contained within the cabin. A cuddy cabin[27] was located forward of the main cabin area and provided additional bench seating. The *CG 33118* was fitted with two blue law enforcement lights mounted at the base of the radar pod, and a siren.

[22] The Coast Guard has 11 stated missions: ports, waterways, and coastal security; drug interdiction; aids to navigation; search and rescue; living marine resources; marine safety; defense readiness; migrant interdiction; marine environmental protection; ice operations; and other law enforcement. According to the SPC-LE Boat Operator's Handbook, the vessel is suitable for all of those missions, except ice operations. The Coast Guard intends its vessels to be used for more than one mission.

[23] Department of Homeland Security, SPC-LE specifications, August 18, 2006, noted that typical SPC-LE missions include locating, tracking, and intercepting suspicious vessels entering U.S. waters as well as maintaining port security.

[24] The district commander also stated that he expected Coast Guard personnel to be able to shift missions as quickly as needs dictated. He stated that a station boat could be under way on a law enforcement mission, be diverted to a search-and-rescue mission, and then be diverted back to a law enforcement case, all in the course of the same patrol.

[25] All SPC-LE Boat Operator's Handbook performance parameters were based on triple 275-hp outboard engines.

[26] The Coast Guard magazine *Proceedings* stated in its fall 2007 edition, page 13, that the SPC-LE "with top speeds in excess of 50 knots, a range of more than 200 miles, and over-the-horizon command, control, and communications is an extraordinarily capable shore-based response asset."

[27] A cuddy cabin is a small cabin on a vessel, usually not high enough to stand up in.

Figure 5. Interior of the *CG 33118* cabin.

SPC-LEs are equipped with a scalable integrated navigation system (SINS) built around a radar chart plotter. The SINS includes a radar antenna,[28] a 10.4-inch color LCD surface radar–chart plotter display (with range scales from 0.125 to 24 nautical miles), a differential global positioning system[29] (DGPS) receiver and navigator display, a multidisplay repeater, a heading sensor, and a depth sensor. The vessel's communication system consists of a loudhailer,[30] an ultrahigh frequency[31] (UHF) marine radio, two VHF-FM marine radios, and a high-frequency–single-sideband[32] (HF-SSB) marine radio.

[28] The crewmembers who could have verified whether the radar was used declined to speak with NTSB investigators.

[29] DGPS is an enhancement to GPS. In addition to receiving satellite-based information, DGPS also receives and computes data from known, ground-based reference stations, which enhances position accuracy.

[30] A loudhailer is a multipurpose device for audio amplification.

[31] A UHF radio uses frequencies between 300 and 3,000 megahertz.

[32] Single sideband modulation uses all available transmitter power to convey information using voice or digital means for long-range communications.

Personnel at the NTSB's vehicle recorder laboratory examined the *CG 33118*'s radar and DGPS display units to determine if the components had recorded the vessel's trackline, speed, and locations leading up to the collision. However, no usable information was available on either unit because the units were not configured to record the information nor were they required to be.

In addition, the *CG 33118* was equipped with an L-3 ProTec AIS that could transmit both standard and restricted signals; however, no AIS data from the vessel registered at any receiving stations on the night of the accident. (For more information, see section 1.15.3 on AIS operation on the *CG 33118*.)

The *CG 33118* was originally outfitted with three 275-hp engines, which were replaced at Station San Diego with three 300-hp gasoline-powered Mercury Verado engines. Coast Guard personnel responsible for maintenance of the station's SPC-LEs told NTSB investigators that the reliability of the 300-hp engines was better than that of the 275-hp engines and that the *CG 33118* was as reliable as the other two SPC-LEs at the station. He further stated that he knew of no outstanding problems with the *CG 33118* either before or after the accident.

The *CG 33118* had accrued a total of 2,340 operating hours up to the date of the accident. The last logbook maintenance issue for the vessel involved an engine overheating at idle on December 5, 2009; no other discrepancies were noted from that time until the accident. The SPC-LE was last operated twice on December 18, 2009, two days before the accident. Neither of the coxswains who operated the *CG 33118* on that date, one of whom was the accident coxswain, noted any operating anomalies in the vessel's logbook. Available engine data from the *CG 33118*'s three engines was downloaded at Sector San Diego on December 22, 2009, under NTSB supervision. The downloaded information was limited to engine alarm codes.

The SPC-LE Boat Operator's Handbook does not include information about the vessel's forward visibility. (For more information, see section on Tests and Research.)

1.6.2 Sea Ray

The 24-foot-long recreational boat was manufactured by Sea Ray Boats Incorporated in Knoxville, Tennessee. The boat was a model year 2003 Sea Ray Sundeck® Sports Boat, designated by the manufacturer as a model 240SD. It had a fiberglass reinforced plastic hull with stainless steel outfitting and trim. The boat was styled as a bow rider, allowing for seating forward of the operator. The engine was a gasoline-powered Mercury Marine Mercruiser 350 Mag MPI Inboard/Outboard rated at 300 hp.

The boat's stated capacity was 12 persons or 2,000 pounds, and up to 2,100 pounds total including gear for the boat and passenger weight. At the time of the accident, 13 people (6 adults and 7 children), were on board. NTSB investigators did not obtain the individual weights of the Sea Ray occupants. To estimate the weight of the occupants at the time of the accident, NTSB investigators used current Federal Aviation Administration (FAA) standard weights for adults and children. Based on FAA weight assumptions, the Sea Ray passengers weighed about 1,490

pounds, or about 600 pounds less than the vessel's rated maximum 2,100-pound passenger-plus-gear load. No substantial equipment or provisions were on board.

The navigation lights on the Sea Ray consisted of a red port and green starboard sidelight and a removable all-around white light, which 33 CFR 83.21(e) defines as "a light showing an unbroken light over an arc of the horizon of 360 degrees." The all-around white light may also function as a stern light on vessels less than 12 meters (39.4 feet) in length, as specified in the inland navigation rules. The all-around light was mounted on the centerline of the transom at the stern of the Sea Ray. Vessel lighting was required to meet the inland navigation rules for vessels the size of the Sea Ray: Annex 1 of 33 CFR Part 84 states that, for inland navigation, an all-round light on vessels less than 12 meters in length should be positioned at least 1 meter (3.28 feet) higher than the sidelights and be visible at a minimum range of 2 miles. The 5.1-foot-high post that supported the light allowed the light to be located above a Bimini top on the Sea Ray (which was lowered on the night of the accident), allowing for 360-degree visibility. The Sea Ray operator stated that he replaced the light bulb about 2 months before the accident with a clear wedge-base bulb found to be rated at 9 watts and 0.69 amps. NTSB investigators determined that the replacement bulb had a light output of 6 candela, or candlepower, the same as the original manufacturer's bulb. (Also see section 1.7.2 on Sea Ray wreckage.)

1.7 Wreckage

1.7.1 *CG 33118*

The *CG 33118* sustained surface scratches and paint transfer starting at the beaching plate[33] at the stem and continuing aft along the keel for about three-quarters of the length of the hull **(figure 6**). The crewmembers indicated that they did not notice any major postaccident problems with the vessel's performance on the way to impoundment at Coast Guard San Diego's helicopter hanger.

[33] A beaching plate is a keel guard that protects the hull from abrasion during beach landings.

Figure 6. Damage to the *CG 33118*.

1.7.2 Sea Ray

Most of the Sea Ray's damage was located above its water line, from the starboard side of the transom and extending forward of the port windshield (**figures 7** and **8**). The port window was torn off and the remaining frame bent outward. The fiberglass at the sheer below the missing port window had failed and cracked down the length of the remaining window frame. The door to the head,[34] located just below the port window, was knocked off and pushed inward. The swim platform in the stern had a sharp gouge on the starboard side. The structural fiberglass damage to the Sea Ray rendered the vessel beyond repair.

The Sea Ray's all-around light pole was bent and found lying in the vessel, separated from its transom mounting socket. Following the accident, the California Highway Patrol's Multidisciplinary Accident Investigation Team (MAIT) analyzed the Sea Ray's all-around light to determine if it had been illuminated at the time of the collision.[35] MAIT investigators determined that material transfer from the light bulb's filament to the light's envelope as well as blue and green discoloration of the bulb's filament indicated that the bulb was hot and the light illuminated at the time of the collision.

[34] The head is the onboard bathroom.

[35] Supplemental MAIT Case No. BL-003-10, Vessel Collision Report No. 09-8157A, San Diego Harbor Police.

Figure 7. Damage to the Sea Ray.

Figure 8. Fractured fiberglass on the Sea Ray, viewed looking aft and port from inside the boat's cockpit.

1.7.3 Strike Angle

NTSB investigators calculated the strike angle by taking location measurements of the damage to both vessels. The strike angle to the Sea Ray was estimated to be about 11 degrees to starboard (**figure 9**).

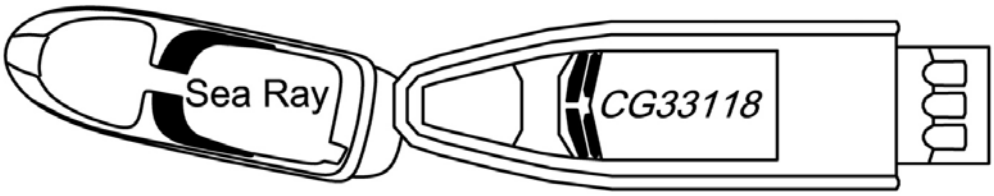


Figure 9. Depiction of the *CG 33118* colliding with the Sea Ray at an angle of about 11 degrees.

1.8 Waterway Information

1.8.1 General

The distance from Harbor Island to the main shipping channel is about 800 yards. The width of the bay in the accident area, between Harbor Island and North Island, is about 1,350 yards. The water depth in the accident area is about 28 feet. According to the *Coast Pilot*, San Diego Bay does not have excessive tidal current movements.

1.8.2 Vessel Traffic Density

Vessel density in San Diego Bay was considered heavy at the time of the accident. SDHP officers stated that on the night of December 20, 2009, the bay was congested with hundreds of boaters because of the Parade of Lights. One officer characterized the Parade of Lights as bringing "one of the highest amounts of boat traffic on any given date in San Diego Bay." In its accident report, SDHP noted that its vessel therefore responded to the collision "at a slow rate of speed due to the very heavy vessel traffic." Witnesses also characterized heavy traffic density from the north end of Shelter Island to the Hilton Hotel on Harbor Island, along the parade route. As noted earlier, the Sea Ray operator estimated that about 20 vessels were within 50 yards of his boat at the time of the accident. Many spectator vessels were located near the West Basin inlet. As the parade moved northeast along Shelter Island and turned east to parallel Harbor Island, spectator vessels located near the West Basin inlet would have been primarily to the left of the parade route. Other than the spectator vessels near the West Basin inlet, vessels were also located along the shore of Harbor Island. **Figure 10** shows conditions near the accident site.

Figure 10. View of San Diego Bay looking southwest from the sixth floor of the Hilton Hotel near the western end of Harbor Island before and after the collision. The two combined photos illustrate the waterway traffic before the accident (right) and the location of the accident site (left). The CG 33118's approximate path to the West Basin would have been from the left to the right through the combined photos. (These two photos were the best available, and were taken as close as possible to the time of the accident.) Photo courtesy of T. Beckman.

A crewmember on board the *Silver Fox III*, a Coast Guard Auxiliary vessel positioned near the west end of Harbor Island to keep spectator vessels south of a perimeter line off the island, said that 30 to 40 spectator vessels were in the area, including kayaks and some vessels with no navigation lights. He said that his vessel was 200 feet from the Sea Ray when the accident occurred. The *Silver Fox III* crewmember said that the Sea Ray was struck just outside the area where the spectator vessels were concentrated.

Figure 4 in section 1.2.2, Accident Narrative, *CG 33118*, depicts the approximate path that the *CG 33118* took leading up to the accident.

1.8.3 San Diego Bay Background Lighting

Coast Guard coxswains who regularly operated on San Diego Bay told NTSB investigators that background lighting from the city at night makes it difficult to differentiate between vessel navigational lights and lights on the shore. SDHP also stated that navigating in the bay at night was "challenging" due to the background lights making it "difficult to distinguish lighting on shore from lighting by navigational aids or other vessels." The police further stated that experience was required to recognize navigation lights and boats on the water because of the conditions in certain parts of the bay.

1.9 Meteorological Information

The sun set at 1646 on the day of the accident. The moon was a waxing crescent, with 19 percent of its disk illuminated. Observations at San Diego International Airport, less than 1 mile from the accident location, noted an unrestricted visibility of about 10 miles, a few clouds at

12,000 feet above ground level, and a broken ceiling at 22,000 feet. According to an NTSB weather study, the broken to overcast cloud cover reduced the illumination from the moon at the time of the accident.[36] The wind was from the south-southeast at about 3 miles per hour. The air temperature was 63° F, and the water temperature was 60° F. The bay was calm.

1.10 Medical and Pathological Information

About 5 hours after the accident, the five crewmembers on the *CG 33118* were tested for the presence of illegal drugs and alcohol at Naval Hospital Balboa.[37] All results were negative. The Sea Ray operator was tested about 6 hours after the accident and those results were negative as well.

The fatality was an 8-year-old boy who was a passenger on board the Sea Ray and was the son of the operator. The cause of his death was determined to be multiple blunt force trauma. Four other passengers on board the Sea Ray received serious injuries: a 37-year-old male suffered a scalp laceration and skull fracture; his son, age 3, suffered a concussion and lip laceration; a 39-year-old male passenger sustained a scalp laceration; his son, age 4, suffered a skull fracture, a concussion, and a deep laceration. No one on board the *CG 33118* was injured.

1.11 Survival Aspects

The Sea Ray passengers were evacuated from the damaged boat and taken to shore on three vessels. The *CG 33118* was the first vessel to assist the passengers. The crew turned around immediately after the collision and brought the vessel alongside the Sea Ray. The 8-year-old boy, who was the most severely injured, was removed from the boat, placed on board the *CG 33118* with a physician who had been on a nearby vessel. They were taken to the Harbor Island fuel dock on the west end of Harbor Island, where San Diego Fire and Rescue had dispatched an ambulance and a fire engine to meet the vessel. The ambulance transported the 8-year-old boy and the physician to University of California, San Diego (UCSD) Medical Center, where the boy later died from his injuries.

The occupants of a nearby 26-foot-long Bayliner also assisted in the evacuation after hearing about the accident on VHF radio channel 16. Its operator and a passenger, both Navy surgeons, offered medical assistance. When they arrived at the Sea Ray, *CG 33118* already had departed with the injured 8-year-old, and no other response assets had yet arrived. The two physicians boarded the Sea Ray and began helping the injured.

[36] Weather Study, NTSB Office of Aviation Safety, December 22, 2009.

[37] Federal regulations at 46 CFR Part 4.06 did not apply in this accident. 46 CFR Part 4.06 requires postaccident drug and alcohol testing on all individuals engaged in or employed on board a commercial vessel who are directly involved in any accident meeting the criteria of a serious marine incident as defined at 46 CFR 4.03-2. On June 20, 2006, new Coast Guard regulations (46 CFR 4.06-3) took effect requiring alcohol testing within 2 to 8 hours of a serious marine incident and the collection of drug-test specimens within 32 hours. The five drugs for which tests are conducted are amphetamines, cocaine, marijuana, opiates, and phencyclidine.

Sea Tow, a local vessel assistance company, dispatched a vessel after hearing about the collision on VHF radio. The Sea Tow vessel arrived at the scene shortly after the two Navy surgeons. Though not typically used as a rescue vessel, the Sea Tow vessel took the injured on board at the request of the Sea Ray passengers. Eight people from the Sea Ray (two men, two women, two boys, and two girls), including the four seriously injured passengers, were transported by the Sea Tow vessel to the Bali Hai Restaurant dock on the north end of Shelter Island, which the Sea Tow operator believed to be closest to the accident location. He estimated that it took 10 minutes to reach the dock.

The remaining four passengers on the Sea Ray (the operator, one woman, and two boys) were taken to the Bali Hai dock by one of the two physicians on the Bayliner. The other physician stayed on board the damaged Sea Ray to assist in towing it to shore. Vessel Assist, another marine assistance company operating on the bay, towed the boat.

Because of the Parade of Lights, several Coast Guard and SDHP vessels were operating on the bay at the time of the accident. The *Haddock*'s commanding officer told investigators that about 1745, after hearing VHF radio communication about the collision, he diverted from the parade to assist. Four crewmembers from the *Haddock*, one trained as an emergency medical technician, assisted the injured passengers at the Bali Hai dock.

Alerted to the collision via radio communications, SDHP responded by sending four vessels, two to assist at the Bali Hai dock, one at the Harbor Island fuel dock, and one remaining on standby near Harbor Island. A responding officer indicated that he and another SDHP crewmember approached the accident slowly because of the heavy vessel traffic density in the area from the ongoing Parade of Lights event.

Three ambulances transported the four seriously injured passengers from Shelter Island to hospitals. Two of the ambulances transported the two injured men to UCSD Medical Center. The third ambulance transported the two injured children to Rady's Children's Hospital. The remaining eight passengers were taken either to UCSD Medical Center or Rady's Children's Hospital, depending on where their injured family members were.

Figure 11 details the approximate location of each passenger on board the Sea Ray at the time of the accident and the severity of their injuries, based on medical records and interviews with surviving passengers. The four seriously injured passengers and the fatally injured boy were all seated in the rear half of the vessel. Those sitting or standing forward of the operating station received either minor injuries or none at all.

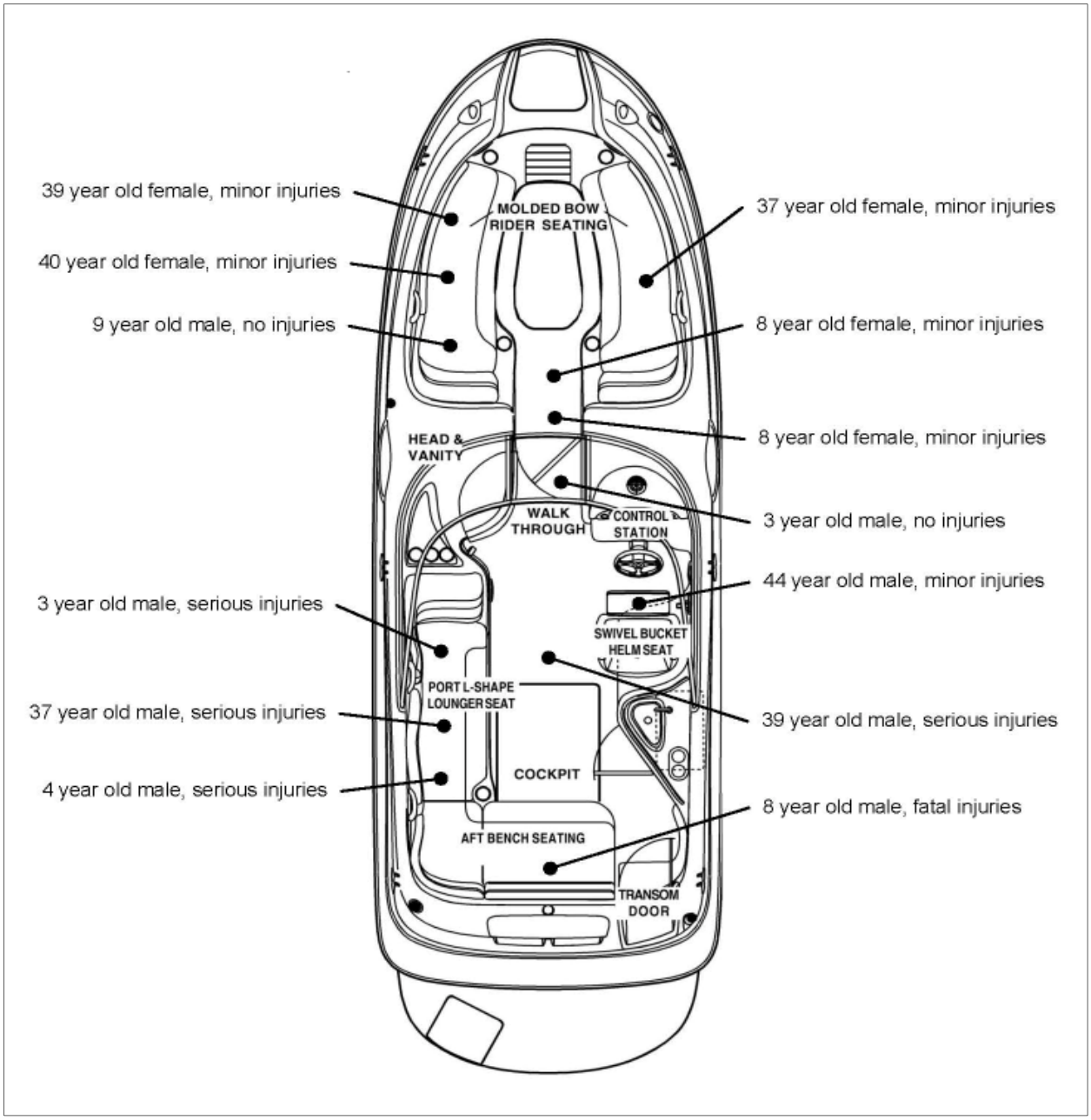


Figure 11. Layout of the Sea Ray and locations and injuries of the 13 people on board.

1.12 Management/Coast Guard Operational Information

1.12.1 Guidance on Parade of Lights Operations

NTSB investigators interviewed six coxswains assigned to Station San Diego, none of whom had served as coxswain during a Parade of Lights. Only one coxswain had participated in any other large event in San Diego, a marine event in Mission Bay north of San Diego Bay. All of the interviewed coxswains stated that no speed limits for Coast Guard or other vessels had

been established in connection with the Parade of Lights, and that they were not aware of any risks or modifications to Coast Guard operating procedures specific to the event.

1.12.2 Small Boat Speed Guidance

The Coast Guard Boat Operations and Training Manual, Volume I, stated, "All personnel operating Coast Guard boats are obligated to abide by Inland and International Navigational Rules." Rule 6 of the navigation rules stated in part, "Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions." Rule 6 further specified factors to be considered in determining safe speed, including visibility, traffic density, maneuverability, and background light" (see Appendix B).

In addition, the Coast Guard's Boat Crew Seamanship Manual provided crewmembers with "approved methods and procedures for the conduct of Coast Guard boat operations." Under "appropriate speed," the manual stated, "Running at full speed all of the time should be avoided" and "finding a speed that offers a comfortable ride as well as allows mission completion is advised." The manual listed factors that should be considered to determine safe speed, including high seas, traffic density, visibility and shoal waters. With regard to traffic density and visibility, the manual stated:

Do not use high speed in high traffic density areas. A safe speed allows response to developing situations and minimizes risk of collision, not only with the nearest approaching vessel, but with others around it. … If conditions make it difficult to see, slow down. … Darkness and steering directly into the sun lessens ability to see objects or judge distances.

The manual also required coxswains to be aware of and responsible for the wake that their vessels create when in enclosed waters or near other vessels, and for injuries or damage that may result from excessive vessel wake. Under "wake awareness" the manual said, "Only an unaware coxswain trails a large wake through a mooring area or shallows, tossing vessels and straining moorings. 'Get-home-itis' and a false sense of urgency are two reasons coxswains forget to watch their wake."

The Boat Crew Seamanship Manual also stated that the coxswain should "choose a boat speed that enables lookouts to effectively and safely perform duties" and to "position lookouts so they can effectively and safely perform their duties under the operating conditions (e.g., restricted visibility, boat speed, sea state, weather)."

The Coast Guard Navigation Standards Manual (Commandant Instruction M3530.2c) directed officers in charge (OICs) of local stations to establish navigation standards for small boats as appropriate to their respective operating areas. Station navigation standards were required to include certain navigation criteria. With regard to speed, OICs were instructed to "describe areas where boats must adhere to no wake zones or speed limits during operations." Pursuant to this requirement, Station San Diego established piloting and navigation standards that prohibited coxswains from exceeding the vessel's operational cruising speed unless operational necessity or law enforcement missions so required. Station San Diego navigation

standards listed the SPC-LE cruising speed as 4200 rpm[38] (about 35 knots) and the UTB cruising speed as 2430 rpm.[39] No other speed restrictions were established for San Diego Bay.

Station San Diego navigation standards identified four geographic areas—all outside San Diego Bay—in which "slow speed" was to be used: Imperial Beach, Point Loma, the entrance to Mission Bay, and the entrance to Oceanside Harbor. Station San Diego also required coxswains to operate their vessels "with extreme caution" when close to known hazards or shoals during times of restricted visibility or darkness.

In addition, Station San Diego navigation standards informed coxswains to consider operating conditions in choosing particular speeds of their vessels: "Reduced ability to see vessel traffic, hazards, or navigation reference points in low visibility or at night add extra risk factors while navigating. Reduced visibility, either from night or weather conditions, usually dictates the need for reduced speed, even when responding to a potential life threatening case."

The San Diego-based Coast Guard coxswains that NTSB investigators interviewed confirmed that, with regard to speed, they were taught Rule 6 of the navigation rules of the road. The coxswains added that when considering operating speeds, they were directed to use their best judgment and experience. They told investigators that they considered their "comfort level with" the number and proximity of boats in their vicinity when determining vessel operating speeds.

They also said that they considered Rule 6 in determining safe speed, but that they routinely operated the SPC-LEs at 4200 rpm, both day and night, on San Diego Bay. The coxswains stated that, in general, they discussed safe speed with coxswain trainees. They reinforced safe speed considerations while under way by reviewing Rule 6 elements for determining a safe speed based on prevailing circumstances and conditions. They told coxswain trainees to evaluate the conditions in judging what speed was safe.

The *CG 33118* crewmember-in-training told NTSB investigators that he had been on SPC-LEs operating at "full throttle"[40] at night on San Diego Bay. The former Station San Diego OIC, the station executive petty officer, and the station training officer told NTSB investigators that coxswains had the authority to exceed the cruising speed if they determined that the situation called for it, such as during search-and-rescue or law enforcement. The former station OIC told NTSB investigators that he would have expected coxswains to request his permission to use higher speed, but Station San Diego had no established procedures to that effect.

[38] The former Station San Diego OIC, who issued the navigation standards in place at the time of the accident, told NTSB investigators the 4200-rpm limit in the navigation standards applied to day and night operations.

[39] Coast Guard small boats have different cruising speeds. According to Coast Guard Boat Forces personnel, small boat cruising speeds are typically based on the most economical speed a boat can travel.

[40] 5300 rpm, or about 44 knots.

1.12.3 Crew Brief

Coast Guard Navigation Standards called for crewmembers to hold an informal brief for the entire boat crew before getting under way or entering restricted waters. The brief was to include a risk assessment associated with the mission, referred to as a green-amber-red (GAR) model. The GAR considered supervision, planning, crew selection, crew fitness, environment, and event complexity. Station San Diego navigation standards required crews to notify the OIC if the GAR scored amber or higher. The *CG 33118* boat engineer told NTSB investigators that the crew performed a GAR before getting under way on the evening of the accident, and that it scored "green." The crewmember-in-training did not remember whether a GAR was conducted.

1.12.4 Coxswain and Crew Training

Coast Guard personnel did not apply to become coxswains; they qualified by completing the boat crewmember and coxswain qualification program. The qualification program established minimum standards of "knowledge, performance, and currency" for all personnel (regular, reserve, and auxiliary) serving as crewmembers on Coast Guard vessels. To qualify for either boat crewmember or coxswain, Coast Guard personnel had to complete required classroom and underway training and demonstrate proficiency in the particular qualification. Coast Guard boat crews would vary through the qualification process; that is, they would serve under, and work with, different crewmembers.

Before coxswains could qualify for their positions, they had to qualify as boat crewmembers. Boat crewmembers needed to complete 92 tasks to qualify for that position, and coxswains an additional 82 tasks, including crew efficiency and team coordination, boat handling, rules of the road, piloting and navigation, search-and-rescue, and towing and salvage. Trainees were apprenticed to instructors who guided them through the qualification phase and provided them with hands-on training and assistance with the program of study.

Both boat crewmembers and coxswains needed to complete an oral exam, which tested the applicant's knowledge of Coast Guard policies and procedures, the local area, navigation and seamanship, pertinent technical data for the boat type for which the trainee was being certified, team coordination and risk assessment standards and concepts. Applicants were assessed on their maturity, judgment, attitude, and professionalism; willingness to accept the duties and responsibilities of a coxswain; detailed knowledge of the unit's operational area including knowledge of the unit's boat piloting; and navigation instruction.

Once qualified, coxswains and boat crewmembers had to meet currency requirements, either through normal operating performance or through dedicated training. This included a minimum of 40 hours under way (including 10 nighttime hours) every 6 months. No mission-specific performance was required, and all underway hours sufficed.

The *CG 33118* coxswain attended boatswain's mate "A" school, a 12-week training program. Students were exposed to the many facets of boatswain's mate rating, including

navigation, rules of the road, and team coordination training (TCT).[41] Students also received first-aid and CPR certification and conducted practical underway exercises on 41-foot-long UTB vessels.

Station San Diego coxswains told NTSB investigators that the Coast Guard's TCT instructed even the most junior persons on a Coast Guard boat to speak up should they feel "uncomfortable" or see what "they think is a violation of rules."

1.12.5 Lookout Procedures

The Boat Crew Seamanship Manual describes watchstanding responsibilities, including performing the lookout watch. On Coast Guard small boats, "although not specifically assigned the duty of lookout, the entire crew must perform lookout duties unless directed otherwise. … Lookouts must report to the coxswain everything seen, smelled, or heard as well as everything they think they see, smell, or hear. If in doubt, report it!" The manual also provides guidelines such as remaining alert; speaking loudly when making a report; repeating a report until acknowledged by coxswain; when in doubt, report it; report floating objects; and make certain duties are understood. These guidelines also included that if conditions impaired the lookout's ability to see, smell or hear, the lookout should report the condition to the coxswain.

1.12.6 Coast Guard Boat Forces Oversight

Station San Diego coxswains were commanded by a Coast Guard station commanding officer, who was overseen by an operational commander at Sector San Diego.[42]

The Coast Guard regularly evaluated the readiness and proficiency of boat forces personnel through Ready for Operations (RFO) and Standardization (STAN) team evaluations. RFO evaluations, which were conducted annually at the station level, assessed boat crew training, survival systems, and personal protective equipment programs to evaluate compliance with Coast Guard policies and procedures. RFO evaluations also included material inspections and underway exercises. RFO evaluations were conducted by the station's operational command, in this case, Sector San Diego. Station San Diego's most recent RFO evaluation before the accident was conducted December 2–3, 2009. In this evaluation, the RFO team concluded that "all boat crews operated safely and competently" during the drills. The RFO team also reviewed Station San Diego's training program and did not note any discrepancies. Station San Diego's coxswains averaged a score of 90.3 percent on the RFO knowledge-based written tests. The unit

[41] The Coast Guard established TCT requirements through Commandant Instruction 1541.1 to increase team effectiveness in cutter, boat, and command/control operations and activities. TCT addressed seven critical skills that reduce the risk of mishaps: leadership, mission analysis, adaptability and flexibility, situational awareness, decision making, communication, and assertiveness. The skills were meant to control safety risks and improve team performance by way of risk management, crew briefing, and crew debriefing. Coast Guard boat crews were expected to apply these TCT skills to prevent mishaps. The *CG 33118* crewmembers had completed and were current with their annual TCT requirements.

[42] Oversight of Station San Diego coxswains was generally provided by a senior enlisted OIC. About 2 weeks before the accident, the OIC was relieved of command for inappropriate behavior and was replaced by a lieutenant, the Sector San Diego Enforcement Division Chief.

received an overall score of 37/50 and was deemed ready for operations. The minimum score that a unit could achieve to maintain its RFO status was 33. The RFO coordinator noted, in reference to Station San Diego personnel, that "the crew continues to impress me with their professionalism and team work."

The RFO evaluation mirrored the biennial STAN assessments. The STAN assessments, conducted at the national level, evaluated the performance of individual stations at least every 2 years. The nationwide STAN mean assessment score for FY10 was 38/50 for the 145 completed assessments. Station San Diego's most recent STAN assessment before the accident was in early 2008. After the accident, a STAN assessment, which had been scheduled before the accident, was conducted January 11–14, 2010. Station San Diego SPC-LE crewmembers, with the exception of the *CG 33118* crew, participated in the STAN evaluation. The station's overall score in the January 2010 STAN evaluation was a 40/50, and it was deemed ready for operations.

Station San Diego received perfect scores in the underway exercises and training program assessment. The station received 3 points of a possible 5 on the knowledge-based written test.[43] The average score for Station San Diego's SPC-LE coxswains was 81.1 percent. They scored lower than 81.1 percent on two of the five sections of the test, with scores of 58.6 percent on navigation rules testing and 71.4 percent on piloting and navigation testing. In the station underway exercises, only one drill failure was noted out of 24 total drills. Drills were conducted on both SPC-LE and 41-foot vessels.

1.12.7 The *Bayside Blaster* Accident

About 2013 eastern standard time on January 12, 2002, a 24-foot-long Coast Guard nonstandard[44] patrol boat from Coast Guard Station Miami Beach with two crewmembers on board was on a routine nighttime recreational boating safety patrol in Biscayne Bay, Florida, when it collided with the small passenger vessel *Bayside Blaster*, carrying 2 crewmembers and 53 passengers.[45] The patrol boat was operating at the Coast Guard Station limit of 4000 rpm (equivalent to 32 knots) in a no-wake zone. The local station had set the 4000-rpm limit for normal, nonemergency operations.

The NTSB determined that the probable cause of the accident was the failure of the Coast Guard coxswain to operate the vessel at a safe speed in a restricted-speed area frequented by small passenger vessels and in conditions of limited visibility due to darkness and background lighting. Contributing to the cause of the accident was the lack of adequate Coast Guard

[43] Written test results accounted for 10 percent of a team's overall performance in both the RFO and STAN team assessments. The written assessments were not treated as pass or fail, rather, as a portion of the overall performance in the assessment.

[44] At the time, several Coast Guard stations operated a variety of station-specific small boats purchased locally by each Coast Guard district to suit a station's operational requirements. Because the purchase and management of these boats was not coordinated nationally, the Coast Guard identified these vessels as "nonstandard" boats.

[45] *Collision Between the U.S. Coast Guard Patrol Boat CG242513 and the U.S. Small Passenger Vessel Bayside Blaster, Biscayne Bay, Florida, January 12, 2002.* Marine Accident Report NTSB/MAR-02/05 (Washington, DC: National Transportation Safety Board, 2002).

oversight of nonstandard boat operations. The NTSB found no safety or law enforcement reason to employ excessive speed while conducting a routine patrol at night, in restricted waters, and close to shore. The NTSB noted that high speeds should be reserved for emergency responses, and it concluded that, even without the speed restriction, the speed the Coast Guard vessel used in the accident was imprudent for the prevailing conditions of darkness, background lighting, and potential for encountering passenger and recreational vessels in the area. The NTSB noted that several Coast Guard small boat accidents had prompted the Coast Guard to issue nonstandard boat operator's handbooks that cautioned against operating vessels at excessive speed. The NTSB report noted that, "The Commandant issued a directive for area and district commanders to publish operating limits for their nonstandard boats and reexamine each boat's suitability for its purpose."

The NTSB also concluded that the lack of Coast Guard policies and procedures regarding operating speeds for nonstandard boats at the time of the accident afforded coxswains too much latitude in determining speed and that Coast Guard oversight was inadequate at the time of the accident. Without some means of oversight, the NTSB noted, Coast Guard commanding officers cannot know that the speed limits are followed or that other safety requirements are met. Further, the NTSB said that oversight could be improved by direct observation of coxswain performance and solicitation of feedback from waterway users as well as greater formality in conducting routine patrols. As a result of its investigation of this accident, the NTSB issued the following recommendations to the Coast Guard:

> Establish oversight procedures for use by the commanding officers or officers-in-charge of Coast Guard stations to improve the safety of Coast Guard routine small boat operations, including the institution of in-depth predeparture briefings, thorough predeparture checks of boats, monitoring of coxswain performance, and thorough postpatrol debriefings. (Safety Recommendation M-02-25)

> Evaluate on an annual basis your program for reducing nonstandard boat accidents and for ensuring compliance with Coast Guard policies and procedures related to those vessels; publish the results annually for use by Coast Guard stations. (Safety Recommendation M-02-26)

In response to these recommendations, the Coast Guard reported that it published a revised Boat Readiness and Standardization Program Manual (COMDTINST MI6114.24B) that required continuous evaluation of readiness of boats and crews. The manual recommended that self-audited evaluations of material readiness and standardization also assess performance in team coordination, risk management, and crew briefings and debriefings as part of standard boat operations. The Coast Guard also tasked operational commanders to conduct annual RFO evaluations to determine unit compliance with Coast Guard policies and procedures, and to assess a unit's crew training program and underway exercise evaluation. As a result of the Coast Guard actions, on November 21, 2003, the NTSB classified both recommendations "Closed—Acceptable Action."

After the Biscayne Bay accident, Coast Guard headquarters issued the following directive to small boat force leaders: "Impress upon all hands that throttles have more than two [stop and

full] operational positions. … Normal operating speeds must be something less than maximum speeds, and coxswains must have time to see, react, and avoid obstacle. … The image of the young Coastie zipping along at max throttle is becoming a stereotype, reflects poorly upon our professionalism, and encourages reckless behavior in our developing boat crews." After the accident the Coast Guard also stated the following in its Non-standard Boat Operator's Handbook:

> A high number of small boat mishaps can be attributed to excessive speed. … As a crewmember, never hesitate to ask the coxswain to SLOW DOWN or take up a more forgiving heading. Safe operating speed is an element of prudent seamanship.[46]

As a result of another Coast Guard small boat accident in 2001,[47] the Coast Guard required each area and district commander to publish operating limits for each boat type and reexamine each boat's suitability for its purpose. Commanding officers were also required by the newly issued Navigation Standards Manual to impose specific operating restrictions (speed, distance from hazards, and frequency of fixes) on locations within the area of responsibility (AOR) identified as posing significant navigational or environmental risk to boats.

1.12.8 Nondistress Search-and-Rescue Assist Policy

At the time of the accident, the Coast Guard's policies and procedures in search-and-rescue operations were included in an addendum to the United States National Search and Rescue Supplement, which in turn was a section of the International Aeronautical and Maritime Search and Rescue Manual. Part of the Coast Guard's search-and-rescue addendum addressed instances in which a boater requested assistance but was not in distress. Under those circumstances, the Coast Guard policy was to offer to issue a MARB on behalf of the boater to request that other boaters or a private towing company in the vicinity come to the boater's assistance. If no one responded within a "reasonable" period of time, the Coast Guard would send one of its boats to assist. Representatives of the Coast Guard's Office of Search and Rescue told NTSB investigators that all Coast Guard personnel, including coxswains, received training in the nondistress policy. Although there were no written procedures, Sector San Diego personnel told NTSB investigators that a coxswain could decide to check on a nondistress vessel and was allowed to do so.

1.12.9 Coast Guard Postaccident Activity

The commanding officer of Station San Diego told NTSB investigators that, shortly after the accident, he issued verbal guidance limiting the speed of SPC-LEs to minimum speed[48] outside the main shipping channel. This new speed restriction was not incorporated into Station San Diego's navigation standards, which were revised on July 29, 2010, and, as of the date of

[46] It was noted in the NTSB of the investigation of the *Bayside Blaster* accident that a recent DOT IG audit reported a 225% increase in accidents in FY 2000 over FY 1998 and that 56% of the accidents were caused by poor judgment or navigation and operational errors and hence were preventable.

[47] Because this accident did not involve a nonpublic vessel, the NTSB did not investigate it.

[48] Minimum speed is generally understood to mean idle speed, or 2–4 knots.

this report, were still current. The commanding officer stated that slower speeds would reduce the risk of collision but he did not think that Coast Guard boat operators were going too fast or operating unsafely during normal operations. Appendix C contains a letter from the commander of Sector San Diego concerning this verbal guidance on safe speed.

Also in the July 29, 2010, revision to the navigation standards, Station San Diego added the following:

> The SPC-LE represents a unique challenge in safe speed determination. At lower rpm's the stern of the SPC-LE will squat, causing the bow to rise and limit the forward visibility of the crew (lookouts). Due to this design restriction, the SPC-LE shall not be consistently (more than a few seconds) operated at between 2000-3500 rpm's unless absolutely necessary to the assigned mission. For missions where slower speeds are extensively needed, the 41 [-foot-long] UTB should be considered the primary resource.

Following the December 20, 2009, collision of the *CG 33118* and a December 5, 2009, collision in Charleston Harbor, South Carolina, involving a 25-foot-long Coast Guard boat,[49] the Coast Guard commandant issued a message titled, "Leadership for Safe and Effective Boat Operations,"[50] to all Coast Guard units. In this message, the commandant discussed the need to ensure that all Coast Guard boat operators "have the time and focus to develop and maintain the skills needed to safely accomplish their very demanding missions." The message also announced that the Coast Guard vice commandant had directed the Coast Guard's force readiness command to conduct a systematic review of small boat operational doctrine, tactics, techniques, and procedures, which was to be completed by August 1, 2010. As of the date of this report, the review ("Boat Operations Safety Review") had not yet been completed. The vice commandant also called for the establishment of a boat forces advisory council "to provide a communications conduit between the field and headquarters" and to make recommendations on policy, doctrine, training, support, and acquisition issues affecting Coast Guard boat forces. The advisory council participated in the Boat Operations Safety Review, and is assessing whether to create a navigator position on Coast Guard high-speed boats.

The admiral in charge of the Eleventh Coast Guard District told NTSB investigators that the Coast Guard would not issue safety alerts targeted to its own operators before its investigations were completed because doing so could communicate information different from the findings of the completed investigations.

[49] A 25-foot Coast Guard vessel collided with a small passenger vessel outfitted with holiday lights in Charleston Harbor, South Carolina. On December 18, 2009, the Coast Guard issued a safety alert 09-09 for informational purposes, addressing how holiday lights can impair navigation lights on vessels. Also see section "Other Information, *Thriller 09* and *CG 25689* Collision."

[50] U.S. Coast Guard, ALCOAST 064/10, COMDTNOTE 16010, February 4, 2010.

1.13 Vessel Forward Visibility

1.13.1 General

The SPC-LE is considered a high-speed planing boat. The hull of such a vessel will rise, that is, be on plane, as the vessel attains higher speeds. As a vessel's speed increases, it passes from displacement to semidisplacement (transition) mode, to planing mode. Once a vessel is in planing mode, planing can be maintained with a slight reduction in engine power. Vessels typically reach their highest trim angle[51] in the transition zone (**figure 12**). In general, planing boat operators avoid traveling in the transition zone because of the obstructive effects of the high trim angles on their forward visibility, and because of poor fuel economy. In addition, operating in the transition zone causes large wakes.

Figure 12. Stages of generic vessel planing and corresponding trim angles.

Visibility from the helm of the SPC-LE is therefore affected by the hull trim angle, which is itself affected by several factors: the weight and distribution of fuel, persons, and gear on board the vessel; vessel speed; sea conditions; trim position of the outboard engines; and the horsepower and rpm of the outboard engines. As on many planing boats, as the vessel transitions between displacement mode and planing mode, the hull is subject to its largest operating trim angle. A high trim angle reduces forward visibility because the height of the bow above the water line obstructs the operator's forward view of the water. Once the vessel reaches planing speed and the bow begins to trim downward, forward visibility improves.

An SPC-LE coxswain at Station San Diego stated that for her to have good visibility in the planing mode, the boat would need to be traveling at 3500 to 4000 rpm. She stated that if she traveled at an rpm below that, she could not see. She further indicated that if she did not want to travel at speeds higher than that rpm range, then she would travel in the displacement mode, at slow speed.

SDHP officers, who operate a 31-foot-long SAFE Boat,[52] stated that while operating in the transition zone, the bow of the vessel can obstruct forward vision. The SDHP officers stated that they accounted for the reduced visibility zone by avoiding traveling in the zone's associated

[51] Trim angle is the change in a vessel's inclination from the boat's design horizontal deck, or reference line, to the surface of the water.

[52] The 31-foot-long SAFE Boat operated by the SDHP is also a planing vessel, but has different engine configuration, performance characteristics, and range of visibility than the SPC-LE.

speed range, that is, by traveling above and below this range as circumstances and conditions warranted.

1.13.2 Design Standards

The American Boat and Yacht Council (ABYC) has published *ABYC Standards for Small Craft* since 1954. Compliance with these standards is not required by regulation, but the standards are widely used by small craft manufacturers. DHS, in its contract with SAFE Boat, required that the SPC-LE meet applicable ABYC standards. The Coast Guard's contract with SAFE Boat said "unless otherwise specified, construction of the SPC-LE and installation of all equipment and systems shall be in accordance with … ABYC standards."

One of the standards ABYC established was visibility standard, H-1 – Field of Vision from the Helm Position, a design standard for vessels less than 79 feet in length.[53] The purpose of this standard was to "minimize obstructions in the field of vision from the helm station(s)." The H-1 standard required visibility to be determined in a range of eye heights, from seated and standing positions. (See Appendix D for more information on the H-1 visibility standard.) The H-1 standard consists of horizontal and vertical components that comprise the range of visibility across the unobstructed vertical and horizontal fields of view.

NTSB investigators requested Coast Guard assistance in verifying that the SPC-LEs met the ABYC H-1 visibility standard. The Coast Guard responded that it had not conducted any first article testing[54] of the SPC-LEs because the vessel "was a proven capability which had been in use by Customs and Border Protection" and did not confirm whether the vessel complied with the H-1 standard. NTSB investigators also requested that SAFE Boat confirm that the SPC-LE met the ABYC H-1 visibility standard. SAFE Boat responded that the vessel complied with the standard and produced documentation to that effect.

1.14 Tests and Research

1.14.1 ABYC Visibility Testing

The NTSB contracted with ABYC to test whether the SPC-LE met the H-1 visibility standard. Because the *CG 33118* was impounded, another SPC-LE was used in the testing on San Diego Bay under NTSB supervision. ABYC conducted underway testing to determine the vessel's highest trim angle. This was done by recording trim angles, engine rpm, and speed throughout the vessel's operating range. The highest trim angle, outside of the transition zone,[55]

[53] This report refers to the ABYC H-1 visibility standard dated July 2000.

[54] First article testing includes inspection and testing to ensure that a product's characteristics conform to drawings or specifications.

[55] The H-1 standard specifically excludes the high trim angles that occur during the transition zone, that is, between the displacement and planing modes.

occurred at about 3000 rpm, corresponding to a speed of about 19 knots. This trim angle corresponded to the end of the transition zone and the start of the planing mode.[56]

ABYC subsequently tested the vessel on shore by positioning a trailered SPC-LE at the various trim angles that had been recorded while under way, and noting if a target point located four boat lengths from the bow[57] (135 feet) could be seen from specific eye positions.

ABYC determined that the SPC-LE failed to meet the H-1 visibility standard for the following reasons:

1. The horizontal 15-degree clear sector to port is obstructed by the center cabin structure at the standing low eye height position.

2. The horizontal 15-degree clear sector in the standing high eye position is obstructed from port to starboard.

3. The standing low eye (3.5 degrees maximum) and standing high eye (5.5 degrees maximum) positions cannot view the target at the maximum running angle of 6.5 degrees.

4. The port forward corner of the cabin structure does not allow normal movements of the operator's head to permit unobstructed visibility.

5. Controls for steering, shift, throttle, and trim were not positioned so that operator hand contact can be maintained during use in the seated position.[58]

1.14.2 Forward Line of Sight—NTSB Comparison Study

NTSB investigators examined the vertical forward field of view from the two front-seat positions of the SPC-LE using input from the ABYC testing, Coast Guard Investigative Service underway testing video, and SPC-LE drawings. Investigators chose these positions because the starboard forward seat is manned by the coxswain, and the port forward seat is required to be manned another crewmember. The assessment considered both front-seat positions to be similar in configuration. Investigators used the approximate eye heights of the *CG 33118* coxswain, who

[56] The following table summarizes the recorded data from the on-water testing, correlating the approximate outboard engine rpm, boat speed, and boat trim angle to the SPC-LE's travel mode:

Mode	Displacement	Semi-Displacement	Planing
Outboard Engine (rpm)	0–2000	2000–3000	3000–5250+
Speed (knots)	0–8.4	8.4–19.2	19.2–43.7+
Boat Trim (degrees)	1.2–5.0	5.0–unknown	6.5–2.0

[57] Established in the H-1 design standard.

[58] The outboard engine throttle control levers on the tested SPC-LE were similar in dimension and location to the levers on the *CG 33118*; however, they were not the same type of control levers as on the *CG 33118*. The crew of the tested SPC-LE stated that the lever style on the tested vessel was the latest model fitted to SPC-LEs.

was 6’1” tall, and the boatswain’s mate, who was 5’5” tall, to determine their sight lines to the surface of the water and the Sea Ray’s all-around light and its hull, at different speeds.

At a vessel speed of 5 to 7 knots, crewmembers with eye heights of either the coxswain or the boatswain’s mate would have had unobstructed sight lines to the Sea Ray’s all-around light, and these sight lines would have met H-1 criteria. At eye heights similar to that of the coxswain, the Sea Ray’s hull would be completely visible until it was 58 feet or less from the bow. At eye heights similar to that of the boatswain’s mate, the Sea Ray’s hull would have been completely visible until it was 77 feet or less from the bow.

At the speed that produced the greatest trim angle (about 19 knots), SPC-LE operators with eye heights similar to the coxswain’s would not have a sight line to the surface of the water that met H-1 criteria, but would still have an unobstructed view to the Sea Ray’s all-around light. The Sea Ray’s hull would be obstructed from 0 to 135 feet from the bow, partially obstructed from 135 to 432 feet from the bow, and completely visible at distances greater than 432 feet from the bow.

At the same speed, the sight line of crewmembers with eye heights similar to that of the boatswain’s mate would not meet H-1 criteria, as those crewmembers would have had an obstructed sight line to the water the entire time; that is, the horizon would never be in view. This eye height would have an obstructed sight line to the Sea Ray’s all-around light until the light came within 160 feet of the bow, at which point it would gradually become visible. However, the Sea Ray’s hull would not be visible at any time to crewmembers with this eye height.

The forward sight lines from both front-seat positions would improve at speeds above 19 knots. Near the SPC-LE’s cruising speed of 35 knots, crewmembers with eye heights similar to either the coxswain or the boatswain’s mate would have an unobstructed sight line to the Sea Ray’s all-around light, and this sight line would have met the H-1 criteria. At this speed, the Sea Ray’s hull would be completely visible to crewmembers with eye heights of the coxswain until the hull was less than 85 feet from the bow, and completely visible to crewmembers with eye heights similar to the boatswain’s mate’s until the hull was less than 121 feet from the bow.

1.14.3 SPC-LE Engine rpm/Speed Determinations

NTSB investigators were unable to obtain documentation of SPC-LE boat speeds at various outboard engine rpms with triple 300-hp engines. The data existed only for the SPC-LE as originally configured with triple 275-hp engines. To obtain the data, after completion of ABYC visibility testing, NTSB investigators recorded vessel speeds at particular engine rpms. The engine speeds recorded for engine rpms above the transition zone (i.e., in planing mode) are as follows:

SPC-LE with Triple 300-hp Engines	
Engine rpm	Speed in Knots
3000	19.2
3250	22.0
3500	25.9
3750	29.0
4100	33.0
4500	34.5
5000	39.2
5250	43.7

1.14.4 Video Study

NTSB investigators obtained witness video of the *CG 33118* operating in San Diego Bay prior to the accident. One video showed the vessel traveling southbound in the bay prior to meeting the cutter *Haddock*, and another showed the *CG 33118* on the leg prior to the accident, traveling from the northern end of Shelter Island eastward along Harbor Island.

The latter eastbound video consisted of 12 seconds of footage of the *CG 33118*, filmed by a witness on board a sailboat a few minutes before the collision. The sailboat was positioned about 460 yards south of the west end of Harbor Island and was estimated at one point to be about 66 yards from the passing *CG 33118*. The witness filmed in a sweeping motion from southwest to northeast. The footage captured the *CG 33118* during the vessel's eastbound transit on the bay when crewmembers were searching for the grounded Catalina along the south shore of Harbor Island. Shortly after this portion of the video was recorded, the *CG 33118* reversed its course to a west-northwesterly heading before the collision occurred. None of the west-northwesterly leg was captured by the video; however, the camera did capture the sound of the collision and filmed the area of the accident immediately after the collision. The video was filmed about 190 yards from the collision site.

Using fixed reference points in the background of the video, NTSB investigators calculated the speed at which the *CG 33118* was traveling during the earlier eastbound transit. Investigators determined that the *CG 33118* was traveling at about 42 knots[59] during a portion of the eastbound transit.

1.14.5 Audio Study of *CG 33118* Speed

NTSB investigators used audio tracks of the recording described in the previous section to conduct a sound spectrum study as an additional determinant of the speed of the *CG 33118*. The results indicated that, during the eastbound leg of the *CG 33118*, its engine rpm reached 5450 to 5550. This rpm corresponds to an estimated speed of 44–45 knots in accordance with the speed-versus-rpm graphs NTSB investigators developed during underway testing of an SPC-LE.

[59] The calculated average speed on a portion of the leg was 41.74 knots, with a +/–3.4 knot range of uncertainty.

1.15 Other Information

1.15.1 Nighttime Visual Perception

Because of statements from *CG 33118* crewmembers that they did not see the Sea Ray leading up to the accident, *CG 33118* investigators considered nighttime visual factors including the contrast of the Sea Ray's hull with the surface of the bay, the visibility and conspicuity of the Sea Ray's navigation lights, and the effect of the lights with regard to the visual angle to determine what effect, if any, these factors may have had on the crew's ability to see the Sea Ray.

During the day, people can visually distinguish objects that differ in brightness, color, pattern, and shading, but at night they rely on contrast to differentiate an object from its background. An object must be sufficiently brighter or darker than its background to be visible at night. Visibility of a lighted object, one researcher notes, normally refers to its intensity and depends on properties such as its luminance or brightness, color, size, and shape.[60] By comparison, an object's conspicuity also depends on these properties, but is relative to those of objects in the perceiver's field of vision. At night, a bright object that may be visible if viewed against a dark background will be inconspicuous or invisible if viewed against a background containing other, similar lights in the visual field. Therefore, at night, a lit object can be visible but not conspicuous if other lit objects are nearby.

The Sea Ray had three navigation lights, red port and green starboard lights mounted forward on its hull and an all-round white light mounted about 7 feet above the waterline at the centerline of the stern. The port and starboard lights faced forward in accordance with regulations and were shrouded from an astern view. Further, from an astern view, the Sea Ray's hull was unlit. Figure 9, shown earlier, depicts the waterway and background near the Sea Ray around the time of the collision. Both photos in Figure 9 indicate that lights with colors similar to the Sea Ray trio of navigation lights were present along the shore from the west to the north and on the water from other vessels, including some with extraneous holiday lighting. San Diego-based coxswains described San Diego Bay as a challenging nighttime visual environment because of background lighting.

Research also indicates that, at night, vehicle drivers use two additional cues, changes in the visual angle and changes in the size of the vehicle, to detect a vehicle ahead. The visual angle, which is formed by the angle of the paths of the two vehicles, will change as the angle of the paths changes. The perceived size of an object will change as a vehicle approaches another. The rate of changes in the visual angle, and the rate of change of the size of a stopped vehicle, provide operators with indications of the distance to an object and its speed relative to the speed of the operator's vehicle. An increasing visual angle indicates that the distance to the object ahead is decreasing. The smaller and more distant an object, the more diminished the ability of an operator to judge its distance and speed. Because the angle of the *CG 33118* and the Sea Ray was relatively constant, it did not change from the perspective of the *CG 33118* crew. Only the

[60] Wertheim, A. H. (2010). Visual conspicuity: A new simple standard, its reliability, validity, and applicability. *Ergonomics* 53, 421–442.

size of the Sea Ray's all-around light would have changed as the *CG 33118* approached the vessel.

1.15.2 Coast Guard AIS Policy

The *CG 33118* was outfitted with AIS, and the transponder was located above the helm console. In standard mode, AIS units on SPC-LEs broadcast a vessel's name, course, speed, latitudinal and longitudinal position, AIS identification number, and the vessel's dimensions. The unit provides AIS capabilities through three modes of operation. Coast Guard AIS policy guidance, issued in August 2008 by the admiral in charge of the Eleventh Coast Guard District, stated the following with respect to the three AIS modes:

- Standard mode—The unit will perform similarly to standard commercial shipboard AIS units, broadcasting the vessel's position and information to all other AIS receivers within VHF range. This mode is recommended for increased navigation safety and overt operations.
- Disabled mode—The unit will not transmit data at all. This mode is recommended for increased operations security and covert operations.
- Restricted mode—The unit will transmit encrypted AIS data that will be available only for friendly or blue force61 units with similar encryption capabilities. This mode is recommended as the default setting for boats with AIS units.

In all modes, the unit is able to receive, monitor, and display both encrypted and unencrypted AIS data from other AIS-equipped vessels.

The August 2008 AIS policy guidance also sought to "standardize the District-wide use of … AIS and to enhance command centers' common operating picture." The policy guidance also stated that coxswains were allowed to switch modes at their discretion.

1.15.3 AIS Operation on the *CG 33118*

The *CG 33118* boat engineer told NTSB investigators that coxswains usually activated the AIS, and he believed that the AIS on board the *CG 33118* was operating on the evening of the collision. He also stated that the JHOC often notified Coast Guard vessels on departure that their AIS signals were displayed on the JHOC screens, but he was unsure if this occurred that evening. After the accident, NTSB investigators reviewed the AIS history plots for San Diego Bay that were recorded around the time of the collision. Although the JHOC AIS recording showed the *Haddock* and several large commercial vessels, it did not display any *CG 33118* AIS data.

After the accident NTSB investigators oversaw the testing of the *CG 33118*'s AIS. The tests were conducted in the enclosed Station San Diego helicopter hanger. The results revealed

[61] Blue force tracking is used by law enforcement and military organizations to denote a GPS-enabled system that allows blue force command centers to locate and monitor AIS-equipped military assets, both friendly and hostile, and general AIS-equipped traffic in the area.

that latitude and longitude coordinates were not displayed on the AIS data screen, nor did the vessel's position register in the JHOC in either restricted or standard modes.

The JHOC watchstander at the time of the accident told NTSB investigators that he normally monitors the AIS of the small boats, but he said that when the *CG 33118* was under way, he did not notice that the *CG 33118* was not transmitting its AIS data. He said that after the accident occurred, he did not have a chance to follow up on whether the *CG 33118* had been transmitting AIS data. He would routinely note vessels not transmitting AIS data and then call their coxswains to tell them to activate their AIS units. He also noted that on some occasions when an AIS was not transmitting data, the JHOC would allow the vessel to continue its patrol.

1.15.4 *Thriller 09* and *CG 25689* Collision

On the night of December 5, 2009, at 2028 eastern standard time, the 25-foot Coast Guard small boat *CG 25689* and the small passenger vessel *Thriller 09* collided in Charleston Harbor, South Carolina.[62] Before the accident, the *CG 25689* had been providing security escort service to a commercial ship that was outbound to sea. At the time of the accident, the *CG 25689* had completed its escort and was returning to its station. The *Thriller 09* was on a 1-hour sightseeing cruise in Charleston Harbor.

On board the *CG 25689* were three crewmembers; on board the *Thriller 09* were two crewmembers and 22 passengers. As a result of the accident, six passengers on the *Thriller 09* sought and received medical treatment for injuries. No crewmembers on the *CG 25689* or the *Thriller 09* were injured.

1.15.5 Cell Phone Use

Following the accident, the NTSB obtained records for the five *CG 33118* crewmembers' personal cellular telephones to determine what cell phone activity, if any, took place after the time the *CG 33118* got under way about 1723. The records indicated that the coxswain made a 2-minute call at 1724, but neither received nor sent text messages. The boatswain's mate in the forward port seat received a text message at 1742 (about 2 minutes before the collision) but did not send any herself, and she did not place or receive calls. The OOD, seated in the aft port seat, made a 9-second call at 1726 and a 7-second call at 1726. He sent a text message at 1727. The boat engineer, seated in the starboard aft seat, did not receive or make phone calls while under way. His text message activity could not be determined.[63]

[62] *Collision between USGC boat CG 25689 and passenger vessel Thriller 09, 12/5/2009, Charleston, SC*, Marine Accident Brief NTSB/MAB-11/02 (Washington, DC: National Transportation Safety Board, 2011).

[63] The boat engineer's wireless provider's information regarding text message activity did not allow investigators to determine the times at which the activity occurred.

1.15.6 Previous Safety Recommendations

In August 2010, the NTSB issued two safety recommendations to the Coast Guard with respect to cellular phone use:

> Develop and implement national and local policies that address the use of cellular telephones and other wireless devices aboard U.S. Coast Guard vessels. (M-10-2)
>
> Issue a safety advisory to the maritime industry that (1) promotes awareness of the risk posed by the use of cellular telephones and other wireless devices while operating vessels and (2) encourages the voluntary development of operational policies to address the risk. (M-10-3)

The recommendations were based in part on the *CG 33118* accident but primarily on the December 5, 2009, collision in Charleston. Cellular telephone records revealed that crewmembers on both Coast Guard vessels had been using cellular telephones to engage in text messaging or personal conversations near the time of the accident. In November 2010, the Coast Guard responded to the NTSB and indicated it concurred with both recommendations. In response to M-10-2, the Coast Guard stated that in July 2010 it established a policy mandating that crewmembers may use cellular telephones or texting devices on Coast Guard small boats, but only when authorized by the coxswain. The Coast Guard further stated that at no time was a Coast Guard vessel operator to use a cellular telephone or texting device for nonoperational purposes. The new policy was to be added to the Coast Guard's Boat Operations and Training Manual in the subsequent revision of the manual in 2011.

In response to Safety Recommendation M-10-3, the Coast Guard issued a safety advisory (01-10) in October 2010 that addressed distractions due to the use of cellular telephones and wireless devices. The Coast Guard added that it would work with the National Boating Safety Advisory Council to raise awareness of this issue with the recreational boating community. As a result of the Coast Guard's response and action, the NTSB in November 2010 classified Safety Recommendation M-10-2 as "Open—Acceptable Response" and M-10-3 as "Closed—Acceptable Action."

On June 21, 2011, the NTSB adopted further recommendations concerning cell phone use following its investigation of the 2010 collision of the tugboat/barge *Caribbean Sea*/*The Resource* with the amphibious passenger vehicle *DUKW 34*, in Philadelphia, Pennsylvania. The NTSB recommended that the Coast Guard

- Develop and implement an investigative protocol that directs its investigation officers to routinely check for nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions involved in marine accidents. (M-11-002)

- Revise its commercial vessel accident database (MISLE) to maintain a record of nonoperational use of cell phones and other wireless electronic devices by on-duty

crewmembers in safety-critical positions when such use is causal or contributory to marine accidents. (M-11-003)

- Regulate and enforce the restriction on nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions so that such use does not affect vessel operational safety. (M-11-004)

- Develop regulations governing nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions, and should continue its outreach program of information and education to the maritime industry on this issue. (M-11-005)

2 Analysis

2.1 General

The analysis first identifies factors that can be readily eliminated as causal or contributory to the accident, followed by a summary of the accident sequence. It then discusses safety issues identified in the accident investigation:

- Speed of the *CG 33118*
- Coast Guard oversight of small boat operations
- SPC-LE forward visibility
- Coast Guard monitoring of small boat operational data
- Coast Guard use of personal cell phones under way

2.2 Exclusions

At the time of the accident, the winds and sea were calm and visibility was good. The *CG 33118* crew and the Sea Ray operator were tested after the accident for the presence of alcohol and illegal drugs, and all results were negative. Both vessels were examined after the accident and found to have been free of preexisting issues that would have compromised their seaworthiness or operational capabilities. The Sea Ray's all-around light bulb was examined after the accident and found to have shown damage consistent with its being illuminated at the time of impact. The NTSB therefore concludes that weather, illegal drugs and alcohol, and the mechanical condition of both vessels were not factors in this accident.

Three of the five *CG 33118* crewmembers declined requests of NTSB investigators to be interviewed. Neither of the two crewmembers NTSB investigators interviewed—the boat engineer and the crewmember-in-training—was directly involved in navigating the *CG 33118*, and they did not sit in the front of the vessel where they could have played a substantial role in its operation. The boat engineer did not recall his sleep schedule in the days preceding the accident, but he reported going to sleep at 0300 and arising at 0630 on the day of the accident, for a total of 3.5 hours of sleep. This amount would, at best, lead to an acute sleep loss, which has been found to degrade performance.[64] The boat engineer reported taking a nap of unknown duration in the afternoon on the day of the accident; however, even if he slept well during the nap, the amount and quality of sleep would have been unlikely to compensate for the night's sleep loss because of the effects of his circadian sleep cycle. In any event, his role in the operation of the vessel was, as noted, minor. The crewmember-in-training estimated that, based on his typical rest schedule, he slept about 8.5 hours per day in the days before the accident. However, because the majority of *CG 33118* crew members declined to be interviewed by the NTSB, insufficient information was available to evaluate the role of fatigue in this accident.

[64] Mallis, M. M., Banks, S., and Dinges, D. D. (2010). Aircrew fatigue, sleep need, and circadian rhythmicity. In E. Salas and D. Maurino (Eds.) *Human Factors in Aviation* (2nd Ed. pp. 401-436). Burlington, MA: Academic Press.

2.3 The Accident

The Coast Guard SPC-LE vessel *CG 33118* departed Coast Guard Station San Diego at 1723 on December 20, 2009. The five crewmembers had no specific assignment except to patrol San Diego Bay during the Parade of Lights and assist other Coast Guard vessels as necessary. After departing the station, the crew coordinated with the crew of the Coast Guard cutter *Haddock*, the lead vessel in the Parade of Lights, and informed its commanding officer that the *CG 33118* crewmembers were available to provide assistance as needed.

After hearing a MARB about a grounded sailboat, the CG *33118* crew obtained permission from the JHOC to respond. The crew initially searched for the sailboat along the south shore of Harbor Island. When the crewmembers could not locate it, they communicated with JHOC personnel and were redirected to the vessel's correct location, Harbor Island's West Basin. About three-quarters of a mile after the *CG 33118* crew turned the SPC-LE to travel to the second location, it collided with the Sea Ray recreational boat.

Witnesses described the *CG 33118*'s course as constant and at the same approximate west to northwest heading as the Sea Ray ahead of it. The physical evidence of the collision shows that the bow of the *CG 33118* struck the stern of the Sea Ray at an angle of about 11 degrees to starboard, an angle consistent with the Sea Ray operator's stated attempt, immediately before impact, to accelerate and turn his boat to the right to avoid being struck by the *CG 33118*.

2.3.1 *CG 33118* Operating Speed

The speed of the *CG 33118* directly affected the amount of time in which the crewmembers could have taken action to avoid the accident once they detected the Sea Ray; specifically, the time available for the coxswain and the crew to detect, perceive, and then avoid the Sea Ray. At the same time, vessel speed has a direct relationship to any vessel damage or personal injury that would be sustained in a collision with another vessel. NTSB investigators sought to determine why the *CG 33118* crew operated the vessel at the speed they did, given the prevailing circumstances and conditions.

The coxswain told SDHP that the *CG 33118* was traveling at 3000 rpm or about 19 knots at the time of the collision. Another crewmember estimated that the vessel was traveling 20 to 25 knots. Witnesses stated that the *CG 33118* was planing, corresponding to a minimum speed of 19 knots at the time of the accident, and estimated its speed as 20–30 knots. They also said that the vessel's speed on the accident leg was about that of the previous eastbound leg. The NTSB analysis of witness video of the *CG 33118* determined the vessel's speed to be about 42 knots while it was traveling east to the first reported location of the grounded sailboat, nearly full throttle, about 5000 rpm, a speed that audio analysis corroborated. If the accident leg speed was as high as the eastbound leg speed, as witnesses consistently attested, the speed on the collision leg could have been as high as 42 knots. Because of the absence of data on the accident leg, a precise determination of the speed and track of the *CG 33118* at the moment of collision could not be obtained. Nevertheless, operating the *CG 33118* at any speed above 8 knots (the vessel's approximate maximum displacement speed) was unsafe for the prevailing conditions. NTSB concludes that the *CG 33118* was planing, that is, traveling at least 19 knots, at the time of the

collision, considerably faster than a safe speed of 8 knots or lower under the prevailing conditions.

2.3.2 Marine Assistance Radio Broadcast

Coxswains must evaluate and determine the commensurate response for any assistance or distress call. The accident occurred while the *CG 33118* was actively responding to a MARB for a grounded sailboat. In accordance with its policy the Coast Guard issues MARBs on behalf of boaters that are requesting assistance, but are not in distress. Although the grounding location was originally conveyed incorrectly to the *CG 33118*, both the original and corrected grounding locations were in a protected harbor environment with fair weather conditions. Further, the JHOC watchstander clearly conveyed to the *CG 33118* that the sailboat was not in distress and there was no indication that the grounded boater was in any danger. Therefore the NTSB concludes that the vessel grounding to which the *CG 33118* responded was not an emergency, and did not necessitate a high-speed response that reached 42 knots at one point.

2.3.3 Traffic Density

Because of the Parade of Lights, considerably more vessels were on the bay that night than virtually any other night. The route of the *CG 33118* in response to the MARB was documented by witness and crew statements and by witness video. The *CG 33118* left station San Diego and met the *Haddock* near the north end of Shelter Island. In response to the MARB, the *CG 33118* initially headed to the northeast in an arc congruent to but south of the parade route. The eastbound leg passed close to the eventual accident site. This track allowed the crew to see the vessels in the vicinity of the parade route near the West Basin inlet, which would have made them cognizant of the heavy vessel density in the area. Further, the two crewmembers that the NTSB interviewed both commented on the greater than usual number of boats on the Bay that night. The NTSB therefore concludes that the *CG 33118* coxswain and crew were aware of the heavy vessel density in the area.

2.3.4 Safe Speed

Inland navigation rules obligate all mariners to operate their vessels at safe speeds "so they can take proper and effective action to avoid collision." The rules assign mariners the responsibility to correctly interpret and apply navigational principles and practices, given the conditions and circumstances. The NTSB examined the prevailing conditions and circumstances to determine how the coxswain should have considered them in operating the *CG 33118.* These included darkness, background lights, the lights of the vessels in the area, the vessel traffic density, and the effects of the *CG 33118*'s wake.

Station San Diego Boat Piloting and Navigation Standards state that "special consideration must be given to the fact that background lights on shore will make the identification of vessel traffic more difficult." Station San Diego coxswains told NTSB investigators that they were aware of the effects of the bay's background lighting on their ability to detect vessels at night. Investigators examined the approximate route of the *CG 33118* on the

accident leg and noted that extensive background lighting spanned across the field of view of the *CG 33118* crew as they overtook the Sea Ray.

In addition to the effects of background lighting, the coxswain also needed to consider the effects of the density of vessels in the area. Over 80 boats participated in the parade, and there were hundreds of spectator boats, ranging from small dinghies, kayaks, and canoes (some unlighted) to large yachts and commercial vessels, congregated along the parade route, creating higher than normal vessel traffic, particularly in the area near the West Basin inlet.

The wake created by the *CG 33118* needed to be considered as well. A boat's wake can be hazardous, especially to smaller vessels. It can rock and potentially swamp or capsize other boats, and passengers may be thrown off balance or overboard. Where local conditions warrant, "no wake" areas are designated in many waterways as a means to protect other vessels. The *CG 33118* would have produced a wake at the speeds at which it was estimated to have been operated, endangering smaller vessels present at the event.

On the accident leg, the coxswain was operating the *CG 33118* at planing speed, which was at least 19 knots and possibly as high as 42 knots. He operated the vessel at 42 knots just minutes earlier on the preceding leg. Station San Diego instructions specified that SPC-LE cruising speed should not exceed 4200 rpm, which is equivalent to a speed of about 35 knots. The *CG 33118* crew was responding to a soft grounding, a nonemergency that did not warrant operating at such speeds. Given the inland navigation rules and Station San Diego speed guidance, the *CG 33118* coxswain and crew should have considered nighttime visibility limitations, San Diego Bay background lighting, and traffic density in determining safe vessel operating speed. In addition, crews should have considered wake effects of vessel speed. As noted previously, operating the *CG 33118* at any speed above 8 knots (the vessel's approximate maximum displacement speed) was unsafe for the prevailing conditions. Therefore, the NTSB concludes that the coxswain's operating the *CG 33118* at any planing speed was unsafe for the prevailing conditions and circumstances of darkness, background lighting, and high vessel density in the parade area.

2.3.5 Visual Perception and Conspicuity

Although the NTSB could not determine the precise point at which *CG 33118* crewmembers could have detected the Sea Ray immediately in front of them, investigators attempted to determine why the crew did not avoid striking the Sea Ray. The vessel was equipped with a functioning radar; however, the only crewmembers consenting to be interviewed were not involved in navigating the vessel and were unable to verify whether the radar was used on the night of the accident. For the crew to visually "see" the Sea Ray, they would need to detect it, perceive it as a boat, and then accurately interpret the boat's distance and relative speed.

In addition, given the cloud layer, the ambient level of illumination was relatively low. As a result, the Sea Ray's hull lacked contrast with the surface of the bay.

The Sea Ray's navigation lights were determined to be illuminated in accordance with applicable regulations. However, the considerable background lights around San Diego Bay

would have lessened the visual cues available to the *CG 33118* crew by limiting the visibility and the conspicuity of the Sea Ray's all-around light against the background. This phenomenon was well known to Station San Diego personnel. Further exacerbating the effects of the background lighting were the brightly lit parade vessels along the eastern shore of Shelter Island that were moving northward into the *CG 33118* field of view. Compounding the difficulties of nighttime visual perception, the *CG 33118* and Sea Ray maintained similar headings for some distance before the accident. Given the *CG 33118*'s course—directly approaching the Sea Ray's stern—the boat's all-around light would have appeared fixed, with no lateral relative motion in the *CG 33118* crew's visual field. This lack of relative motion deprived the crew of another visual cue which would have assisted in differentiating the all-around light from the background lighting because people more readily detect changes in the visual field, that is, motion or flashing, than they do constancy. Because of the constant-heading, dead-astern approach path of the *CG 33118* to the Sea Ray, the crew's ability to detect the Sea Ray's all-around light was limited. Assuming that the crewmembers detected the all-around light, their ability to perceive that they were rapidly closing on the slow-moving boat in front of them would be limited because of the single-point nature, or small size, of the all-around light and its lack of contrast with the surroundings.

In sum, an operator must detect and identify an object, perceive the associated hazard, and then take effective action to avoid striking that object. Operating at a slower speed would have increased the amount of time available to the *CG 33118* crew to detect, perceive, and take action to avoid the collision. Therefore, the NTSB concludes that the continuous illumination of the Sea Ray's all-around light, the effects of the background lights that limited the conspicuity of the all-around light, and the similar headings of the two vessels coupled with the dead-astern approach by the *CG 33118* made it difficult for the crew to visually detect and perceive the Sea Ray; however, traveling at a slow speed would have compensated for these visual difficulties.

2.4 SPC-LE Forward Visibility

Vessel design standards, while fundamental, play but one role in vessel safety. Regardless of design standards, operator skill and judgment, as well as system safety factors, are all basic elements in overall safety. The NTSB did not investigate contractual matters between SAFE Boat and the Coast Guard, which accepted delivery of the vessels under its contract with SAFE Boat. The NTSB also did not investigate the suitability of the specifications, or adequacy of the standards, that the Coast Guard specified for the SPC-LEs.

The NTSB examined the forward visibility of the SPC-LE to determine if, absent nighttime visual perception factors, the boat's design had any impact on the ability of the crew to detect targets ahead. The purpose of the visibility study was to identify obstructions to forward visibility for the two *CG 33118* crewmembers in the forward seats, the operating conditions under which these obstructions were present, and the effects of these obstructions on the ability of the two crewmembers to see the Sea Ray. One of the ABYC small craft standards (ABYC H-1, Field of Vision from the Helm Position) pertains to forward visibility, which for the SPC-LE applied only to the coxswain's position. At the request of and under observation by NTSB investigators, ABYC tested the SPC-LE's compliance with the H-1 standard. This standard

divides forward visibility into horizontal and vertical fields of view. The SPC-LE did not meet all the horizontal visibility criteria of the H-1 standard. However, considering the dead-astern approach of the *CG 33118* to the Sea Ray, investigators determined that the horizontal range of visibility was likely not a factor in the crew's ability to see the Sea Ray immediately preceding the accident. The NTSB examined the effects, if any, of the SPC-LE's failure to meet vertical visibility criteria on the coxswain's ability to detect the Sea Ray from the helm position.

However, the NTSB encountered several difficulties in attempting to determine what the coxswain could have seen. The vessel's exact speed, and therefore trim angle, before striking the Sea Ray is unknown. Further, the coxswain's position during this period could not be precisely determined.

Nonetheless, the NTSB attempted to determine, within a range of vessel speeds, the point at which the coxswain may first have seen the Sea Ray. Assuming a known static coxswain position and the highest vessel running trim angle, that is, a speed at 3000 rpm or 19 knots, the results of the NTSB comparison study indicate that the coxswain's unobstructed sight line to the water did not meet the vertical distance criteria specified in the H-1 standard. At this speed, the coxswain would have seen a portion of the Sea Ray, including the all-around white light, until that vessel was about 135 feet forward of the *CG 33118*'s bow, at which point only the all-around white light would still have been visible. These circumstances illustrate a worst-case visibility scenario. The vessel's vertical forward visibility is most limited at its highest running trim angle.

In addition, the evidence indicates that at least one *CG 33118* crewmember reacted to the Sea Ray just before the collision, and the operator of the Sea Ray said he saw crewmembers in the cabin of the *CG 33118* just before impact. Thus, regardless of the H-1 visibility standards, the *CG 33118* coxswain should have been able to see at least a portion of the Sea Ray at some point before the collision.

Further, boat speed and nighttime visual perception factors may have played a larger role than vessel obstructions in limiting the ability of the coxswain to detect and perceive the Sea Ray in time to avoid the collision. Operators can reduce the extent to which obstructions impair visibility by changing speed (for instance, slowing below 8 knots), changing their eye positions, or both to suit operational circumstances. Forward sight lines progressively improve with higher speeds which decrease the trim angles. Slower speeds, specifically below the transition zone (or about 8 knots), also improve forward sight lines due to lower trim angles. Several SPC-LE coxswains stated they were aware that the bow obstructed forward visibility, at speeds in, and just above, the transition zone. They therefore avoided traveling in this range.

Although not required by the visibility standard, the Coast Guard requires that the forward port position be manned. Along with the coxswain's position, the forward port position affords the best forward visibility on the vessel. Therefore, NTSB investigators examined the sight line of the boatswain's mate, who was seated in that position on the night of the accident. The results of the NTSB study indicate that at the boat's highest running trim angle, the boatswain's mate, who was of average female height, would not have been able to see the surface of the water over the *CG 33118* bow or any part of the Sea Ray. In addition, she would

not have seen the Sea Ray's all-around light until the *CG 33118* bow was within 160 feet of it. At speeds below 8 knots, the crewmember would have had an unobstructed sight line to the Sea Ray until it was about 77 feet forward of the bow.

The importance of adequate visibility for coxswains and crew is self-evident. Without it, the safety of SPC-LE operations is compromised and the risk of collisions and allisions increases. The Coast Guard expects its boats to be operated by crewmembers of a wide range of heights. However, the evidence indicates that shorter operators may not be able to see the surface of the water directly forward of the SPC-LE while in its lower planing range. Therefore, the NTSB concludes that SPC-LEs have obstructions to forward visibility from the helm and the forward port positions, which increase risks if not properly addressed.

Investigators were unable to find evidence indicating that the Coast Guard was aware at the time of the accident that SPC-LEs had obstructions to forward vertical visibility at certain speeds. In July 2010, Station San Diego modified its navigation standards, stating that its SPC-LEs should not be operated "between 2000-3500 rpm's unless absolutely necessary" because of the bow rise in that rpm range. However, investigators found no evidence that any other Coast Guard stations with SPC-LEs have similarly revised their navigation standards. As a result, the Coast Guard may not be adequately mitigating the risks associated with SPC-LE operation. Unless crewmembers are aware of the vessel's forward visibility limitations, they may not take adequate steps to compensate for them. Therefore, the NTSB recommends that the Coast Guard develop and implement procedures for its SPC-LEs that allow crewmembers to compensate for obstructions affecting forward visibility from the helm and the forward port positions.

2.5 Sea Ray

The Sea Ray operator stated he was traveling at idle speed, and witness statements supported this. NTSB investigators determined that the Sea Ray's navigation lights were illuminated at the time of the accident and configured in accordance with applicable inland navigation rules. Therefore, the NTSB concludes that the Sea Ray operator was driving his vessel at a safe speed and manner for the prevailing conditions and circumstances.

Further, with the estimated speed of the *CG 33118* and its reported path, the Sea Ray operator could have done little to avoid being struck by the Coast Guard vessel. Although he attempted to steer his boat out of the path of the oncoming *CG 33118,* the time available to him to maneuver the boat was insufficient to avoid being struck. Therefore, the NTSB concludes that the *CG 33118*'s high speed and its astern path relative to the Sea Ray precluded the Sea Ray operator from taking effective action to avoid the collision.

2.6 Training and Oversight

Investigators examined Coast Guard training and oversight of its small boats and SPC-LE crews in San Diego to determine why the coxswain and the crew operated the *CG 33118* at high speed in the crowded conditions of the Parade of Lights on San Diego Bay.

2.6.1 SPC-LE Coxswain Training

Coast Guard coxswains at all stations were trained through standardized instructional methods. The candidate must complete numerous qualification tasks, demonstrate proficiency during a comprehensive check ride with an instructor, and pass an oral examination before a board comprising senior Coast Guard station command and operations personnel. Examination topics included situational judgment, rules of the road, piloting and navigation, and risk assessment. The Coast Guard emphasized successful completion of each requirement more than the time required to attain proficiency.

2.6.2 Oversight

The *CG 33118*'s speed exceeded Station San Diego's maximum recommended operating speed for SPC-LEs in San Diego Bay on the evening of the accident. While coxswains were permitted to exceed the 4200 rpm limit, or 35 knots, for operational necessity or hot pursuit, no operational need called for speeds as high as 42 knots on the night of the accident, especially given the crowded, dark conditions that prevailed. Coast Guard managers told investigators that its oversight provided sufficient information to determine whether crews followed policies and rules. However, the speed of the vessel on the night of the accident and the lack of objections by other *CG 33118* crewmembers, including the officer of the day, regarding its speed, raises questions about Coast Guard oversight. The disparity in the evidence and testimony suggest that Coast Guard management is unaware of or possibly tolerates such speeds.

Station navigation standards specifically call for reduced speed at night, "even when responding to a potential life threatening case." However, interviews with coxswains and crew indicated that they considered 4200 rpm to be a normal transit speed for the SPC-LE in the bay during the day and night. Station command appears to have accepted this speed as normal. Further, following the accident witnesses stated that Coast Guard boats often operated vessels at high speeds in the bay. While some Coast Guard high-speed operations observed may have been for valid reasons, the evidence suggests that high-speed operations were routine rather than isolated events. The NTSB would expect an effective oversight system to identify unsafe practices, including excessive speed, and take steps to address them. There is no evidence that this occurred.

Coast Guard crewmembers were trained to voice safety concerns to coxswains about how boats were operated. However, neither of the two crewmembers NTSB investigators interviewed after the accident reported that anyone on the *CG 33118* voiced objections about the speed at which the coxswain operated the vessel. The NTSB cannot determine the reasons why none of the crewmembers objected to the speed even though they were expected to speak up if they were concerned about the way the vessel was being operated. Further, Coast Guard personnel on board the *Haddock* who witnessed the *CG 33118* depart from alongside the cutter at high speed also did not indicate a concern with the vessel's speed. Moreover, a more senior coxswain was on board the *CG 33118*; he was higher in rank than the coxswain and functioning as officer of the day and therefore directly represented the station's senior management. The senior coxswain declined an NTSB request to be interviewed; therefore, investigators could not ask him whether he recognized the speed of the *CG 33118* as excessive. Regardless, based on

conditions in the bay that night, he should have recognized that the speed of the *CG 33118* was excessive, and he was responsible and obligated to inform the coxswain to maintain a safe speed. His not speaking up regarding the vessel's speed indicates that the senior coxswain was deficient in exercising his oversight role and may have regarded the speed as acceptable.

In 2002, the NTSB investigated a collision in Biscayne Bay, Florida, between a Coast Guard Station Miami Beach patrol boat and a small passenger vessel, the *Bayside Blaster*. In that case, a Coast Guard coxswain was determined to have been operating at an excessive speed, at night, and in an area subject to background lighting. In both the Biscayne Bay and the San Diego accidents, Coast Guard station management was unaware of coxswains' excessive speeds for existing circumstances and conditions.

In the *Bayside Blaster* accident report, the NTSB commented, "Without some means of oversight, commanding officers cannot know that the speed limits are being followed or that other safety requirements are being met." Additionally, the NTSB concluded, the Coast Guard should "establish oversight procedures for use by commanding officers or officers-in-charge of Coast Guard stations to improve the safety of Coast Guard routine small boat operations." The NTSB added that oversight could be improved by regular direct observation of coxswain performance, and it issued Recommendations M-02-25 and M-02-26 to address the shortcomings it identified. The following year, NTSB classified both recommendations as "Closed—Acceptable Action."

Maximum authorized speed was apparently regarded as normal operating speed at Coast Guard Station Miami Beach during that time, prompting a 2002 Coast Guard Commandant statement to urge small boat force leaders to "impress upon all hands that throttles have more than two [stop and full] operational positions. The image of a young coastie zipping along at max throttle is becoming a stereotype, reflects poorly upon our professionalism, and encourages reckless behavior in our developing boat crews. This is a safety issue, an equipment issue and a leadership issue."

The Coast Guard concurred with the NTSB recommendations. It revised its Boat Readiness and Standardization Program Manual requiring continuous evaluation of the readiness of boats and crews. It recommended that readiness and standardization evaluations include assessment of performance in team coordination, risk management, and crew briefing and debriefing as part of standard boat operations. It used STAN and RFO evaluations to assess a unit's crew training program and underway exercise evaluation.

NTSB investigators examined the results of the January 2010 STAN assessment conducted shortly after the accident. Station San Diego SPC-LE coxswains performed poorly on portions of the written test, averaging a score of 58.6% on navigation rules. Coxswains on the station's other small boat also performed poorly on this section, averaging 62.5%. According to the STAN program manager, the station's command is responsible for addressing such shortcomings. Investigators requested documentation of actions taken in response to these findings. There were none. Lack of any remedial actions taken is not indicative of responsible oversight.

Although RFO and STAN team evaluations provided the Coast Guard with information about SPC-LE crew knowledge, techniques, and skills, they did not provide Station San Diego information about how coxswains and crewmembers were operating the vessels outside these controlled circumstances. RFO and STAN team evaluations provide snapshots in time of performance in controlled, predicted, and structured environments with oversight personnel constantly present, but provide no information to managers about how SPC-LE vessels were being operated day-to-day. Therefore, RFO and STAN team assessments provide an incomplete picture of how vessels are routinely being operated.

In sum, the investigation uncovered several areas in which Coast Guard Station San Diego oversight was deficient: the speed at which the *CG 33118* was operated on the night of the accident; the speeds at which SPC-LE vessels were routinely being operated at night; the silence of the *CG 33118* crewmembers regarding the speed; the limitations of RFO and STAN team evaluations; the lack of follow-up on STAN assessments; and, as is discussed below, the failure to ensure transmission of AIS data.

Without effective oversight, management cannot determine if policies and procedures are followed or other safety requirements are being met. Oversight of Station San Diego Coast Guard small boat operations could be improved by direct observation of coxswain performance and monitoring of AIS and other recordable operating data, among other means. Therefore the NTSB concludes that Station San Diego oversight of small boat operations was ineffective in ensuring compliance with established policies for safe operations.

Effective oversight requires an organization to maintain an ongoing awareness of how its personnel operate its equipment, so that rules are being adhered to and best practices followed. This involves problem recognition and implementation or modification of policies and procedures as needed. Without the necessary data and procedures needed to review and analyze operations, managers are limited in their ability to assess those policies, procedures, and risks. Current Station San Diego practices do not afford comprehensive oversight of small boat operations. Changes in oversight procedures should effectively address risks that small boat crews face. These risks include nighttime operations in areas where background light can interfere with visibility and in congested waterways. The circumstances of this accident call for the Coast Guard to implement oversight procedures that provide it with information about day-to-day small boat operations. Moreover, given the shortcomings identified in Station San Diego oversight, the NTSB is concerned that other Coast Guard small boat stations may also be unaware of the manner in which small boats are being operated. Therefore, the NTSB recommends that the Coast Guard examine its oversight of small boat operations to determine where local procedures are inadequate, implement procedures nationally and at each station (including Station San Diego) to provide continual, systematic, and thorough oversight information, and require action on information obtained to ensure that crewmembers are operating their vessels safely in all conditions and circumstances.

2.6.3 SPC-LE Speed Policies

Shortly after the *Bayside Blaster* accident, the Coast Guard updated its safety policies[65] to require commanding officers of Coast Guard stations to establish speed limits in specific areas of their AORs "that pose significant or environmental risk to boats." In hindsight, the evidence suggests that the actions the Coast Guard took after that accident did not establish the policies it needed to ensure the safety of its vessel operations.

Station San Diego afforded coxswains broad authority to determine the speed at which to operate their vessels, although coxswains were expected to proceed at a safe speed at all times and were not to exceed 4200 rpm (about 35 knots) unless dictated by operational necessity, hot pursuit, or an emergency. The rpm limit appears to be related to fuel efficiency rather than to safe operation. San Diego coxswains told NTSB investigators this was the only parameter that restricted their boat speed and that it was not unusual to operate at night, in the bay, at 4200 rpm. After the accident, Station San Diego's commanding officer issued verbal guidance restricting speeds in the bay, outside of the main shipping channel, to a "minimal" or idle speed. The NTSB concludes that at the time of the accident, the absence of Station San Diego speed restrictions for routine patrols at night allowed coxswains too much latitude in selecting patrol boat speed. Furthermore, the NTSB is concerned that other Coast Guard stations may lack speed restrictions for routine patrols in their areas of responsibility.

Although the NTSB supports Station San Diego's attempt to improve safety by providing verbal speed guidance to its SPC-LE coxswains, such guidance can, over time, lose effectiveness. Providing written policy to small boat operators, on the other hand, serves as an official Coast Guard procedure for coxswains to follow. Over time, written policy retains its effectiveness to a greater extent than verbal guidance. Therefore, the NTSB recommends that the Coast Guard require each small boat station, including Station San Diego, to establish specific operating procedures governing small boat speeds that account for prevailing conditions and circumstances affecting the safety of small boat operations.

2.7 AIS Use

This investigation was hampered by the absence of exact speed, heading, and position data on the *CG 33118* at critical points during the transit. Although the *CG 33118* was equipped with AIS, which would have provided this information, no AIS data were available. Investigators determined possible reasons why the data were not recorded: crewmembers did not activate the unit; they activated the unit in a mode that did not transmit; or the AIS unit was not functioning properly at the time of the accident. However, the reason why AIS data were not recorded at the JHOC could not be determined.

Regardless of the reason, Coast Guard policy calls for small boats to operate their AIS in a transmitting mode when under way unless operational security needs dictate otherwise. Both Coast Guard headquarters and the Eleventh Coast Guard District's AIS transmission policy identified "restricted mode" as the default setting for standard (small) boats. The fact that the

[65] Commandant Instruction (COMDTINST) 3530.2C, Coast Guard Navigation Standards Manual.

CG 33118 was operating on the night of the accident without its AIS transmitting, and that JHOC personnel did not address this omission, indicates that deficiencies exist in the application and enforcement of the Coast Guard's AIS policy. Therefore, the NTSB concludes that the Coast Guard failed to effectively ensure that its AIS policy was enforced in San Diego.

Coast Guard policy relied on coxswains to activate the AIS, and set it to the appropriate mode. However, no procedures were in place to ensure that the coxswain activated the AIS or that, if on, the AIS was actually transmitting. In San Diego, JHOC personnel were in the best position to carry out this function. On the night of the accident, the *CG 33118* crew checked in with the JHOC, as required, on getting under way. JHOC personnel should have noticed that the *CG 33118*'s AIS was not transmitting at that time. However, this verification did not take place, nor was it required to by any written policy or procedure. As a result, important vessel data from the *CG 33118* was not transmitted or recorded. The NTSB therefore recommends that the Coast Guard develop and implement procedures to ensure that its coxswains follow established AIS transmission policies.

2.8 Vessel Operations Monitoring

In addition to AIS, a wide array of technologies is used to navigate and operate vessels, including electronic chart displays and Global Positioning System (GPS) units. The NTSB recognizes the benefits of using all available data for operational and crew monitoring and oversight in addition to navigation.

An operational monitoring program might have helped to prevent this collision by enabling supervisors to track coxswains' underway practices that may have fallen outside established guidelines. However, no formal monitoring program was developed or used by the Coast Guard.

The Coast Guard would benefit from the review and monitoring of all these sources of available operational recorded data on its vessels. The NTSB recognized this in its investigation of the collision of the *CG 242513* and the *Bayside Blaster* when it commented, "Technological advances in transponder technology may provide an additional oversight tool if applied to station operations." Therefore, the NTSB concludes that systematic monitoring of all available operating data could assist Coast Guard small boat supervisors in objectively assessing how their vessels are operated, and periodic review of this information could enhance operational safety and oversight by aiding supervisors in detecting and correcting deviations from standard operating guidance and procedures. The NTSB therefore recommends that the Coast Guard establish a structured data monitoring program for its small boats that reviews all available data sources to identify deviation from established guidance and procedures.

2.9 Cell Phone Use

At the time of the accident the Coast Guard had no policy governing the use of cell phones and similar portable electronic devices by its crewmembers during vessel operations. However, all crew were responsible for performing lookout duties during small boat operations,

according to the Coast Guard's Boat Crew Seamanship Manual.[66] Coast Guard crewmembers also were trained to voice safety concerns or "speak up" if they noted an unsafe condition, such as operating at an unsafe speed or in an area of high boat traffic density. Yet, if crewmembers were engaged in using personal electronic devices during the trip, this distraction would have prevented them from executing these duties.

As noted, the NTSB obtained records from the *CG 33118* crewmembers' personal cell phone service providers and determined that activity was recorded for the coxswain, the boatswain, and the OOD (activity could not be determined for the engineer). The NTSB was troubled to learn that this activity included sending text messages approximately 15 minutes before the collision. The NTSB concludes from these records that *CG 33118* crewmembers used their personal cell phones for voice calls and text messaging while under way, distracting them from effectively performing their duties as lookouts.

Based on this accident, along with the *Thriller 09* accident in Charleston, South Carolina, the NTSB issued recommendation M-10-2 to the Coast Guard urging it to develop and implement policy to address the use of cell phones and other wireless devices by its crewmembers during vessel operations, as previously noted. The Coast Guard responded positively by issuing a policy restricting crew cell phone use during operation of its vessels to purposes related to those operations.

2.10 Emergency Response

Following the collision, the *CG 33118* crew quickly responded to the accident and cared for the most seriously injured passenger on the Sea Ray, the 8-year-old boy who had been seated near the center of the rear bench of the boat. The crew immediately removed him from the vessel and transported him to the nearby Harbor Island fuel dock, where he was taken to a nearby hospital. Other seriously injured passengers were transferred to local hospitals for treatment as a result of the prompt actions of the Sea Tow, good Samaritans on nearby recreational vessels, and shore side responders from San Diego Fire and Rescue. The NTSB therefore concludes that actions of the emergency response personnel following the collision were timely and effective.

[66] See section 1.12.5, Lookout Procedures.

3 Conclusions

3.1 Findings

1. Weather, illegal drugs and alcohol, and the mechanical condition of both vessels were not factors in this accident.

2. The vessel grounding to which the *CG 33118* responded was not an emergency and did not necessitate a high-speed response that reached 42 knots at one point.

3. The *CG 33118* was planing, that is, traveling at least 19 knots, at the time of the collision, considerably faster than a safe speed of 8 knots or lower under the prevailing conditions.

4. The *CG 33118* coxswain and crew were aware of the heavy vessel density in the area.

5. The coxswain's operating the *CG 33118* at any planing speed was unsafe for the prevailing conditions and circumstances of darkness, background lighting, and high vessel density in the parade area.

6. The continuous illumination of the Sea Ray's all-around light, the effects of the background lights that limited the conspicuity of the all-around light, and the similar headings of the two vessels coupled with the dead-astern approach by the *CG 33118* made it difficult for the crew to visually detect and perceive the Sea Ray; however, traveling at a slow speed would have compensated for these visual difficulties.

7. Special purpose craft – law enforcement (SPC-LE) vessels have obstructions to forward visibility from the helm and the forward port positions, which increase risks if not properly addressed.

8. The Sea Ray operator was driving his vessel at a safe speed and manner for the prevailing conditions and circumstances.

9. The *CG 33118*'s high speed and its astern path relative to the Sea Ray precluded the Sea Ray operator from taking effective action to avoid the collision.

10. Station San Diego oversight of small boat operations was ineffective in ensuring compliance with established policies for safe operations.

11. At the time of the accident, the absence of Station San Diego speed restrictions for routine patrols at night allowed coxswains too much latitude in selecting patrol boat speed.

12. The Coast Guard failed to effectively ensure that its automatic identification system policy was enforced in San Diego.

13. Systematic monitoring of all available operating data could assist Coast Guard small boat supervisors in objectively assessing how their vessels are operated, and periodic review of this information could enhance operational safety and oversight by aiding supervisors in detecting and correcting deviations from standard operating guidance and procedures.

14. *CG 33118* crewmembers used their personal cell phones for voice calls and text messaging while under way, distracting them from effectively performing their duties as lookouts.

15. Actions of the emergency response personnel following the collision were timely and effective.

3.2 Probable Cause

The National Transportation Safety Board determines the probable cause of the collision between the *CG 33118* and the Sea Ray was the failure of the *CG 33118* crew to see and avoid the Sea Ray because of the excessive speed at which the coxswain operated the *CG 33118*, given the prevailing darkness, background lighting, and high vessel density, and the U.S. Coast Guard's lack of effective oversight of its small boat operations both nationally and at Coast Guard Station San Diego.

4 Recommendations

To the U.S. Coast Guard:

Develop and implement procedures for your special purpose craft – law enforcement that allow crewmembers to compensate for obstructions affecting forward visibility from the helm and the forward port positions. (M-11-8)

Examine your oversight of small boat operations to determine where local procedures are inadequate, implement procedures nationally and at each station (including Station San Diego) to provide continual, systematic, and thorough oversight information, and require action on information obtained to ensure that crewmembers are operating their vessels safely in all conditions and circumstances. (M-11-9)

Require each small boat station, including Station San Diego, to establish specific operating procedures governing small boat speeds that account for prevailing conditions and circumstances affecting the safety of small boat operations. (M-11-10)

Develop and implement procedures to ensure that your coxswains follow established automatic identification system transmission policies. (M-11-11)

Establish a structured data monitoring program for your small boats that reviews all available data sources to identify deviation from established guidance and procedures. (M-11-12)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

DEBORAH A.P. HERSMAN
Chairman

ROBERT L. SUMWALT
Member

CHRISTOPHER A. HART
Vice Chairman

MARK R. ROSEKIND
Member

EARL F. WEENER
Member

Adopted: July 12, 2011

Appendixes

Appendix A

Investigation

The National Transportation Safety Board was notified of the accident by the Coast Guard National Command Center at 2157 eastern standard time on December 20, 2009. A four-member go-team launched at 1200 the following day and arrived on scene in San Diego at 1500 Pacific standard time. The launch team consisted of specialists in engineering, deck operations, and survival factors. On December 22, the team was joined by a representative from the NTSB's Transportation Disaster Assistance Division. Also joining the team was a Coast Guard investigator from Coast Guard headquarters' Office of Investigations and Analysis.

The investigators interviewed two crewmembers from the *CG 33118*, the operator and the passengers on the Sea Ray, and Coast Guard Sector San Diego supervisory personnel. After completing the interviews, documenting the vessel damage, and collecting documentation, the investigators concluded the on-scene investigation on December 25.

The NTSB investigated the accident under the authority of the Independent Safety Board Act of 1974, according to the Board's rules. The sole party to the investigation was the Coast Guard.

Appendix B

U.S. Coast Guard Inland Navigation, Steering and Sailing Rules, Rule 6, Safe Speed

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.

In determining a safe speed the following factors shall be among those taken into account:

(a) By all vessels:

(i) the state of visibility;

(ii) the traffic density including concentration of fishing vessels or any other vessels;

(iii) the maneuverability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;

(iv) at night, the presence of background light such as from shore lights or from back scatter of her own lights;

(v) the state of wind, sea, and current, and the proximity of navigational hazards;

(vi) the draft in relation to the available depth of water.

(b) Additionally, by vessels with operational radar:

(i) the characteristics, efficiency and limitations of the radar equipment;

(i) any constraints imposed by the radar range scale in use;

(ii) the effect on radar detection of the sea state, weather, and other sources of interference;

(iii) the possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range;

(iv) the number, location, and movement of vessels detected by radar; and

(v) the more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity.

Appendix C

Letter from Commander, U.S. Coast Guard Sector San Diego, Concerning Verbal Speed Guidance

U.S. Department of Homeland Security
United States Coast Guard

Commander
U.S. Coast Guard Sector

2710 N Harbor Dr
San Diego, CA
Staff Symbol: s
Phone: (619) 278-7201
Fax: (619) 278-7235
Email:

3505
May 20, 2011

Brian Curtis
Investigator-In-Charge
National Transportation Safety Board
Washington DC 20594

Dear Mr. Curtis

This letter is in response to your request for additional information regarding my verbal order on safe speed referenced in LCDR Schultz's January 21, 2010 interview. I issued this order as a reminder to our boat operators and their leaders that we are always in the public eye and that we need to be cognizant of the impression we may be leaving the public with when training and operating. This was not a new requirement, but a reminder.

My directive was not intended to impose speed restrictions. Coast Guard coxswains are highly trained and are provided tools to constantly evaluate the changing risks encountered in executing their missions, including determining safe speed. The Station's standing orders in effect at the time of the mishap clearly discuss that special consideration must be given to operating at night and in areas where background lighting could cause visual impairment, and also discuss the tendency of the SPC-LE to ride bow high at certain speeds. The requirement to follow standing orders is made perfectly clear to Coxn's during training and continuously throughout their assignment. Unfortunately on the evening in question a well trained, qualified, and current Coxn failed to follow the written guidance provided in his standing orders with tragic consequences.

Safety of my crew and the public is my utmost priority. Recognition of the need to travel at safe speed was stressed specifically to station personnel by me on at least 8 specific occasions prior to the mishap. My email was a reminder of that important tenet to all of our boat operators.

I remain confident in my leaders and their coxswains' ability to safely conduct our missions while balancing risk and gain. I hope that this letter will assist with your understanding of my order and its intent. Please, feel free to contact me with any questions regarding this matter.

Sincerely,

T. H. FARRIS
Captain, U.S. Coast Guard

Appendix D

ABYC H-1 Visibility Standard

The purpose of the ABYC H-1 visibility standard is to provide guidance to minimize obstructions in the field of vision from the helm position. In part, the standard includes the following visibility criteria:

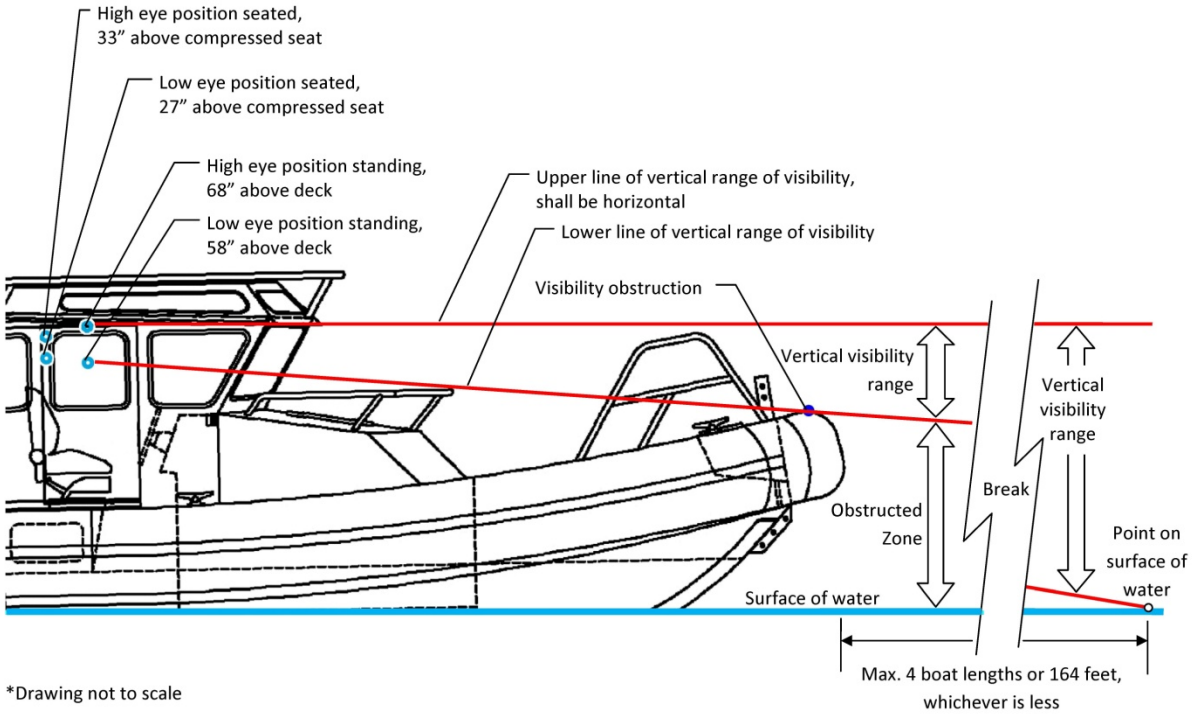
- Horizontal range looking forward: Shall have a 30-degree clear sector (15 degrees to port and starboard). Outside the clear sector, from 90 degrees to port and 112.5 degrees to starboard, obstructions shall be kept to a minimum so normal head movements will permit unobstructed visibility.
- Horizontal range looking aft: Must keep obstructions to a minimum.
- Vertical range looking forward, within the 30-degree clear horizontal section: Shall extend from a horizontal line from the high eye position to a line established between a point on the water four boat lengths or 164 feet, whichever is less, ahead of the boat and measured from the bow, through the highest point of lower obstructed visibility to the low eye position. [An NTSB-developed diagrammatic representation of the vertical range requirement is shown on the following page.]
- Vertical range outside the forward 30-degree clear sector (remaining 330 degrees): Similar to within the 30-degree clear sector forward, but measured from the gunwale.

The standard also states:

1. In order for this standard to be effective the boat must be operated in a reasonable and prudent manner.

2. Boats can be operated in a manner and at certain speeds causing trim and/or roll angles such that vision is obscured. This standard cannot assure that a boat can be operated without some loss of vision from the helm position while operating at high trim angles during the transition between displacement and planing mode.

3. This standard does not relieve the operator of the requirement to comply with the Rules of the Road.


High eye position seated,
33” above compressed seat
Low eye position seated,
27” above compressed seat
High eye position standing,
68” above deck
Low eye position standing,
58” above deck
Upper line of vertical range of visibility,
shall be horizontal
Lower line of vertical range of visibility
Visibility obstruction
Vertical visibility range
Vertical visibility range
Break
Obstructed Zone
Point on surface of water
Surface of water
Max. 4 boat lengths or 164 feet,
whichever is less
*Drawing not to scale

Appendix E

USCG Shore-Based Boat Accident Data

Each year the Coast Guard publishes an Annual Afloat Safety Report containing data on mishaps for that year, and historical data from previous years. The report examines cutter mishaps and small boat mishaps separately. The Coast Guard provided investigators with the annual reports from FY01-FY10. There was no report created for FY06. Overall small boat mishap rates (Class A-D combined)* increased each year from 1999 to 2007. Since 2007, mishaps rates have declined steadily, from about 118 per 100,000 operating hours to just fewer than 80 per 100,000 operating hours in FY10.

Mishap rates for Class A and B mishaps have remained steady for the last 10+ years. There was only one Class A mishap in FY10, the San Diego CG3318 accident. There were no Class B mishaps in FY10. In FY09 there were two Class B mishaps and no Class A. In FY08 there were no Class A or B mishaps. There was one of each in FY2007. Overall, the Class A and B mishap rates per 100,000 small boat operating hours are each less than 1 since 1999.

The SPC-LE's mishap rate per 100,000 hours has decreased each year since FY07, the first year data was available for the platform. In FY07 its mishap rate was around 120 per 100,000 hours. In FY10 its mishap rate was around 75 per 100,000 hours. In FY10, the SPC-LE had the 7th lowest rate of mishaps per 100,000 operating hours out of 17 small boat platforms. The most common types of mishaps were collisions, followed by groundings. The mishaps most often occurred during training, followed by search and rescue missions.

Collision of Tugboat/Barge *Caribbean Sea*/*The Resource* with Amphibious Passenger Vehicle *DUKW 34* Philadelphia, Pennsylvania July 7, 2010

Accident Report

NTSB/MAR-11/02
PB2011-916402

National Transportation Safety Board

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NTSB/MAR-11/02
PB2011-916402
Notation 8240A
Adopted June 21, 2011

Marine Accident Report

Collision of Tugboat/Barge *Caribbean Sea*/*The Resource* with Amphibious Passenger Vehicle *DUKW 34* Philadelphia, Pennsylvania July 7, 2010

National Transportation Safety Board

490 L'Enfant Plaza, SW
Washington, DC 20594

National Transportation Safety Board. 2011. *Collision of TugBoat/Barge* Caribbean Sea/The Resource *with Amphibious Passenger Vehicle* DUKW 34*, Philadelphia, Pennsylvania, July 7, 2010*. Marine Accident Report NTSB/MAR-11/02. Washington, DC.

Abstract: This report discusses the July 7, 2010, collision of the tugboat/barge combination *Caribbean Sea*/*The Resource* with the amphibious passenger vehicle *DUKW 34* on the Delaware River in Philadelphia, Pennsylvania. As a result of the accident, two passengers on board *DUKW 34* were fatally injured, and several other passengers sustained minor injuries. Damage to *DUKW 34* totaled $130,470. Damage to the barge was minimal; no repairs were made.

Safety issues identified in this accident include vehicle maintenance, maintaining an effective lookout, use of cell phones by crewmembers on duty, and response to the emergency by Ride The Ducks International personnel.

As a result of this accident investigation, the National Transportation Safety Board makes safety recommendations to the U.S. Coast Guard, K-Sea Transportation Partners L.P., Ride The Ducks International, LLC, and The American Waterways Operators.

Contents

Figures

Acronyms and Abbreviations

AB	able seaman (also known as able-bodied seaman), an unlicensed member of the deck department of a merchant ship.
ABS	American Bureau of Shipping
AIS	automatic identification system
AMS	American Maritime Safety, Inc.
APV	amphibious passenger vehicle
ASE	National Institute for Automotive Service Excellence
AVM	Amphibious Vehicle Manufacturing, LLC
AWO	The American Waterways Operators
CAMI	Civil Aerospace Medical Institute
CDL	commercial driver‘s license
CFR	*Code of Federal Regulations*
COI	Certificate of Inspection
COO	chief operating officer
DOT	U.S. Department of Transportation
ISM	International Safety Management Code, another name for the International Management Code for the Safe Operation of Ships and for Pollution Prevention
MMD	Merchant Mariner‘s Document
MRO	medical review officer
nm	nautical mile
NVIC	Navigation and Vessel Inspection Circular
OS	ordinary seaman, an unlicensed member of the deck department of a merchant ship
PFD	personal flotation device (lifejacket)
PVA	Passenger Vessel Association

RTDI	Ride The Ducks International, LLC
SMS	Safety Management System, a program required under the International Safety Management Code as a means of protecting people, property, and the environment
SOLAS	International Convention for the Safety of Life at Sea
SQMS	Safety & Quality Management System
TSAC	Towing Safety Advisory Committee
USACE	U.S. Army Corps of Engineers
UTC	universal coordinated time

Executive Summary

On Wednesday, July 7, 2010, the empty 250-foot-long sludge barge *The Resource*, being towed alongside the 78.9-foot-long tugboat *Caribbean Sea*, collided with the anchored 33-foot-long amphibious passenger vehicle *DUKW 34* in the Delaware River at Philadelphia, Pennsylvania. *DUKW 34* carried 35 passengers and 2 crewmembers. On board the *Caribbean Sea* were five crewmembers. As a result of the collision, *DUKW 34* sank in about 55 feet of water. Two passengers were fatally injured, and 26 passengers suffered minor injuries. No one on the *Caribbean Sea* was injured. Damage to *DUKW 34* totaled $130,470. Damage to the barge was minimal; no repairs were made.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the mate of the *Caribbean Sea* to maintain a proper lookout due to (1) his decision to operate the vessel from the lower wheelhouse, which was contrary to expectations and to prudent seamanship, and (2) distraction and inattentiveness as a result of his repeated personal use of his cell phone and company laptop computer while he was solely responsible for navigating the vessel. Contributing to the accident was the failure of Ride The Ducks International maintenance personnel to ensure that *DUKW 34*'s surge tank pressure cap was securely in place before allowing the vehicle to return to passenger service on the morning of the accident, and the failure of the *DUKW 34* master to take actions appropriate to the risk of anchoring his vessel in an active navigation channel.

The major safety issues identified in the accident investigation are as follows:

- Vehicle maintenance
- Maintaining an effective lookout
- Use of cell phones by crewmembers on duty
- Response to the emergency by Ride The Ducks International personnel

As a result of this accident investigation, the National Transportation Safety Board makes safety recommendations to the U.S. Coast Guard, K-Sea Transportation Partners L.P., Ride The Ducks International, LLC, and The American Waterways Operators.

Factual Information

Accident Narrative

At 1415,[1] on Wednesday, July 7, 2010, the amphibious passenger vehicle (APV) *DUKW*[2] *34*, carrying 35 passengers and a crew of two (master and deckhand), entered the Delaware River at a boat ramp just south of the Benjamin Franklin Bridge in Philadelphia, Pennsylvania (figure 1).

Figure 1. A Ride the Ducks APV similar to the one involved in this accident. (Photo by Ride The Ducks International)

[1] All times in this report are eastern daylight time (universal coordinated time [UTC] –4) according to the 24-hour clock.

[2] The acronym DUKW came from General Motors Corporation nomenclature in which the "D" indicated the first year of manufacture, the "U" indicated a utility vehicle, the "K" indicated all-wheel drive, and the "W" indicated a rear tandem axle. Production of the DUKW began in 1942, and 21,147 would eventually be manufactured. The vehicles are usually referred to as "ducks." Also see section "Vessel Information; *DUKW 34*" in this report.

DUKW 34, owned and operated by Ride The Ducks International, LLC (Ride The Ducks), was on a scheduled tour of historic sites and was embarking on a 20-minute river cruise as part of that tour. The route called for *DUKW 34* to turn south on entering the river and continue southbound for about 10 minutes, after which the vessel would reverse course for the return trip northbound to the boat ramp (figure 2). The master told investigators that as soon as the APV entered the river and turned south, he turned operation of the vessel over to the deckhand so that the master could narrate the tour from the crew ~~j~~jump seat" beside the operator's seat at the front of the boat. According to the master, the vessel was operating normally when it entered the water. In postaccident interviews, the deckhand told investigators that he had noticed that the engine coolant temperature was registering (on the operating console temperature gauge) about 220° F during the upstream (northbound) waterborne portion of the tour. The deckhand did not inform the master of the high engine coolant temperature.

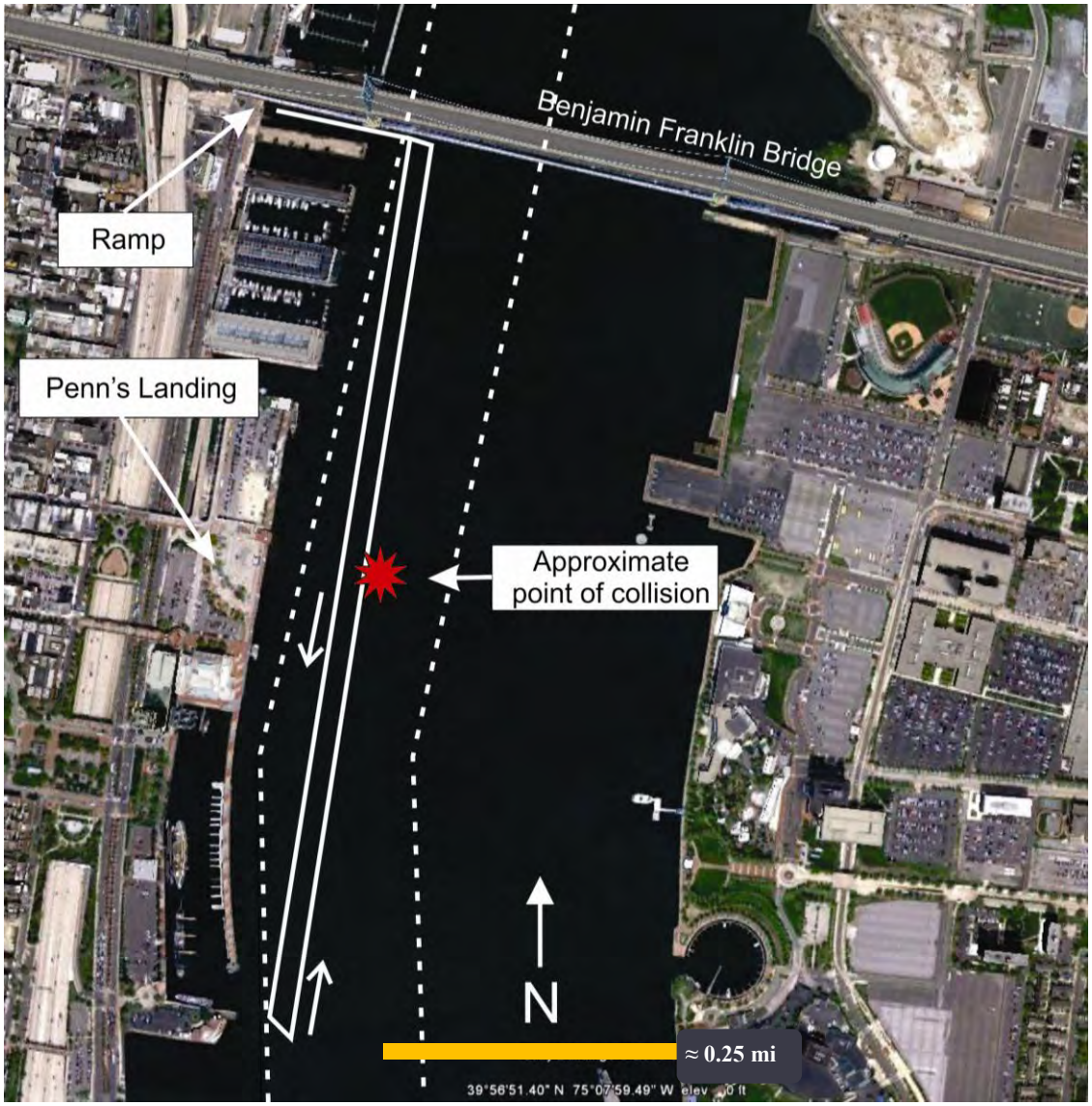

Figure 2. View of the Delaware River at the accident site. The solid white lines indicate the approximate route of Ride The Ducks APVs. The dotted white lines indicate the approximate boundaries of the navigational channel. (Background by Google Earth)

At this same time, the tugboat *Caribbean Sea*, owned and operated by K-Sea Transportation Partners L.P. (K-Sea Transportation), was traveling northbound up the Delaware River, about 3 miles south of *DUKW 34*, with the empty 250-foot-long barge *The Resource*, owned by the city of Philadelphia, configured in a starboard hip tow[3] (figure 3). The *Caribbean Sea* was being navigated by the mate, with a deckhand (referred to as "deckhand No. 1" in this report) and an engineer also on duty. The other two crewmembers, the master and another deckhand (referred to as "deckhand No. 2" in this report), were off duty and in their living quarters.

Figure 3. Tugboat *Caribbean Sea* with tank barge *The Resource* in a starboard hip tow as seen about 45 seconds before the accident. (Photo by Megan Scharpf)

The *DUKW 34* master told investigators that about 10 minutes into the voyage, shortly after the vessel had reversed course to begin its return trip to the boat ramp, he smelled an odor and saw what he thought was smoke coming from the starboard engine compartment vent. Believing that the vessel was on fire, he said he resumed his position in the operator's seat and initiated emergency procedures, which included shutting down the engine (by turning off the

[3] In a *starboard hip tow*, the barge is positioned on the tugboat's starboard side. In accordance with the master's preference and with accepted industry practice, the *Caribbean Sea* was positioned alongside the barge such that its propellers were aft of the barge stern. This positioning of the tugboat improves control of the barge.

ignition), activating the emergency fuel shutoff, turning off the battery switch, closing the port and starboard fire dampers,[4] and securing the forward hatch.

The master told investigators that he did not discharge the vessel's fixed CO_2 fire-suppression system because he believed that his earlier efforts to control the fire by securing the fuel and oxygen supply had been successful. He said he was also concerned that some of the extinguishing agent could migrate into the passenger space. He said he would consider use of the fire suppression system a "last ditch effort" and that he believed if he used it, he would not be able to restart the engine.[5]

The master told investigators that he made a call on VHF channel 13[6] to alert other vessels in the vicinity of the situation on board *DUKW 34*. (No such call at that time was captured on any of the available recordings of radio transmissions, nor did anyone interviewed for this accident investigation recall hearing such a call.) He said he then used the direct-connect radio feature on his company-supplied mobile phone to inform the Ride The Ducks manager-on-duty that he believed he had a fire on board, that he was taking emergency measures, and that he needed a tow. The manager-on-duty began making arrangements to dispatch another APV as a tow vessel for the disabled *DUKW 34*. According to U.S. Coast Guard regulations and company policy, the manager-on-duty should also have notified the Coast Guard, but she did not do so (see section "Coast Guard and Ride The Ducks Emergency Procedures" in this report).

About 1425, another Ride The Ducks APV, *DUKW 44*, was traveling about 100 to 150 feet behind *DUKW 34* on the same route. Seeing *DUKW 34* dead in the water, the master of *DUKW 44* maneuvered his APV to within hailing distance of *DUKW 34* and asked the crew if they needed help. The *DUKW 34* deckhand recalled telling the master of *DUKW 44* that the APV had overheated but that the problem had been radioed in and that "everything's good." The *DUKW 34* deckhand said that he told the other master to "finish the tour—everything's all right," after which the other APV departed.[7] During this time, the company manager-on-duty used the direct-connect radio to inform the master that *DUKW 46* was being dispatched to tow *DUKW 34*.The master told investigators that he then (about 1428) ordered the deckhand to go forward and drop the anchor to keep the APV from drifting downstream with the current. The deckhand deployed the anchor about 1429.

[4] As will be discussed in more detail later in this report, the engine bay of the vessel was equipped with two sets of doors (fire dampers) that could be closed to block air flow through the engine compartment and thus help contain or extinguish an engine fire.

[5] Release of the CO_2 activated a pressure switch, located near the operating station, that cut all electrical power to the engine. The pressure switch could be manually reset by the operator.

[6] VHF channel 13 (156.650 MHz) is one of the bridge-to-bridge navigation channels used in U.S. waters and is the channel that should be used to contact a ship when there is danger of collision. All ships 20 meters or more in length are required to monitor VHF channel 13, in addition to VHF channel 16, when operating in U.S. territorial waters.

[7] *DUKW 44* was full of passengers and was not equipped with the rigging necessary to safely tow the disabled vessel to shore.

By about 1433, the APV was anchored[8] in the navigational channel about 320 feet from the bulkhead of Penn's Landing, near Grand Plaza and almost in the center of the navigation channel. The deckhand remained on the bow, where he used his cellular telephone to send what investigators confirmed was a personal text message. A review of the deckhand's cell phone records indicated that two outgoing and two incoming text messages were transmitted to or from the deckhand's cell phone between 1431 and 1436.

Both the master and the deckhand told investigators that shortly after anchoring, they saw the tugboat and barge heading northbound in their direction. The master stated that he was not sure of the exact position of the tugboat and barge at that time but that he believed they were passing a moored tall ship known as the *Gazela Primeiro*. The deckhand estimated their distance at that time to be about 1 nautical mile (nm). According to location data transmitted by the *Caribbean Sea*'s automatic identification system (AIS)[9] and recorded by the Coast Guard, about 1433, the *Caribbean Sea* was about 0.3 nm from the APV.

The master said that he made another callout on VHF channel 13 regarding the situation on board his APV. (This call was also not captured by any radio transmission recordings.) He said that at that time he thought he could see the tugboat pushing the barge away and therefore believed his radio call had been heard by the tugboat crew. He said he then began applying duct tape to seal two access plates on the port and starboard side of the control panel from which ~~"s~~moke" was still entering the passenger space.

The master said that when he had finished taping over the access plates, he noted that the tugboat and barge had not changed course to avoid the APV. He said he attempted to sound a warning using the APV's air horn, but the horn was inoperable.[10]

The master said he called out three times to the approaching tug and barge on VHF channel 13 to alert them that his vessel was broken down and anchored. A recording of marine VHF channel 13 made by the Burlington County Bridge Authority shows that, about 1436, a person identifying himself as *DUKW 34* began calling out to ~~"t~~he northbound tug near Penn's Landing" (this would have been the *Caribbean Sea*) that he was broken down and could not maneuver. Over the next minute, the same caller made several additional callouts to the northbound tug. Another caller was recorded making subsequent callouts to the northbound tug reporting that *DUKW 34* was broken down. These calls, beginning at 1436, were the first calls regarding the incident that were recorded. The recording did not capture a response from the *Caribbean Sea*. At 1436:54, the *DUKW 34* master made a final callout on channel 16 saying, "~~H~~ey ferry ferry . . . whoa whoa . . . ."

[8] Although the anchor was deployed about 1429, the anchor dragged along the bottom for about 155 feet (based on postaccident sonar imaging of the river bottom) before taking a set.

[9] AIS is a maritime navigation safety communications system. At 2- to 12-second intervals on a moving vessel, the AIS automatically transmits vessel information, including the vessel's name, type, position, course, speed, navigational status, and other safety-related information, to appropriately equipped shore stations, other vessels, and aircraft. The AIS also automatically receives such information from similarly fitted vessels.

[10] The investigation determined that the horn would only activate when the ignition switch was "~~o~~n." After the accident, Ride The Ducks modified its fleet of APVs to allow the air horns to operate with the ignition switch off. The APV was equipped with a handheld air horn in a watertight emergency box that could have been accessed if time was available.

The *DUKW 34* master told investigators that shortly before the collision he realized the tugboat did not see them or hear his radio calls so he instructed passengers to put on lifejackets. Not all passengers recalled hearing the master's instructions; however, passengers did attempt to retrieve lifejackets before the collision. Many did so after seeing other passengers begin pulling them down from their overhead storage area. One passenger told investigators that

> one of the ladies . . . from our church got up, and she yelled, _We've got to move.' And she started pulling down the life vests, and people started screaming, and other people were getting up and pulling life vests down, and that's right before the barge hit.

A video security camera on the New Jersey side of the river captured the accident sequence. According to the time correlation study[11] on the video, the barge made contact with the stern of *DUKW 34* at 14:37:23. Ten seconds later, at 14:37:33, the APV, having been turned to port, rolled over onto its starboard side and was pushed completely under the water (figure 4). Based on AIS data, in the minutes before the accident, the *Caribbean Sea* was near the center of the river's navigation channel and traveling at about 6 knots.

Figure 4. Tugboat *Caribbean Sea* and barge *The Resource* seconds after the bow of the barge made contact with *DUKW 34*, a portion of which is visible at far left. (Photo by Brian E. Stover)

None of the passengers on board *DUKW 34* had evacuated the vessel before impact. The only person not on board when the barge struck was the deckhand, who jumped off the starboard bow before impact and swam toward the middle of the river. Not all of the passengers had obtained a lifejacket before the barge struck. Of those who did, several stated that they had been able to get a lifejacket over their heads, but none of them was able to fully don the jacket and fasten it properly. Many passengers reported being unable to hold onto their lifejackets when the vessel was pushed under, so they grabbed the floating jackets when they surfaced.

[11] The NTSB performed a time correlation study that synchronized the time stamp from this video and other time information gathered during this investigation to eastern daylight time (UTC time adjusted to EDT offset).

Most passengers were unsure about how they evacuated the APV and made it to the surface. Several stated that one moment they were under water and the next they were on the surface. A number of passengers described seeing sunlight through the water and swimming toward it. A few reported feeling the metal either from the window frames or the side of the APV and swimming out of the vessel and up toward the water's surface.

According to interviews of the *Caribbean Sea* crew, at the time of the collision, deckhand No. 1 and the engineer were seated at the table on the port side of the galley (figure 5). They said that they noticed a reduction in the rpm of the vessel's engines and thought that it had arrived at the destination. The deckhand said that he looked out a galley porthole and noticed what appeared to be people in the water off the vessel's port side. Both crewmembers said they then left the galley and proceeded to the aft main deck area (fantail). From there, they said they saw several persons and some debris passing down the port side of their vessel.

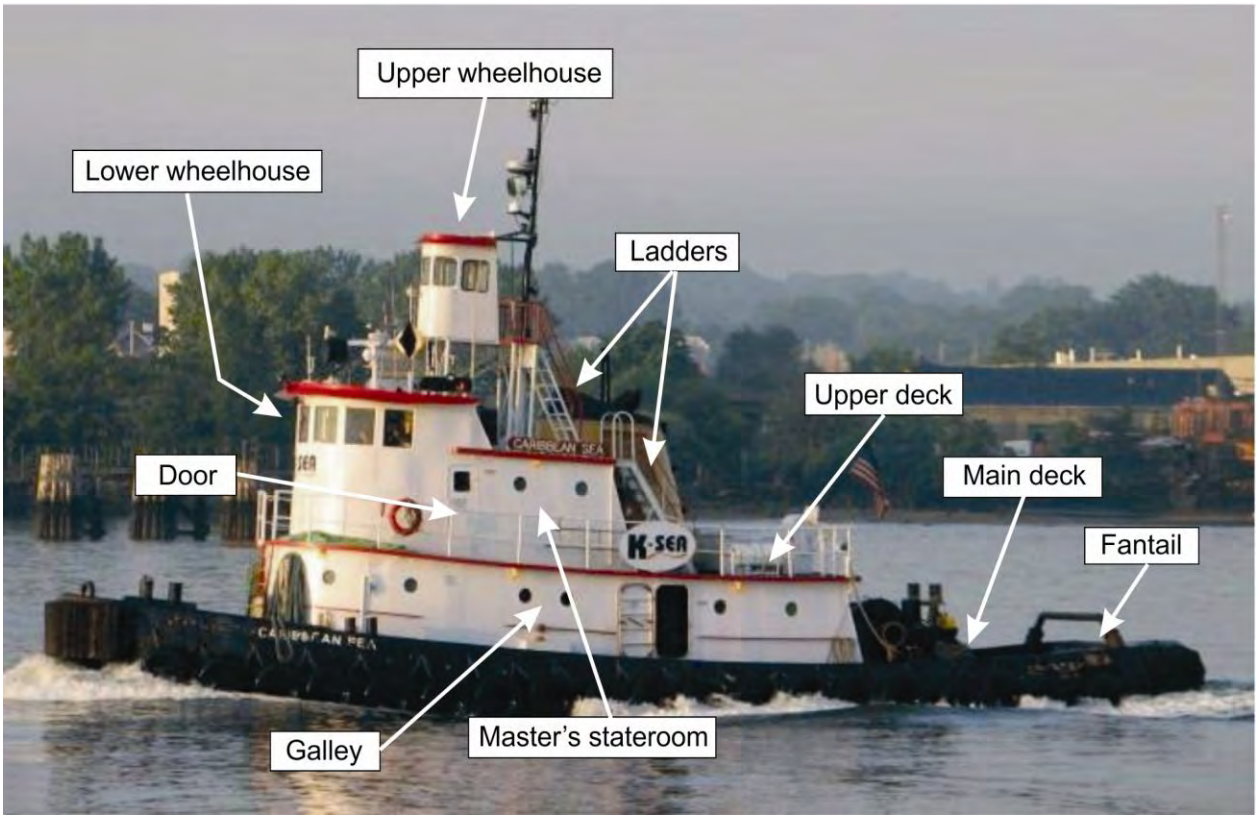

Figure 5. *Caribbean Sea*. (Photo by Joe Becker)

The engineer said he then went forward to alert the master of the situation. He said he climbed the ladder on the aftermost bulkhead to the upper deck (refer to figure 5) and then proceeded forward along the port side of the vessel to the exterior door that leads into a passageway between the master's stateroom and the lower wheelhouse. He said that when he opened the door, he saw the mate standing in front of the master's stateroom door. He said this was the first time he had seen the mate after the collision.

The master of the *Caribbean Sea* stated that he was sleeping when the accident occurred and was awakened by a knock on his stateroom door. The door was then opened, and the master said he saw the mate, who stated something to the effect that he ~~r~~an over a duck boat." The master said after getting dressed, he proceeded to the upper wheelhouse where he assumed control of the *Caribbean Sea*. The master said that when he arrived at the upper wheelhouse, the mate was already there, and control for the vessel's throttle was active. (The throttle control system for the vessel can be active at only one of the two wheelhouses at any time. Control must be transferred manually by activating an air control valve at the station to which control is being transferred.) The master further said that both VHF radios were on, with one tuned to channel 13 and the other to channel 16.[12] He said that the radar was turned on.

The master said he attempted to contact the Coast Guard on VHF channel 16 to inform them of the accident, but a local passenger ferry, *Freedom*, was already communicating with the Coast Guard on that channel regarding the casualty. The master said he swung the vessel and barge to starboard and held position while the engineer and deckhand No. 1 maintained lookout from the deck of *The Resource.* He said that because of the current and the limited maneuverability of the tug and barge combination, he was unable to assist other vessels in the recovery of persons in the water.

About 1530, Coast Guard personnel from Coast Guard Sector Delaware Bay boarded the *Caribbean Sea*, and two Coast Guard investigators jointly interviewed the mate in the galley. According to the Coast Guard written summary of that interview, the mate told the investigators that he had been in the upper wheelhouse at the time of the collision, that he had not seen the APV before the collision, and that he did not hear, see, or feel anything before seeing people in the water. He further stated that he did not hear any radio calls about the anchored APV or see any targets on the *Caribbean Sea*'s radar.

The mate told the Coast Guard investigators that he had seen an APV somewhere near the Benjamin Franklin Bridge when the *Caribbean Sea* was under way in the vicinity of Pier 38, (which is about 1.2 nm from the bridge) but that he could not determine its heading. He said that the last time he saw an APV before the collision was as the *Caribbean Sea* was near the southern end of the main pier at Penn's Landing. At that time, he said, the APV was out of the channel on the starboard (east) side. Following the mate's initial interview by the Coast Guard on the day of the accident, the NTSB attempted several times during its on-scene investigation to interview him. However, the mate declined to provide further statements or testimony regarding the accident.[13]

[12] VHF Channel 16 (156.8 MHz) is the international VHF/FM calling, reply, and safety channel. It may also be used for distress and urgency signals.

[13] On June 24, 2011, after this report, its conclusions, and its recommendations were approved by the NTSB, the mate indicated his willingness to provide information about his role in the accident. NTSB investigators interviewed the mate on July 11, 2011. Portions of that interview are summarized in Appendix C.

Emergency Response

The primary responders to this accident included the Philadelphia Marine Police (part of the Philadelphia Police Department), the Coast Guard, and two Good Samaritan vessels (a local ferry and a U.S. Navy small boat). The first responder on scene was the ferry *Freedom*.

The *Freedom* was making its regularly scheduled trip from Camden, New Jersey, on the east side of the river to Penn's Landing on the west side when the accident occurred. The master of the *Freedom* told investigators that he departed Camden at 1430. At about 1435, as he was heading north, he heard three calls from the APV to the tug on VHF channel 13, saying "I cannot maneuver; I'm at anchor." He was approximately 3/4 to 1 mile away and saw the barge heading toward the APV. He said he attempted to hail the tug on channel 13 but got no response. His view of the APV then became obscured by the barge. Shortly thereafter, his senior deckhand reported seeing lifejackets in the water. The ferry's master said he made best possible speed toward the accident site and, as they approached, he saw people in the water. He said he surveyed the area and noticed that one person was farther from shore than the others, toward the center of the river. He decided to assist that person first. That person was the deckhand. He said they rescued the deckhand, after which he saw that the marine police and Coast Guard boats had arrived and were assisting the rest of the passengers.

The Philadelphia Police Department was notified of the accident at 1439 via 911, and units were dispatched at 1440. Philadelphia Marine Police launched two boats. At about the same time, the Coast Guard launched three boats, including two 25-foot-long response boat-small (RB-S) vessels and a 41-foot-long utility boat. Philadelphia Marine Police and Coast Guard Sector Delaware Bay share the same office building and dock facilities on the Delaware River, about 0.9 nm south of the accident site. According to one marine police officer, marine police and Coast Guard boats arrived on scene "less than 3 minutes" after being notified. They immediately began helping APV passengers from the water.

Also assisting in the rescue effort were members of the U.S. Navy Special Boat Team 20, based in Little Creek, Virginia. The team had two special operations craft in port at the marina south of the Independence Seaport Museum at Penn's Landing and were providing vessel tours to the public at the time of the accident. A senior chief petty officer from the team said he heard a distress call on the VHF radio, heard first responder sirens, and noticed a commotion along the waterfront. He said he ran to the waterfront and saw "approximately 20–30 . . . people in the water." He said he returned to the marina, boarded vessel 976, and got it under way with several crewmembers. Once under way, they launched a small inflatable boat, called a combat rubber raiding craft, with four crewmembers on board. Crewmembers on the raiding craft helped pull survivors out of the water. Back on shore, other Navy personnel joined first responders in assisting survivors who swam to shore.

Thirty-five people on board the APV survived the accident. Of these, 19 were recovered by various vessels, and 16 managed to swim to shore. Ambulances transported six passengers to Hahnemann University Hospital and one passenger to Jefferson Hospital. Both hospitals were located within about 1 mile of the accident site. Two passengers (a 20-year-old male and a 16-year-old female) did not survive. Their bodies were recovered on July 9. The two fatalities had been seated next to each other on the starboard side, in the second row forward, in

an undamaged area. Investigators were unable to verify whether or not the two individuals were able to swim. Both were part of a Hungarian student group, and their level of English language comprehension is not known. Neither victim was wearing a lifejacket when they were recovered.

Injuries

Twenty-six passengers and one crewmember on board the APV reported being injured as a result of the accident. Most of the injuries were minor, consisting of bumps, bruises, and small cuts and scrapes. Autopsies for the two fatalities listed the cause of death as drowning with no external or internal evidence of traumatic injury for either individual.

Table 1. Injuries

Type of Injury	Crew (*DUKW 34*)	Passengers (*DUKW 34*)	Total
Fatal	0	2	2
Serious	0	0	0
Minor	1	26	27
None	1	7	8

Title 49 *Code of Federal Regulations* (CFR) 830.2 defines a fatal injury as any injury that results in death within 30 days of an accident. It defines serious injury as that which requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; results in a fracture of any bone (except simple fractures of fingers, toes, or nose); causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third- degree burns, or any burn affecting more than 5 percent of the body surface.

Damage

DUKW 34

DUKW 34 was raised from the river on July 9, 2010. Damage to the APV was principally to the port side of the hull and the aft portion of the port side of the canopy. The hull damage consisted of scrapes and indentations along the hull's external support members and hull shell, and to the "Ride The Ducks" sign attached to the side of the hull. The scrapes to the Ride The Ducks indicated the relative movement between the APV and the barge during their period of contact (figure 6).

Figure 6. *DUKW 34* after being raised from the river bottom.

Damage to the canopy framing system (figure 7) consisted of bending and buckling of the square and rectangular steel tubing and some tearing of the canopy awning, principally at the aft portion. The two aftermost port side vertical frames of the canopy were bent over about 45°, and other support members were similarly damaged. The port-side roller curtain was damaged and detached from its mountings, and the passenger loading ladder indicated distortion and impact damage. The left front wheel was slightly displaced from its axis of rotation, and a subsequent tear-down examination showed that its drive axle was slightly bent.

The damage to *DUKW 34* totaled $130,470.

Figure 7. View of *DUKW 34*'s damaged canopy, looking aft.

Caribbean Sea/*The Resource*

The barge *The Resource* showed minor damage at its bow area (rake); the *Caribbean Sea* was not damaged. The damage to the barge bow consisted of contact scrapes to the port and starboard side of the bow area. According to an American Bureau of Shipping survey report, the contact scrapes affected the hull coating only, with no indication of damage to the hull plating or interior framing. A representative from the city of Philadelphia told investigators that the minor damage to the barge hull coating was not repaired after the accident.

Operations Information and Events Preceding the Accident

Ride The Ducks and *DUKW 34*

The APV involved in this accident was owned and operated by Ride The Ducks International, LLC. Ride The Ducks was founded in 1977 by an entrepreneur in Branson, Missouri, as a small sightseeing company. In 2001 the company partnered with the Herschend Family Entertainment Corporation (Herschend), and in 2004, Herschend became the sole owner of Ride The Ducks. Both Herschend and Ride The Ducks are headquartered in Norcross, Georgia.

Ride The Ducks operated a fleet of more than 90 amphibious vehicles at seven locations across the United States.[14] Company records show that about 1.2 million people take the company's amphibious tours annually at all locations.

Ride The Ducks began operations in Philadelphia in 2003 providing amphibious tours from March through November, weather permitting. At the time of the accident, the Philadelphia operation had a fleet of 15 APVs. The embarkation and termination point for each Ride The Ducks Philadelphia tour was the Independence Visitor Center (Visitor Center) at Independence Mall. Each tour began with a drive downtown along a route with sites of historical or other interest. The waterborne portion began at a boat ramp at the intersection of Race Street and Christopher Columbus Boulevard, just south of the Benjamin Franklin Bridge. The water tour took the vessel into the Delaware River southward along Penn's Landing for not more than 1 nm and returned along the same route. The APV left the water at the same boat ramp where it entered and returned to the Visitor Center. The entire tour took about 70 minutes, with the on-road portion lasting about 50 minutes and the waterborne portion lasting about 20 minutes.

For the land portion of the amphibious tours, the APV driver must hold a commercial driver's license (CDL) with a passenger endorsement. For the water portion, the operator must hold the appropriate Coast Guard master's license. Unless the operator conducts his or her own tour narration, another employee performs that task. This can lead to a variety of operator/tour guide/deckhand configurations on a tour.

Philadelphia staffing at the time of the accident consisted of 11 "Capt III Tour Guide Captains" (Coast Guard-licensed masters with a CDL who also performed their own tour narration); 6 "Capt. II Ramp Captains" (Coast Guard-licensed masters without a CDL); 9 "Capt. I Tour Guides" (CDL holders without a Coast Guard license); 2 "Tour Guides" (tour narration only with no driving); 10 "ambassadors" (employees who worked in administrative positions or served as deckhands); 5 mechanics; and 7 administrators/managers.

The master on board *DUKW 34* on the day of the accident was a "Capt III Tour Guide Captain," who held both a CDL and a master's license and performed his own tour narrations. In such cases, during the land portion of the tours, the master is normally the only company employee on board. At the boat ramp, a deckhand boards the APV in order to meet Coast Guard manning requirements for the water portion of the tour. On returning to the ramp, the deckhand disembarks and waits to board the next APV where his or her services are needed. Communication between vessel crews and the shore-side staff is conducted using company-supplied mobile telephones with direct-connect radio capability.

The *DUKW 34* master said that on the day of the accident he reported to the Ride The Ducks maintenance facility about 0840 to prepare the unit for operation and to complete a pre-trip inspection. As will be discussed in more detail later in this report, company procedures required that all captains or drivers inspect each APV before and after each operational period (for example, each day) and document these inspections on a form called "RTDI Captain's/Driver's Pre-Trip Inspection." Any deficiencies that would prevent the safe and legal

[14] Company-owned operations are in Branson, Missouri; Philadelphia, Pennsylvania; and San Francisco, California. Four other locations operate as licensees.

operation of the APV were to be brought to the attention of the maintenance manager so they could be corrected before the vehicle could carry passengers.

The master told investigators that when he inspected *DUKW 34* on the morning of the accident, he found no discrepancies. Investigators were unable to locate a completed captain's/driver's pre-trip inspection form for *DUKW 34* for July 7, 2010. The most recently completed pre-and post-trip inspection forms for the APV, including the pre- and post-trip inspection forms completed by the master on the day before the accident, were recovered from the salvaged vessel. Those forms indicated that no deficiencies had been noted during either inspection.

The master said that he left the maintenance facility about 0945 and drove the APV to the Visitor Center, arriving about 1000. The master's first tour of the day, with 35 passengers, began at 1030. The tour, which the master described as "uneventful," was completed at about 1140. At about 1205, the master began his second tour of the day with *DUKW 34*, again with 35 passengers. That tour was also completed uneventfully at about 1315. The master said he then took a break for lunch in the employee break room before returning to *DUKW 34*.

Just before 1330, a Ride The Ducks employee completed loading passengers on *DUKW 34* for its third tour of the day. The 35 passengers included a tour group comprising 13 Hungarian students, 2 Hungarian teachers, and 7 American citizens who were acting as group hosts or chaperones. At about 1335, after the master had conducted a Coast Guard-required pre-departure safety briefing, *DUKW 34* departed the Visitor Center and began the road portion of the tour. At about 1415, the APV arrived at the boat ramp, picked up the deckhand waiting there, and entered the Delaware River. The APV *DUKW 44* entered the water shortly after *DUKW 34.* After *DUKW 34* made its turn to starboard to begin the southern transit along Penn's Landing, the master allowed the deckhand to take control of the APV.[15] The master took a position in the jump seat adjacent to the helm and continued the tour narration.

The master told investigators that, about 10 minutes after the APV had turned and was returning northbound to the ramp, a dense, white smoke appeared, and that he believed he had a fire on board. He said he had not seen flames but that, "I can't [afford to] wait to see flames." The master said:

> I had no indications that my DUKW was running hot, no indications of any overheat conditions. That wasn't my first, that was my third tour. And if there was any things that even looked like that, the DUKW wouldn't have moved.

The deckhand told investigators:

> It was white smoke. It had a scent to it but it wasn't . . . something you could pinpoint. It wasn't like [a] . . . fire scent—it wasn't like it was fuel burning. . . . I kind of had a thought it had a fragrance of burning rubber . . . White smoke started pouring out the side vents on both sides. [The master] immediately told me to get out of the seat, I got out. He

[15] Both Ride The Ducks and Coast Guard policy permitted deckhands to operate the APV on water to provide the deckhands (potential captains) with experience under way.

> jumped into the seat, started pulling all the valves for both the vents. He closed both the side vents. He dropped the front hood. Because what we do for fire procedures, you know, you see smoke, regardless of what it is, you know, we're going to follow it. I'm like, that's fine. If we close the hatches, it can't hurt anything, and if there is a fire, it's out. But we knew there wasn't a fire. We saw the white smoke, so we knew it was something different.

When the master was later asked who was acting as lookout at that time, he responded, "I would hope [the deckhand] was." The deckhand told investigators he believed that maintaining a lookout was a shared responsibility between himself and the master.[16] He said that while he was on the bow after deploying the anchor he was generally focused on the northern portion of the river. Because the master was interacting with the passengers and generally facing toward the south, he thought the master would be monitoring vessel traffic from that direction.

K-Sea Transportation and the *Caribbean Sea*

The tugboat *Caribbean Sea* was owned by K-Sea Transportation Partners L.P., headquartered in East Brunswick, New Jersey. The company, founded in 1999, provided marine transportation, distribution, and logistics services primarily to oil companies, oil traders, and oil refiners domestically and internationally. In addition to its New Jersey headquarters, K-Sea Transportation had offices in Staten Island, New York; Philadelphia, Pennsylvania; Norfolk, Virginia; Seattle, Washington; and Honolulu, Hawaii. The company owned and operated 78 tugboats and 73 barges and employed about 850 people.

The *Caribbean Sea* was one of 13 tugboats operating out of the company's New York division and at the time of the accident was staged at the company's River Associates office in the Philadelphia Naval Business Center.[17] The vessel was manned by one licensed master, one licensed mate, two deckhands, and one licensed engineer. According to the *K-Sea Transportation Vessel Procedures Manual*, every deck watch was to have one licensed individual (master or mate) and one deckhand, with the licensed individual having ultimate responsibility for safe navigation, radio guard, lookout, and radar observation.

On June 17, 2009, the city of Philadelphia contracted with K-Sea Transportation to move two city-owned barges, *The Resource* and *The Recycler*, between the city's Northeast Water Pollution Control Plant on the Delaware River north of Philadelphia and the privately owned Biosolids Recycling Center on the Schuylkill River in the city's southeast—a distance of about 11.7 nm. Barges loaded with wastewater "sludge" at the pollution control plant were to be moved downriver to the recycling center where the sludge would be discharged for processing. The empty barges would then be returned to the pollution control plant for reloading.

[16] According to the Ride The Ducks job description, the deckhand was to "assist the Captain with customers on the DUKW, to identify and assist in emergency situations, and to perform basic routine operations of the DUKW during the water portion of the tour." One of the "essential functions" was to "Recognize potential safety issues and follow company and Coast Guard procedures in emergency situations."

[17] The Philadelphia Naval Business Center was once known as the Philadelphia Naval Shipyard before the U.S. Navy ended most of its activities there in late 1995. The former naval base is now home to several maritime-based companies.

Several K-Sea Transportation tugboats worked on this project until the *Caribbean Sea* assumed the responsibility for the barge transits on June 23, 2010. The city provided the company with a weekly schedule of anticipated barge movements. The number of scheduled trips between the two locations in any 24-hour period ranged from one load or discharge to two or more loads and discharges.

At the time of the accident, the *Caribbean Sea* was in operation or standing by (tied up and available for service) 24 hours a day. The vessel was operated on a two-watch, or "square watch," system in which watchstanders are on duty for 6 hours followed by 6 hours off. On a towing vessel, the masters and mates standing a two-watch system concentrate on navigation, boat handling, communication with other vessels and with the company office, and crew supervision and direction. Deckhands are responsible for making and breaking tows, carrying out regular maintenance and housekeeping, and performing lookout duties as directed by the officer on watch. Engineers respond to alarms, perform routine maintenance and repairs, and perform other activities related to the vessel's engineering systems.

The *Caribbean Sea* master and deckhand No. 2 had the "front watch," (also known as the "captain's watch") which was from 0600 to 1200 and 1800 to 2400. The mate and deckhand No. 1 were on the "back watch" (also known as the "mate's watch") from 1200 to 1800 and 2400 to 0600. The engineer was on duty from 0700 to 1900 each day. On the *Caribbean Sea*, this rotation was maintained for 2 weeks, after which a crew change would take place. The crewmembers lived on board the tugboat during the 2-week assignment.

Just after midnight on July 7, 2010, the *Caribbean Sea* was at the pollution control plant waiting for the tank barge *The Resource* to finish loading. At 0510, the *Caribbean Sea* got under way en route to the recycling facility with the loaded tank barge made fast to its starboard side. The vessel and barge arrived at the recycling center at about 0805. After securing the tank barge to the facility for discharge, the crew shifted the *Caribbean Sea* to the River Associates dock about 1 nm away. It arrived there at about 0900 to reposition one of the company's smaller oil barges and to take on water and supplies.

At 1100, the mate (who would be navigating the vessel at the time of the accident) reported for duty and relieved the previous mate. He was beginning a 2-week tour of duty on board the *Caribbean Sea*, a vessel on which he had served previously. Although the master and the mate had never worked together, they knew each other from their service on other company vessels.

At 1200, the mate and deckhand No. 1 assumed the vessel's watch. At that time, the vessel was shifted from the River Associates dock to the recycling facility to begin preparing for the transit north back to the pollution control plant. Deckhand No. 2 told investigators that at that time he had lunch and then went to his stateroom to sleep. The mate, deckhand No. 1, and the engineer were responsible for making fast the vessel to the barge.

At the time of the accident, K-Sea Transportation had no written policy for tugboats with an upper and lower wheelhouse regarding which wheelhouse was to be used when towing an empty barge, and the master had not written his directive into the standing orders of the vessel. The master said that he told the mate that with a light (empty) barge and the resulting high

freeboard,[18] the vessel should be operated from the upper wheelhouse to provide better visibility. The master said that when he informed the mate that he should navigate from the upper wheelhouse, the mate responded, "No problem. You don't have to worry, that's normal. That's where I would be." The master said that shortly thereafter, between 1230 and 1245, he went to his stateroom to rest.

At about 1315, the mate got the vessel under way. According to deckhand No. 1, the mate was navigating the vessel from the upper wheelhouse at that time. Deckhand No. 1 said that, once under way, he began performing day work consisting of routine maintenance and housekeeping chores. The engineer said that he returned to the engineroom.

Family Medical Emergency of the *Caribbean Sea* Mate

A K-Sea Transportation official told investigators that, in a conversation with the mate after the accident, the mate informed him that he had learned while on watch that his young child had suffered a serious medical emergency earlier that day. The official said that the mate told him that he had been "consumed" with dealing with this family crisis (medical records obtained by the NTSB confirmed that the mate's child, who was undergoing a scheduled routine medical procedure that day, had suffered a potentially life-threatening complication less than an hour before the mate went on duty). The mate's postaccident conversation with the company official was the first mention that the mate had made of this emergency; he had not mentioned it to the master of the *Caribbean Sea* or to any of his other fellow crewmembers. K-Sea Transportation officials told the NTSB that, although the company had no written policy to cover such eventualities, these situations were covered in employee interviews and new-hire processing. The officials stated that, had the mate made his situation known, he would have been granted emergency relief. The company informed the NTSB of 15 instances from the 12- to 18-month period preceding the accident in which mariners had requested and been granted emergency relief from duty because of family emergencies.

Mate's Cell Phone Use

On August 25, 2010, the NTSB obtained from the wireless carrier for the mate of the *Caribbean Sea* a record of the calls made to and from the mate's personal cell phone on the day of the accident. Those records show that between 1222, just after the mate assumed the navigation watch, and 1432, about 5 minutes before the collision, the mate made 13 outgoing calls to five different telephone numbers. He made two outgoing calls to his personal voice mail. During this period, he also received six incoming calls, two of them from numbers he had previously called. Eighteen of the calls, lasting a documented total of 53 minutes, were made or received while the mate was responsible for navigating the tugboat and barge. Six of the calls were recorded as having lasted 1 minute. The two longest calls lasted 7 minutes each. The call he placed at 1432, about 5 minutes before the collision, lasted 6 minutes. Based on the records, the calls collectively lasted a total of 65 minutes; however, because the service provider rounds the

[18] *Freeboard* is the vertical distance from the waterline to the uppermost continuous deck.

calls upward to the nearest minute, the mate's phone calls may have lasted for a significantly shorter period of time.[19] (Also see section "Company Policies Regarding Use of Wireless Devices While on Duty.") NTSB investigators determined that all of the (non-voicemail) outgoing and incoming calls were to or from the mate's father, mother, or spouse.

Mate's Use of Company Laptop Computer

K-Sea Transportation provided all company vessels with laptop computers for the purpose of general communication, aids to navigation, and transmission of data for billing. K-Sea Transportation policy prohibited personal use of these laptops, and allowed only business use so long as such use was not distracting to operations. On the *Caribbean Sea*, the laptop computer, which had Internet connectivity, was located in the lower wheelhouse.

Following the accident, NTSB investigators removed the laptop computer for analysis. In June 2011, the Federal Bureau of Investigation, which had further examined the computer, informed the NTSB that on the day of the accident, between about 1400 and 1420, the computer had been used to look up medical information on the Internet.

Survival Factors

Fifteen of the 35 passengers on board *DUKW 34* at the time of the accident were from Hungary, including 13 teenage students and 2 teachers. Based on interviews with the passengers, English language skills varied greatly throughout the group. The Hungarian group was accompanied by a local American host group consisting of three adults and four teenagers. The remaining 13 passengers on board the APV were "walk-ups" (one group of 4, two groups of 3, one group of 2, and one solo passenger). Passenger ages ranged from 8 to 72 years.

Safety Briefing

Before getting under way, the master on a small passenger vessel such as *DUKW 34* is required by Coast Guard regulation at 46 CFR 185.506 to provide a safety briefing to passengers. The briefing must include the location of emergency exits, the location of lifejackets, and the proper method of donning and adjusting lifejackets, including a demonstration. The briefing must also inform passengers that they will be required to don lifejackets when potential hazardous conditions exist, as directed by the master. According to Coast Guard Navigation and Inspection Circular (NVIC)[20] 01-01 (*Inspection of Amphibious Passenger Carrying Vehicles*),

[19] Call initiation and duration times are rounded up to the next minute. For example, a call shown as having started at 14:32 could have been initiated as early as 14:31:01 or as late as 14:32. If the duration of the call is shown as 6 minutes, it could have ended as early as 14:36:02 or as late as 14:38:00. The NTSB calculated the mate's minimum possible cell phone activity level to be about 42 minutes.

[20] The Coast Guard uses NVICs to disseminate information or policy to the marine industry. Although the guidance in a NVIC is not enforceable, the industry usually makes an effort to comply with it. NVICs are sometimes used to disseminate information that will subsequently be proposed as regulations.

the safety briefing should also discuss the method of disembarking the vehicle during emergency egress and the method of removing obstructions to egress (windows or curtains):

> 177.500(o) requires only one means of escape.[21] Most DUKWs have been granted special consideration for reduced aisle widths with the stipulation that the primary means of escape is over the side. This goes against human nature, which is to exit in the same manner one enters. The method of boarding, for the majority of DUKWs, is over the stern; hence the perceived escape is over the stern. These vehicles have a tendency to sink stern first. This places the perceived escape in the opposite direction from which the passengers should go. Because of this, the master should give specific instructions to the passengers during the safety orientation concerning the method of escape from the vehicle.

At the time of the accident, the primary guidance document for operators of Ride The Ducks APVs was the *Captains' Operations Manual*, dated February 20, 2010. According to the manual's introduction, its purpose is to ~~–s~~standardize certain operations across the fleet and provide support and clarification of . . . day-to-day operations." With regard to safety briefings, the manual stated the following:

> **Safety Briefings**
>
> A safety briefing is an informational presentation that ensures the safety of all passengers from the time the tour starts until it ends. It is necessary to give the following safety briefings at the appropriate times:
>
> **Pre-Trip Safety Briefing**
>
> - Prior to starting your tour, cover the following items:
> - Keep arms and hands in the vehicle at all times
> - No smoking throughout the trip
> - Remain seated throughout the trip unless authorized by your Captain/Driver
> - Be prepared for sudden stops or turns and keep children firmly in laps/seats for their protection
>
> **Pre-Water Entry Safety Briefing**
>
> Prior to entering the water, cover the following items:
>
> - Location of Adult PFDs [personal flotation devices]
> - Location of Child PFDs
> - How to access the PFDs

[21] Title 46 CFR 177.500(o) states that only one means of escape is required if the space has a deck area less than 30 square meters (322 square feet). Normally, two means of escape are required.

- Demonstration of donning PFDs
- Location of PFD placard
- Location of emergency egress (over the side)
- Location of ring buoy
- How curtains will release in the event of emergency egress
- Passengers should follow the instructions of the Captain

According to Ride The Ducks Philadelphia employees, safety briefings, including the pre-water briefings, were always conducted before the APVs departed the Visitor Center. The master of *DUKW 34* told investigators that he always conducted a safety briefing before departing the Visitor Center on a tour. The briefing covered general safety requirements as well as safety issues specific to the marine environment. With regard to lifejackets, the master described his pre-departure brief to investigators as follows:

> [I tell them] ‗Okay, folks, I want you to know this is a Coast Guard-inspected vessel. I am required to tell you about a PFD. Folks, we're not going to need these today, but I need to tell you about these. Okay. They're located here and there. This side is for adults. This side is for children.' (I'm holding the jacket, pointing to them, for children.) ‗Okay. If you're not sure if you're an adult or a child, the Coast Guard really doesn't care about your emotional level of stability. They only care about weight. Ninety pounds and over, 90 pounds and under. If you're right at 90 pounds, like me, make sure you put the bigger jacket on, okay? Now folks, if I tell you, and only if I tell you to put the jackets on, here's what you need to do. Pull down on the yellow tab, the jacket comes down, looks like this. Unhook the clip. It looks like a dog leash clip. Open up, put it over your head and around your neck. This thing goes around the back of your body and comes back to the front.' (I don't do the procedure with the jacket over my head. I show them how to put it on . . . but to simplify this, I took it off.) I said, ‗this thing goes around the back of your body, comes back and clips on the D ring. It doesn't matter what side you use. Both sides will work. Okay. Now if you do what I ask you to do, you, too, are going to float like a –' and everybody is supposed to yell –Duck."'

All passengers interviewed remembered hearing the master's safety briefing before departing on the tour. Although none of the American passengers commented negatively on the briefing, 11 of the 13 surviving Hungarian passengers had negative comments. Several Hungarian survivors commented on the fact that the master did not physically demonstrate how to don a lifejacket. One Hungarian passenger compared it to the safety brief on airplanes saying:

> Because yes, you know, if you were on an airplane, there is a video demonstration there, and everybody is so bored, because you can see it many times, as many times as you travel. But now, I would have been curious how it [a lifejacket] should be used, because it is the first time I am on that vehicle.

Two other Hungarians indicated that after listening to the master's brief, they did not know how to put on a lifejacket.

Lifesaving Equipment

DUKW 34 was required to carry lifesaving equipment on board as stipulated in its Coast Guard-issued Certificate of Inspection (COI).[22] The COI required 39 adult lifejackets and 4 child lifejackets, as well as a ring buoy with line attached. Because the tours often carried large groups of children, Ride The Ducks APVs were equipped with more than the minimum number of required child-sized lifejackets. Because not all lifejackets from *DUKW 34* were recovered after the accident, investigators were unable to verify the exact number carried on board; however, the vessel had been inspected by the Coast Guard on March 25, 2010, and had been found to be carrying all required lifesaving equipment.

Lifejackets were stowed in the overhead on both sides of the vessel. Adult lifejackets were stowed in stacks of two on the starboard side above all but the last row of seats. Child-size lifejackets were stowed similarly on the port side and were above all but the last 3 rows of seats. The bottom end of each lifejacket was resting in a metal channel just below the canopy on each side (figure 8).

Figure 8. Lifejackets on Ride the Ducks APVs were stowed in stacks of two above each row of passenger seats. Adult jackets were on the starboard side; child jackets were on the port side.

[22] A COI is required by law (46 *United States Code* Section 3309), and an approved stability letter is required by regulation (46 CFR Part 170) before a small passenger vessel is allowed to carry more than six passengers at least one of whom is for hire. COIs for this particular class of vessel are issued for 5-year intervals, with annual inspections due within 3 months before or after each anniversary date of the certificate.

The top end of each lifejacket was secured to the overhead using a black nylon strap with a yellow tip and button-type snap. Passengers needed only to pull the yellow strap end to release the snap and free the lifejackets from the overhead.

Coast Guard regulations at 46 CFR 185.508 and Ride The Ducks policy[23] specify that lifejackets are to be donned by passengers when hazardous conditions exist, such as when the vessel is being towed. The Coast Guard regulations also cite ―flooding, fire, or other events that may possibly call for evacuation" as circumstances under which passengers should don lifejackets.

Evacuation

The *DUKW 34* passenger cabin had nine rows of bench seats (each seat accommodating two passengers) arranged down the port and starboard sides of the vessel with a center aisle in between.[24] The cabin was covered overhead by a canopy consisting of a composite vinyl and polyester awning material supported by welded steel tubular framing. Coast Guard NVIC 01-01 states that:

> Canopies and canopy supports can impede the egress of passengers. Again, the primary egress on these vehicles is over the side. Canopy supports should be positioned to allow the majority of passengers unobstructed egress.

The canopy support stanchions on Ride-the-Ducks APVs were positioned in line with seat backs.

During inclement weather, roller curtains of clear plastic sheeting could be electrically lowered to enclose the otherwise open-sided cabin. In the event of an emergency requiring an over-the-side evacuation while the curtains were down, each roller curtain was fitted with a manually operated release mechanism that used gravity to quickly drop the curtain outward. The curtain release mechanisms were consistent with the recommendations of NVIC 01-01, as follows:

> If side windows or curtains are installed they should not cause an impediment to passenger egress. Arrangements should be in place to allow the master the ability to open all windows and or curtains on each side from a point located at the control station.

On the day of the accident, as was normal for operations during warm weather, the plastic curtains were rolled up, leaving the windows completely open.

DUKW 34 complied with the guidance of NVIC 01-01 with regard to evacuation, including requirements for seat spacing, aisle width, deck rails, window openings, and means of escape.

[23] The Ride The Ducks *Captain's Operations Manual* references 46 CFR 185.508.

[24] A folding seat between the rearmost bench seats was dropped down after the rear access door was closed to accommodate a 37th passenger.

Vessel Information

DUKW 34

The hull and mechanical systems of *DUKW 34* comprised mostly new but some rebuilt components installed on the chassis of an original 1945-vintage DUKW, classified by the U.S. Army as a "2 1/2 ton, 6 x 6, Amphibian Truck." The APV had six wheels—two forward, two middle, and two aft—of which four (the forward and mid-wheels) were driven.[25] The hull was constructed of 10-gauge steel at its bottom and 12-gauge steel at its sides and was reinforced by interior framing and exterior reinforcement ribs. The vehicle was 33 feet long and 8 feet wide. During water operations with a full passenger load, the vessel draft was about 5 feet with a freeboard of about 2 feet.[26]

Although the appearance of the APV closely matched the original 1945 model, most engineering systems had been updated from the original design, and some new systems and equipment had been added. These included a fire detection and manually activated suppression system in the engine compartment, a vapor detection system,[27] communications equipment, and additional electric bilge pumps.[28]

DUKW 34 was built in 2003. It was one of a series of sister APVs that were termed "Stretch Ducks" by their builder, Amphibious Vehicle Manufacturing, LLC, (AVM) of Branson, Missouri.[29] The "Stretch Duck" was lengthened by about 2 feet over the original 1945 DUKW. Ride The Ducks manufactured its last APV in 2008. Since 2008, construction of new Ride The Ducks APVs has been contracted out to Chance Morgan, Inc., and Chance Rides Manufacturing, Inc., of Wichita, Kansas.

The operator's station of *DUKW 34* had a bucket-style seat for the operator at the left side of the front of the passenger cabin. A jump seat to the right of the operator's was used by a deckhand or the tour narrator, depending on the circumstances. The vessel's COI authorized it to carry a maximum of 39 persons, including a 2-person crew.

The APV was propelled on both land and water by a Chevrolet, 8-cylinder, 235-hp gasoline engine that was fitted in an engine compartment located forward of the operating station and passenger cabin. For land operation, the engine output shaft was connected to an automatic

[25] The on-road drive arrangement had been modified from the original DUKW six-wheel drive (6 x 6) arrangement to a four-wheel drive (6 x 4) system.

[26] According to the stability letter issued for the vessel by the Coast Guard on March 19, 2009, "Freeboards of at least 2 feet 1/2 inches, as measured at the stem to the top of the bulwark, and 2 feet 4-7/8 inches, as measured to the top of the bulwark at a point 7 feet 6 inches aft of the bow, shall be maintained. This corresponds to a maximum draft at the stern of 5 feet 2-3/8 inches.

[27] Title 46 CFR 182.410 requires that small passenger vessels under 100 tons be equipped with a system that can detect flammable vapors. Title 46 CFR 182.480 requires that this vapor detection system provide a visual and audible alarm at the operator's station.

[28] Guidance regarding the additional bilge pumps is provided in NVIC 01-01.

[29] Amphibious Vehicle Manufacturing was merged into Ride The Ducks International, LLC, in 2005.

transmission. The transmission was connected to a single-speed transfer case that was then connected to differentials at the forward and mid axles, which were then connected to the forward and middle driving wheels. For water operation, a separate output from the transfer case was connected to the propeller through a 2:1 helical reduction gear and a propeller shaft. The operator had to engage and disengage the propeller manually before and after each waterborne operation. The three-bladed bronze propeller had a diameter of 24 inches and a pitch[30] of 14 inches.

A conventional (automotive style) power-assisted hydraulic steering system was used to steer the APV on the road. On the water, steering was accomplished by a mechanical linkage (a push-pull cable) from the steering column to the rudder tiller at the stern. In the event of an on-water steering failure, the APV was equipped with a redundant steering cable that could be connected manually to the tiller and operated with a hand crank stored near the operator's station.

The APV engine was cooled by a conventional (automotive style) closed and pressurized cooling system using a mixture of water and ethylene glycol (antifreeze).[31] The mixture was cooled by passing it through both a traditional air-cooled radiator and a water-cooled heat exchanger called a "keel cooler" mounted on the exterior of the APV, on the port side below the waterline.[32] A manually operated ball valve could be closed to prevent coolant flow through the keel cooler during cold weather. According to the lead mechanic for Ride The Ducks, the normal coolant temperature would be from 160° to 180° F, with "200[0] not real bad, particularly in hot weather." The mechanic said that APV operators were told to contact the maintenance facility if the cooling water temperature reached 220° F.

The APV radiator was mounted at the front of the engine. Air flow across the radiator was generated by an engine-driven axial-flow fan and could be supplemented by ram air entering through the partially open engine compartment cover (hood). After passing across the radiator, the air was directed to port and starboard plenums on either side of the engine bay before exiting to the atmosphere through screened openings on the vessel bow just forward of the passenger cabin.

The APV cooling system included a metal surge tank[33] mounted near but external to the radiator. A pressure cap on the surge tank served to maintain an elevated pressure within the cooling system and thus raise the boiling temperature of the coolant.[34] The pressure cap, which was rated at 13 pounds per square inch (psi) (gauge), was attached to the fill neck for the surge

[30] *Pitch* refers to the theoretical distance a propeller would move forward in one revolution if it were moving through a soft solid.

[31] Ethylene glycol both lowers the freezing point and raises the boiling point of the water while inhibiting corrosion within the system.

[32] A second keel cooler, mounted on the starboard underside of the hull, was used for cooling the engine transmission oil.

[33] The *surge tank* is normally situated at the highest point in the vehicle cooling system and is where air is separated from the liquid coolant.

[34] The boiling point of water at 13 psi is 245° F. The presence of antifreeze in the cooling water raises the boiling point even higher.

tank, not to the radiator itself. A plastic expansion tank (sometimes referred to as a "reserve" tank or "overflow" tank) mounted near the surge tank allowed the coolant level in the system to rise or fall as the liquid was heated or cooled. Reference marks labeled "hot" and "cold" on the translucent tank indicated the proper coolant level for each condition.[35]

For communications, the APV was fitted with a fixed marine VHF-FM radio mounted near the operator station and a spare handheld VHF-FM marine radio. The master was also provided with a cellular phone with push-to-talk (direct-connect) capability for communicating with company personnel ashore.

Caribbean Sea

The *Caribbean Sea*, a 78.9-foot-long, 148-gross-tons uninspected[36] tugboat, was built in 1961 by Equitable Shipyard of Madisonville, Louisiana, as the *H.D. Campbell*. After two owner and name changes, the vessel was purchased by K-Sea Transportation in 2008 and became the *Caribbean Sea*.

The vessel was a twin-screw, twin-rudder tugboat of all-welded construction built for coastwise ocean towing service. The vessel had a single deck. Located amidships was a two-level deckhouse[37] that contained the original (lower) wheelhouse, crew quarters, and galley. The deckhouse was equipped with heating and air-conditioning systems. An upper wheelhouse was fitted atop the original wheelhouse some time after initial construction (refer to figure 5). The upper wheelhouse was equipped with two small heaters for cold-weather operations. In warm weather, the door and side windows of the upper wheelhouse could be opened for ventilation, but the space was not air-conditioned. The *Caribbean Sea* was fitted with two 1,200-rpm propulsion diesel engines rated at 1,200 hp, each driving two 72-inch-diameter, 52-inch-pitch, four-blade, stainless steel propellers.

During voyages, the *Caribbean Sea* steering and throttle system could be controlled from either the upper or lower wheelhouse, but throttle control could be active at only one of the wheelhouses at any time. Throttle control was transferred from one wheelhouse to the other through activation of an air control valve. Activating the valve at either station would transfer control to that station. The *Caribbean Sea* was actually equipped with four separate control stations—an aft deck station (usually used while configuring a tow), port and starboard lower wheelhouse stations, and the upper wheelhouse station. In all cases, the throttle could be controlled from only one station at a time. The *Caribbean Sea* was not equipped with a recording

[35] Coolant expands when heated, raising the pressure within the cooling system. When this pressure exceeds the pressure rating of the pressure cap, a valve within the cap opens to allow some of the coolant to be routed to the unpressurized expansion tank. As the liquid cools and contracts, pressure within the cooling system drops, drawing liquid from the expansion tank back into the system.

[36] *Uninspected* in this context refers to a vessel that does not carry passengers or freight for hire and is therefore not required to be inspected by the Coast Guard. Such vessels must comply with 46 CFR Subchapter C, "Uninspected Vessels."

[37] The "upper deck" referred to for clarity in this report is actually part of the deck house.

device that would have recorded steering and throttle inputs, rudder response, or the location of throttle control.

For communications and navigation, the lower wheelhouse was fitted with three VHF-FM marine radios (aft, port, starboard), two GPS receivers (aft, forward), satellite compass, two radars (2-3 cm X-band, port, starboard), AIS navigation unit, echo depth sounder, and a SIMRAD 50 autopilot. A company-issued laptop computer with Internet connectivity was also located in the lower wheelhouse. The upper wheelhouse was fitted with two VHF-FM marine radios (port, starboard), satellite compass,[38] magnetic compass, one radar (3 cm), and an AIS navigation unit.

The Resource

The tank barge *The Resource*, an uninspected, unmanned, and non-self-propelled vessel, was built in 1989 by Trinity Marine Group, Nashville, Tennessee. This barge and another, nearly identical tank barge called *The Recycler*, were designed and built specifically for the city of Philadelphia's water department to transport wastewater sludge between the city's pollution control plant and a recycling facility. *The Resource* was 250 feet long with a beam of 50 feet. It was raked on each end and had four cargo tanks with a total combined capacity of 1 million gallons. When loaded, the vessel draft was 15 feet 4 inches. When the barge was empty, as it was on the day of the accident, its draft was 3 feet 6 inches. Its freeboard when empty was about 20 feet at the bow and 16 feet at the stern, and when full about 7.5 feet at the bow and 4.5 feet at the stern. The barge was classed by the American Bureau of Shipping and was limited to river service. At the time of the accident, the barge was owned by the city of Philadelphia.

Personnel Information

DUKW 34 Master

The *DUKW 34* master, age 58, was first employed by Ride The Ducks as master on March 1, 2004. He remained in that position for 2 months. After leaving the company, he worked on charter fishing vessels and, for a time, operated his own charter fishing boat. He was rehired by Ride The Ducks in the spring of 2009 and worked as master with the company for the 2009 and 2010 tour season, until the time of the accident.

Licenses and Training. The master was operating under the authority of a Coast Guard master's license with a current issuance approved for steam or motor vessels of not more than 50 gross tons operating upon near-coastal waters, issued in March 2008. He obtained his first Coast Guard master's license in May 2003. That license was limited to steam or motor vessels of

[38] A satellite compass uses GPS technology to provide heading data for autopilot, radar, AIS, sonar, and plotting systems. The accuracy of heading data provided by a satellite compass is not affected by vessel pitch and roll.

not more than 25 gross tons operating upon near-coastal waters. The master also held a current CDL issued by the state of New Jersey.

Ride The Ducks had corporate and local office safety, operational, and emergency procedures and required all employees, based on the position held, to attend annual preseason and periodic training sessions.[39] The position of APV master was deemed by Ride The Ducks to be a safety-critical position, and all APV masters were required to meet with supervisors or designated safety trainers at least once each quarter to review and acknowledge the company- and Coast Guard-required emergency vessel procedures. These procedures included actions to be taken in the event of loss of steering, loss of propulsion, man overboard, an abandon ship emergency, and fire. The master's most recent formal training was a 3-day preseason training session in March 2010, which included 2 days of classroom instruction and 1 day in the field covering Coast Guard-required emergency drills and Pennsylvania Department of Transportation vehicle inspection refresher training. Subsequent to the formal training sessions, the master completed two safety standards review sessions, on April 30, 2010, and May 1, 2010. He had participated in a quarterly review of on-water emergency drill procedures on June 25, 2010.

Medical. According to his merchant mariner's medical evaluations and the associated records, the master had uncorrected vision in both eyes of 20/200, correctable to 20/20, and each Coast Guard license was issued with the following endorsement, "Corrective lenses to be worn with spare glasses carried on board." A video taken by a passenger on board *DUKW 34* before the APV's departure on the accident tour showed the master wearing glasses during the safety briefing. During his most recent Coast Guard merchant mariner's physical in 2008, the master reported no illnesses or disabilities. On a medical examination form associated with his CDL application in 2004, he checked the "NO" box for the symptom titled, "Sleep disorders, pauses in breathing while asleep, daytime sleepiness, loud snoring." When asked by the attending physician about his sleep patterns, he said he did not experience excessive tiredness. U.S. Department of Transportation (DOT) regulations require CDL holders to undergo a physical examination every 2 years. Ride The Ducks required its CDL holders to have a physical examination every year. The master's last physical exam before the accident took place in April 2009.

Work/Rest Cycle. In the days that preceded the accident, the master worked Sunday, July 4, and he indicated it was a hot and long day and that he was tired after work. He could not tell investigators exact times because he said he documented everything in his personal log book, which was lost overboard in the accident. He said that on Monday, July 5, he awoke around 0830 and went to bed at about 2100 or 2130. When asked how he slept that night, he replied "I usually sleep pretty good." He said that on Tuesday, July 6, he did not have to report to work until 1100, so he "slept in a little later." He could not remember the exact time he went to bed on the night before the accident. He said that on the morning of the accident, he awoke at about 0600 feeling rested.

[39] Ride The Ducks Safety Procedures Manual, dated February 16, 2010.

DUKW 34 Deckhand

The deckhand, age 18, was hired by Ride The Ducks in the spring of 2009 as an "ambassador."[40] He worked the 2009 tour season and the 2010 season up until the time of the accident.

Licenses and Training. The deckhand did not hold a Coast Guard license or merchant mariner's document, nor was either required by law or regulation. He self-reported that he had marine experience on small boats, and he stated that he had been around the maritime industry since he was a child because his father was a Coast Guard-licensed mariner. He further indicated that his father had previously been employed by K-Sea Transportation and was employed by Ride The Ducks at the time of the accident.

Because he held a position that was considered by Ride The Ducks to be safety critical, the deckhand had completed a 2-day preseason training session in April 2010, which included 1 day of orientation held in a classroom, and a second day that combined classroom and in-the-field training covering Coast Guard-required drills and Ride The Ducks safety standards for deckhands. The deckhand also completed three more reviews of the company safety standards on April 30, May 2, and June 2, 2010.

Work/Rest Cycles. In the days preceding the accident, the deckhand was off duty Sunday, July 4, through Tuesday, July 6. He said he had "a good night's sleep" on the two nights leading up to the accident. That Monday night, he recalled going to sleep around 2330 or 2400 and awoke the following day sometime between 1100 and 1300. He said he recalled going to sleep around 2330 or 2400 the evening before the accident and awoke sometime around 0730 the next morning in order to report for work by 0900.

Caribbean Sea Master

The master, age 31, was hired by K-Sea Transportation as mate on April 28, 2004. Before joining K-Sea Transportation, he had served as a third mate on seagoing vessels and as a deckhand on towing vessels. He assumed his very first position as master on board the *Caribbean Sea* on July 3, 2010, 4 days before the accident. In total, he had served 8 days as either mate or master on board the *Caribbean Sea* while the vessel was assigned to the tank barge movements.

Licenses and Training. The master was operating as a Coast Guard master of towing vessels upon oceans. The license was also endorsed as second mate of steam or motor vessels of any gross tons upon oceans, and radar observer (unlimited), issued on April 26, 2007. This was his second issuance of a Coast Guard license. The master also held a Merchant Mariner's

[40] In addition to greeting the passengers at the point of loading, Ride The Ducks personnel serving in the position of "ambassador" are responsible for taking tickets at the Visitor Center while loading the vessel and for counting passengers to make sure that all passengers who purchased tickets for the scheduled trip are on board. Ambassadors may also work as deckhands if they are assigned to the ramp where the vessels enter the water.

Document (MMD) as a person in charge/medical care provider, able seaman (AB), and tankerman/person in charge, dangerous liquids.

The master graduated from Maine Maritime Academy in 2002 with a B.S. degree in marine transportation. He received his first issuance of a Coast Guard license as third mate, steam or motor vessels of any gross tons upon oceans, and radar observer on April 29, 2002. On January 13, 2004, he obtained an endorsement on the original license for service as master of towing vessels. On March 18, 2008, the master's license was upgraded to master of steam or motor vessels of not more than 1600 gross tons (domestic tonnage), 300 gross tonnage (ITC[41] tonnage), upon oceans.

Medical. No physician-noted or self-reported sleep disorders were documented in the master's medical records. During his most recent physical evaluation, which took place in November 2009, a physician determined the master to be medically and psychologically fit for duty.

Work/Rest Cycles. The master reported to the *Caribbean Sea* as mate on June 30, 2010, and participated in the "back watch" from 1200 to 1800, and then again from 2400 to 0600. On Saturday, July 3, 2010, he assumed the position of master and transitioned to the "front watch," 1800 to 2400 and 0600 to 1200. He remained in that duty rotation until the time of the accident. He stated that he got most of his rest during his off-duty period between about 0010 and 0600 but that he also slept well during the afternoon off-duty period.

Caribbean Sea Mate

The mate, age 34, joined K-Sea Transportation in December 2000 as an ordinary seaman (OS)/deckhand. From that date until mid-2006, he served on various vessels in the company fleet and progressed from OS to AB/deckhand.

Licenses and Training. The mate was operating under the authority of his first issuance of a Coast Guard mate's license for steam or motor vessels of not more than 200 gross tons, upon near-coastal waters, mate of towing vessels upon near-coastal waters, and radar observer (unlimited), issued on November 13, 2006. The mate also held an MMD as an AB seaman, limited to service on non-lifeboat-equipped vessels, wiper, and steward or food handler.

The mate attended and completed several licensing courses at Quality Maritime Training (QMT) in St. Petersburg, Florida. He completed the 56-hour Operator of Uninspected Passenger Vessels course on September 16, 2006, a 24-hour Operator of Uninspected Passenger Vessels upgrade to master 100 gross ton course on September 21, 2006, and the 36-hour master 100 gross ton upgrade to master 200 gross ton course on September 29, 2006.

K-Sea Transportation had its own mate trainee program that established minimum levels of competency, awareness, and training that had to be met before a seaman would be considered for promotion to the position of mate. According to company records, the mate began that

[41] International Tonnage Convention.

program on January 24, 2007, on board the *Falcon*, and completed the training on March 5, 2007, on the *Davis Sea*. On March 7, 2007, he began his first service in the position of mate on the *Davis Sea*, and continued to serve on board various company vessels at that rank until the time of the accident. He had previously served as mate on the *Caribbean Sea* from October 21, 2009, through November 2, 2009, and then again on June 24, 2010, through June 30, 2010. In total, he served 118 days as mate on either the *Falcon* or the *Caribbean Sea* when the vessels were assigned to the tank barge movements.

Medical. The mate's most recent physical examination before the accident was completed on April 21, 2010. The physician determined at that time that the mate was medically and psychologically fit for duty. He had uncorrected vision of 20/20 in both eyes. No physician-noted or self-reported sleep disorders were documented in the mate's medical records.

Work/Rest Cycles. After an initial interview with Coast Guard investigators, the mate declined to provide any additional information or participate in further interviews. Therefore, the mate's 72-hour work/rest profile before the accident is unknown (see Appendix C). Records show that the mate was off duty from July 1, 2010, until the date of the accident.

Medical and Toxicological Information

Caribbean Sea Crewmembers

K-Sea Transportation used the consortium American Maritime Safety, Inc., (AMS) for the company's chemical testing program. At 1611 on the day of the accident, a local K-Sea Transportation employee certified by AMS to collect urine specimens and perform alcohol swab testing performed an alcohol screening of the accident mate. The swab test was negative for the presence of alcohol.[42] Between 1632 and 1739, this same individual also performed saliva swab testing on the four remaining crewmembers and collected urine specimens from each. The saliva test for each crewmember was negative for the presence of alcohol. The urine specimens collected from the mate and the other crewmembers were sent to MedTox Laboratories, Inc., for testing and were later confirmed by a medical review officer (MRO) to be negative for the presence of illicit drugs.[43] A specimen from the *Caribbean Sea* mate was also sent to the Federal Aviation Administration's Civil Aerospace Medical Institute (CAMI) for additional testing. The results of those tests were also negative for illicit drugs and alcohol as well as for prescription and over-the-counter medications.

[42] A Q.E.D. A150 brand saliva alcohol test swab was used for the test. These swabs meet both U.S. Department of Transportation standards and Coast Guard maritime requirements for alcohol testing.

[43] Regulations at 46 CFR 16.113 specify testing for marijuana, cocaine, opiates, phencyclidine, and amphetamines.

DUKW 34 Crewmembers

Sometime after the initial search-and-rescue effort, local Coast Guard personnel performed alcohol tests on the *DUKW 34* master and deckhand using an Alco-Sensor IV breath alcohol testing unit. The exact time of the alcohol test on each individual was not recorded; however, it is known that the testing took place sometime between 1442 and 1804, within the 8 hours required by Coast Guard regulations. The test results on both individuals were negative for the presence of alcohol.

A specimen collection technician collected a urine sample from the deckhand at 1804 and from the master at 1812. The urine specimens were sent to Laboratory Corporation of American (LabCorp) for testing. An MRO reported on July 9, 2010, that the test results for both the master and the deckhand were negative for the presence of illicit drugs. Specimens from both the deckhand and the master were sent to CAMI for additional testing. The results of those tests were negative for illicit drugs and alcohol as well as for prescription and over-the-counter medications.

Meteorological Information

The closest official National Weather Service weather reporting location to the accident site was Philadelphia International Airport, located about 6.5 miles southwest of the accident site. The following conditions were reported for the time period within which the accident occurred: At 1412, wind was from 010° at 8 knots gusting to 17 knots, visibility was unrestricted at 10 statute miles, temperature was 100° F, dew point temperature was 59° F. At 1454, wind was from 010° at 8 knots gusting to 19 knots, visibility was unrestricted at 10 statute miles, temperature was 101° F, dew point temperature was 58° F. No rainfall was reported on the day of the accident. The recorded low temperature of the day was 84° F; the high temperature was 101° F. An excessive heat warning was in effect in the Philadelphia area until 2000 hours. An excessive heat warning is issued when the heat index (the human-perceived temperature equivalent based on a combination of the actual air temperature and relative humidity) is expected to exceed 110° F for 3 hours or more during the day for at least 2 consecutive days and evening temperatures exceed 80° F.

At 1436, National Oceanic and Atmospheric Administration buoy station PHBP1, located about 1 mile south of the accident site in the Delaware River, reported an air temperature of 99° F and a water temperature of 82° F.

Waterway Information

The Delaware River runs 410 miles, from the Catskill Mountains of New York to the Atlantic coast. The river constitutes a part of the boundary between the states of Pennsylvania and New York and the states of Delaware and New Jersey. It is the entire boundary between Pennsylvania and New Jersey. The river is generally considered navigable by large oceangoing vessels and by tug/barge combinations as far as the Trenton, New Jersey, area. At the site of the

accident, water depth in the navigation channel was about 55 feet, with charted water depth immediately outside the eastern edge (New Jersey side) of the channel indicating a water depth between 35 and 42 feet. The western (Pennsylvania side) border of the navigation channel in the accident area was about 120 feet from the Penn‘s Landing bulkhead.

The shipping channel in the Delaware River is federally maintained by the U.S. Army Corps of Engineers (USACE). The channel originates at the entrance to Delaware Bay and terminates at Newbold, New Jersey. The channel has a controlling depth of 40 feet. As the channel proceeds upriver, its width gradually decreases: For the first 35 nm, the channel is 1,000 feet wide. From that point to an area known as Eagle Point Range, where the Schuylkill River feeds into the Delaware River, the channel is 800 feet wide. From that point to the Walt Whitman Bridge, the channel narrows to 400 feet. The channel width remains at 400 feet there, through the Penn‘s Landing area, and up to Newbold Island, about 22 nm north of Philadelphia, where both the water depth and channel width are further reduced.

The portion of the Delaware River where the accident occurred is subject to Federal jurisdiction with the Coast Guard being the primary Federal agency responsible for marine safety, search and rescue, law enforcement, and security on the waterway. The Mariners Advisory Committee for the Bay & River Delaware, an organization formed in 1964 by the Delaware Bay and River Pilots Association and local maritime stakeholders, is active in the area and makes recommendations to USACE on suggested improvements, navigational aid placement, and other areas which may enhance safe navigation. Additionally, the Maritime Exchange for the Delaware River and Bay, an organization originally chartered in 1882 to promote trade and harbor development and to enhance local maritime practices, provides the maritime community with various commercial, navigational and maritime security needs.

Postaccident Inspection and Testing

DUKW 34

After the damaged APV was salvaged, NTSB investigators performed extensive examination and testing of its mechanical systems. The results of those examinations and tests are as follows:

Water Pump. The water pump, which keeps the engine‘s coolant in constant circulation, was removed from the engine and disassembled. No deficiencies were found with the water pump impeller other than some indication of water leakage at the lower weep hole in the case (rust stains near hole).

Radiator. Examination of the vessel‘s engine compartment revealed that the pressure cap normally fitted to the radiator surge tank was missing (figure 9). The pressure cap was subsequently found undamaged in the lower part of the engine compartment. The pressure cap was tested and was shown to open at 11 to 13 psi. The pressure cap was rated for 13 psi.

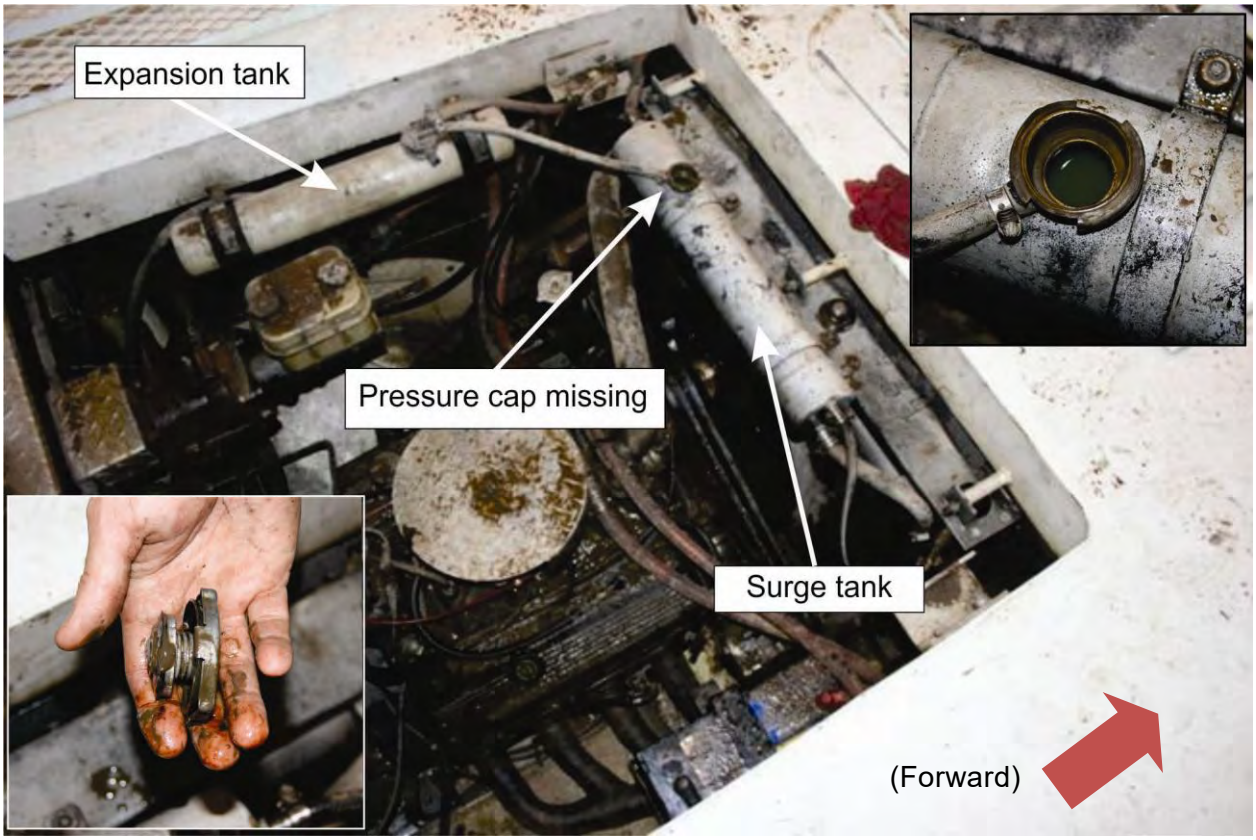

Figure 9. Engine compartment of the salvaged *DUKW 34*, with the surge tank pressure cap missing. The upper inset photo is a close-up of the uncapped tank; the lower inset photo shows the pressure cap recovered from the bottom of the engine bay.

Investigators collected a sample of the engine coolant using the drain valve at the bottom of the radiator. This sample was then tested for freeze protection[44] using a refractometer. The test indicated a coolant freeze protection level of +3° F.

After removing the radiator from the vehicle, investigators removed the radiator top cover (header) to expose the ends of the heat exchanger tubes. A water flow test showed that the radiator functioned normally.

Thermostats. The APV was fitted with two thermostats, both rated at 160° F. During testing, both thermostats began opening at 160° F and were fully open at 170° F.[45]

Keel Cooler. The ball valve controlling coolant flow through the keel cooler was found open after the vessel was salvaged. A water flow test through the keel cooler revealed no

[44] The amount of freeze protection is a function of the proportion of ethylene glycol in the cooling water.

[45] Thermostats help regulate engine coolant temperature to maintain most efficient engine performance. When coolant temperature is lower than the temperature rating of the thermostat, the thermostat remains closed, causing the coolant to circulate through the engine while bypassing the radiator. When the coolant temperature is higher than the thermostat rating, the thermostat opens to allow some or all of the coolant to be routed through the radiator (or other heat exchanger, such as the keel cooler).

significant blockage. No deficiencies were found with the keel cooler or the tubing connecting it to the engine cooling water system.

VHF Radio. Because the VHF radio had been submerged in water for almost 2 days, it was not tested. Testing of the same model radio on another Ride The Ducks APV revealed that when the radio was turned on or powered up, it defaulted to channel 16, regardless of the channel setting when it was last shut off or powered down.

Engine and Heads. The engine cooling system was pressure tested at 15 psi for 30 minutes, and a pressure drop of about 1 psi was noted after 30 minutes. The engine heads were then removed from the engine and sent to a specialized repair shop for examination. The heads indicated some minor warping and no cracks.[46]

Radiator/Engine Ventilation System. The APV's engine compartment was equipped with two fire damper doors that were controlled by levers on either side of the operator's station. The port fire damper was controlled by a lever at the lower left of the operator's station, near the position of the operator's left foot. The starboard fire damper was controlled by a similar lever on the right side of the operator's station.

Investigators examined and tested both fire dampers. The damper doors were held open against spring pressure by a two-stage latch, similar to an automobile hood latch. To close the damper, one had to pull upward on a trip lever. The force needed to trip (close) the damper was found to be about 3 pounds when latched in the first-stage position and about 12 pounds when latched in the second-stage position. The trip lever had to be moved about 0.5 inch to cause activation of the latch (which closed the damper door).

After the accident, the port-side fire damper was found closed; the starboard-side damper was open. A review of a video taken by a *DUKW 34* passenger during the incident indicates that the master closed the port damper and engine hood as part of his emergency procedures after he had shut down the engine.

Engine Compartment. The engine compartment was examined for evidence of fire/smoke damage, and none was found. All electrical wiring, belts, and hoses were in good condition and showed no evidence of having been subjected to fire or smoke.

Air Horn. Investigators determined through initial testing of the air horn that it would not operate with the ignition switch off. Some sediment was found on the trumpet diaphragm. After the horn trumpet and compressor were cleaned and inspected, the horn was tested (with the ignition switch on) and was found to function normally.

Test Runs. In an attempt to simulate scenarios that could possibly have led to the conditions observed by the *DUKW 34* master on the day of the accident,[47] investigators

[46] Both heads were warped between .005 and .007 inch. Based on vacuum tests, a valve repair was recommended.

[47] In his interview, the *DUKW 34* master stated that he smelled an odor and saw dense white smoke in the forward part of the passenger compartment near his operating station. The appearance of this smoke, which he believed to be from an onboard fire, prompted him to shut down the main engine and anchor the APV.

performed two sets of test runs in a Ride The Ducks APV similar to *DUKW 34*. The first test run was performed in Philadelphia on July 14, 2010. The test run was intended to duplicate, as closely as possible, the conditions present on the day of the accident. The APV was loaded with weights to simulate the load conditions at the time of the accident, and the pressure cap was removed from the surge tank. The ambient temperature at the time of the accident could not be simulated. At the time of the test, the air temperature was about 77° F, while the temperature at the time of the accident was about 100° F.

The route taken during the first test run was similar to the route taken by *DUKW 34* on the day of the accident, with one on-land trip preceding the on-water portion of the test. The engine coolant temperature was observed throughout the test run. The highest on-land coolant temperature was about 180° F; the highest on-water temperature was about 165° F.

The second test was performed in Branson, Missouri, with a similar APV to determine the temperature at which steam would be produced from an open water cooling system. In this test run, the pressure cap was removed from the radiator surge tank, and the port side fire damper was closed after the engine cooling water temperature had stabilized at a normal level. The test was conducted with the port fire damper closed because the door was closed when the vehicle was salvaged after the accident, and investigators believed that the closed fire door may have contributed to the high coolant termperature on the day of the accident. The investigation later determined that this door had been closed by the master after the incident began, indicating that it had not been a factor in the accident.

The test run consisted of on-road travel only,[48] and no attempt was made to match the test load to the passenger load on *DUKW 34* at the time of the accident. At the time of the test, the ambient air temperature was about 72° F. After about 10 minutes of on-road travel, the engine coolant temperature increased to about 220° F, at which time steam from the boiling coolant could be seen escaping from the vessel hood and began entering the passenger cabin from the starboard engine compartment vent (figure 10).

[48] The on-road trip was from the Ride The Ducks Branson maintenance facility to the parking lot near the point at which the on-water Branson tour would normally begin. The on-road trip in Branson took place over more "hilly" terrain than would be encountered during a normal on-road tour in Philadelphia.

Figure 10. Steam from the engine compartment of a test APV, with cooling water temperature of about 220° F.

Caribbean Sea

NTSB investigators and third party electronics technicians working under the direction of the NTSB examined and conducted functional testing of the tugboat's steering, navigation, and communications systems, including the radios and their volume levels. No deficiencies were found. During an underway trip performed on board the *Caribbean Sea* with *The Resource* configured in a hip tow similar to the day of the accident, investigators were able to tune and adjust the radars in both the upper and lower wheelhouses so that each unit acquired a small target such as the anchored APV.

Caribbean Sea AIS data (which included reported vessel position, ground speed, ground track angle, and true heading parameters before, during, and after the accident voyage) and post-accident photographic and video evidence were used to validate the visibility study blind zone position and orientation calculations. A review of the available AIS data and photographs/video that documented the vessel upper/lower wheelhouse radar image returns, GPS position, satellite compass true heading, date, and time indicated that the recorded AIS heading parameter was biased about 11 degrees clockwise (to starboard) of the vessel true heading.

Maintenance of Ride The Ducks Philadelphia APVs

General

At the time of the accident, Ride The Ducks Philadelphia APVs were maintained by three line mechanics, a "cleaner," and a supervisory mechanic (the fleet maintenance manager). Maintenance operations were overseen by the Philadelphia general manager, and technical support to the Philadelphia maintenance operations (as well as other company locations) was provided by personnel in Branson, Missouri. The company maintained a dedicated point-of-contact at headquarters to address maintenance- and repair-related issues.

According to the Philadelphia fleet maintenance manager, the company hired mechanics who were already experienced in heavy vehicle maintenance and then provided them with on-the-job training that focused on the differences between an APV and a commercial vehicle. The company also provided its maintenance staff with written maintenance procedures and checklists to guide them when performing maintenance and repairs. A mechanic exchange program that operated among the various company operating locations was intended to provide a means of information sharing among the company's mechanics.

The company had an internal website, known as "DuckCentral," that served as a repository for operational and maintenance information and was available to employees with access to a computer. Duck Central was also used to provide employees with safety and training information. The company had also implemented an electronic parts and maintenance system, known as "Asset Works" that was used for parts inventory control and for the recording of maintenance actions performed on the APVs.

In addition to the daily inspections described below, more in-depth routine maintenance and inspection of APVs were performed based on engine operating hours. Most major maintenance actions were performed at 250-hour intervals. This routine maintenance covered such items as wheels, brakes, steering, suspension, lubrication, drive axles, struts, drive shafts, transfer cases, radiator, water pump, cooling fan, and electrical system (battery, alternator, wiring). The inspection items were listed on a 9-page "250-Hour Periodic Inspection and Repair" form. According to information provided by the company, the most recent 250-hour inspection for *DUKW 34* had been performed in February 2010.[49]

During the winter off-season, the APVs had annual maintenance and repair periods during which company mechanics performed major repairs, such as engine rebuilds.

[49] The form does not indicate the engine hour meter reading at the time of the inspection, and it was not signed by the person completing the inspection even though those items that were completed on the checklist are check marked "acceptable" or "repairs made" and initialed. Not all items on the form were indicated by either a checkmark or initials as having been inspected.

Daily Vehicle Inspections—General

Each operating APV was required to undergo three operational inspections each day. The first inspection of the day was to be performed by the assigned APV operator before the vehicle left the maintenance facility. This pre-trip inspection was based on the "RTDI Captain's/Driver's Pre-Trip Inspection" checklist. At the end of the day, the driver was required to inspect the vehicle again, this time using the "RTDI Captain's/Driver's Post-Trip Inspection" checklist (more below). Finally, at the end of each operating day, company mechanics were required to review each operator's post-trip inspection form and to perform additional checks of the APV's mechanical systems.

Pre-Trip Inspections. The pre-trip checklist incorporated both Pennsylvania Department of Transportation inspection requirements for operation as a highway vehicle and Coast Guard requirements for operation as a waterborne vessel. According to the checklist, the pre-trip inspection included, among other items, an examination of items responsible for ensuring hull watertight integrity (seal "boot" and hull drain plugs), an inventory and function check of safety equipment (VHF radio, navigation and road lighting, the air horn) a check of steering and rudder controls, and a check to ensure overall cleanliness of the APV.[50] The checklist did not require that the operator open the engine compartment cover (hood) to inspect any items within the engine compartment. The fleet maintenance manager told investigators that operators did not examine the engine bay during their pre-trip inspections because that area had already been checked by the mechanic performing the vehicle's most recent post-trip inspection (discussed below). The operator was required to sign and submit the inspection form before starting operation for the day.

The clipboard recovered from the salvaged APV contained the master's completed pre-trip inspection form for the day before the accident. No deficiencies were noted on that form. The inspection form for the day of the accident could not be found. Ride The Ducks representatives informed the NTSB after the accident that, "standard procedure was to leave the completed Pre-Trip Inspection Forms and Post-Trip Inspection Forms in the Maintenance Shop and not carry them on the vehicle."

Post-Trip Inspections. At the end of each operating day, the APV was subjected to a "post-trip inspection," again using checklists prepared by the company. The operator was required to complete the "RTDI Captain's/Driver's Post-Trip Inspection" form. This one-page checklist contained 13 items that had to be inspected, including brakes, steering mechanisms, lighting devices and reflectors, tires, horn, windshield wipers, mirrors, coupling devices, wheels and rims, emergency equipment, trash removal and fuel. In addition, space was provided for the operator to note any deficiencies.

In addition to the operator's post-trip inspection, company mechanics were required at the end of each operating day to review the operator's post-trip inspection form and to perform additional checks of each APV's mechanical systems. According to the mechanic's post-trip

[50] The version (version 3/12/2010) of the checklist in use at the time of the accident was a one-page checklist. A previous version (version 2/20/2010) was a two-page checklist that included both interior and exterior items and that had space for the operator to note any deficiencies.

inspection form, this inspection included an examination of the hull bottom, drive tube boots, tires, interior items, engine bay, prop shaft, and hour meter. The form indicated that the engine bay inspection required mechanics to "check the bay area, check all fluid levels, check engine coolant, check fan belts, and check water pump for excessive play." Coolant level could be checked either by removing the surge tank pressure cap and looking inside the tank[51] or by using the "hot" and "cold" coolant level indicator marks on the plastic expansion tank mounted near the surge tank.

Any significant deficiencies found during the post-trip inspections were to be corrected before the APV could be returned to service. The mechanics performing the post-trip inspection were required to note the deficiencies found and to sign the form.

Daily Inspections of *DUKW 34*

DUKW 34 was not operated on July 1, 2010. Based on post-trip inspection forms, the APV did operate on July 2 and 3, and no post-trip deficiencies were noted. On July 4, *DUKW 34* was in service and was inspected and signed-off on by the fleet maintenance manager with no deficiencies noted. On July 5, 2010, the fleet maintenance manager inspected three APVs, including *DUKW 34*, and no deficiencies were noted.

When *DUKW 34* was inspected on July 6, 2010, the evening before the accident, the inspecting mechanic (who had been with the company about 2 weeks) noted no deficiencies on the inspection form that he signed for *DUKW 34*; he did note deficiencies on three other APVs he inspected on his shift. The mechanic told investigators that he had not removed the surge tank pressure cap on *DUKW 34* and that he had checked the coolant level by looking at the level in the plastic expansion tank. He said that the level in the tank "was right at the level it should have been."

Recent Maintenance on *DUKW 34*

According to the lead mechanic, Ride The Ducks APVs did have occasional problems with engine high temperatures. The mechanic stated that the most common cause of DUKWs running hot was the operator's accidentally closing the damper doors, but that the problem was easily resolved by "a 2-second fix."

When asked about which APVs had experienced temperature problems, the lead mechanic told investigators:

> *[DUKW] 34* was one of them, and I put thermostats in it, everything else being good, and [the operator] said that it was still running a little warm. So, I got a sending unit from a local vendor here that was the wrong one, and then we took that out and put a used one in from another water pump and put that in there, and it was still running a little hot. Then I

[51] According to the Ride The Ducks lead mechanic, an acceptable coolant level would be 0.5 to 0.75 inch below the filler neck of the tank.

> got the correct . . . sending unit and put that in and as far as I know, it was within acceptable limits. The captain had stopped writing it up and each time I saw the gauge, it was fine.

Repairs to the APVs were documented on a company form titled "Equipment Repair Work Order." A review of the maintenance work orders for *DUKW 34* identified the following recent work items:

- 5/21/10 – Replace power steering pump
- 6/6/10 – Replace thermostat, engine running hot
- 6/12/10 – R & R [remove and replace] left front wheel seal races and bearings
- 6/30/10 – R & R [remove and replace] temp[erature] switch [sensor], high temp[erature] reading

Coast Guard Notifications and Ride The Ducks Emergency Procedures

With regard to mandatory reporting to the Coast Guard of a marine casualty, 46 CFR 4.05-1 states, in part:

> (a) Immediately after the addressing of resultant safety concerns, the owner, agent, master, operator, or person in charge, shall notify the nearest Marine Safety Office, Marine Inspection Office or Coast Guard Group Office whenever a vessel is involved in a marine casualty consisting in…
>
> (1)…
>
> (2)…
>
> (3) A loss of main propulsion, primary steering, or any associated component or control system that reduces the maneuverability of the vessel;
>
> (4) An occurrence materially and adversely affecting the vessel's seaworthiness or fitness for service or route, including but not limited to fire, flooding, or failure of or damage to fixed fire-extinguishing systems, lifesaving equipment, auxiliary power-generating equipment, or bilge-pumping systems….

The *Ride The Ducks Philadelphia Standard Operating Procedures* dated February 25, 2010, states the following:

> **Water Incidents**
>
> • Loss of Steering
>
> • Loss of Propulsion
>
> • Injury or Death

Procedures:

1. Captain must immediately notify the USCG by radio

The Ride The Ducks *Captains' Operations Manual*, dated February 20, 2010, also included procedures to be followed in case of an emergency. Regarding an on-water fire, the manual stated the following:

Fire Procedures on Water

- Shut off engine.
- Shut off fuel.
- Close all vent closures, engine hatch, side hatches and floor flaps.
- Activate CO_2.
- Ask passengers to don PFDs and to stay calm.
- Call in to Dispatch to let them know that you have activated your CO_2 your location (be specific) and that you are in need of assistance.
- Attend to your passenger's needs and wait for help to arrive.
- Monitor sea state and freeboard.
- One Manual Bilge Pump: This can be used on [*sic*] the same way as the buckets. Put the intake for the pump into the water and direct the discharge with the hose at the base of the fire.

Note: If you have a Higgins pump,[52] it will not work with your engine off. Also, don't ever turn your ignition switch back on, as it will turn your fuel pumps back on.

With regard to actions required as a result of a loss of propulsion, the manual states the following:

Loss of Propulsion Procedure

- Brief the passengers that there is no danger and to remain calmly seated calm [*sic*] and don PFDs.
- Notify Dispatch of your status.

  Dispatch is to notify the USCG and other Ducks in the vicinity in order to request their assistance.
- Increase attention to your surroundings and continually monitor your freeboard.
- In the event you have no radio communication, utilize your second means of communication and/or deploy the red distress flag to get the attention of other vessels.

[52] A Higgins pump is a chain-driven bilge pump powered by the main propulsion drive system.

- If your zone requires an anchor, deploy the anchor when conditions dictate.
- Continue to monitor vessel traffic and the freeboard and wait for a rescue Duck to arrive.

Company Policies Regarding Use of Wireless Devices While on Duty

K-Sea Transportation

The *Caribbean Sea* was outfitted with multiple VHF marine radios for communication with other vessels. For daily internal communications between the vessels in the fleet and shore-side personnel, K-Sea Transportation used a company-issued cellular telephone. This phone was assigned specifically to the vessel and was stored in the wheelhouse where it was to be used and monitored by the master or mate on watch.

K-Sea Transportation addressed the issue of potential watchstander distraction that could result from use of the company telephone and other electronic devices on board, such as a company-issued computer, by a procedure in the company's Safety & Quality Management System (SQMS) program. The procedure required each watch officer to maintain a focused watch, but it allowed use of the company telephone provided that it did not distract from operations or interfere with normal or emergency communications. The company prohibited crewmembers from carrying or using personal cell phones and or other personal electronic devices while on watch.

Before the SQMS procedure was issued, the company's chief operating officer (COO) had issued several memoranda to the fleet addressing the use of cellular telephones. The first, issued on March 22, 2002, prohibited the carriage of a personal cellular telephone by vessel crewmembers on deck and while on watch and restricted the use of personal cell phones to an enclosed area of the vessel. On February 10, 2004, the COO issued another memorandum to the fleet that addressed the company's expectations for the crew to comply with rules and regulations at each marine terminal at which the vessels moored, and also noted restrictions regarding cellular phone use.

On July 17, 2006, the COO issued a third memorandum to the fleet that restated the company's policy prohibiting the carriage of cellular telephones on watch and included a synopsis from a recent casualty report regarding the grounding of the containership *Berit*, which was attributed to the second officer's distraction because of text messaging. This particular memorandum, along with other memoranda issued in 2006 and 2007, was discussed at a 2-day seminar the company held on November 7 and 8, 2007, for individuals serving in the position of mate upon company vessels. The accident mate attended this seminar and received a Certificate of Completion.

Ride The Ducks

Ride The Ducks of Philadelphia personnel used company-issued cellular telephones with direct-connect radio capability for internal communications (except while driving) during business hours. The company assigned a cell phone to each APV unit in operation and issued phones to certain personnel. Although the APVs were outfitted with marine VHF radios for communication with other vessel traffic, APV-to-APV communications or between APV operators and company personnel were made using the direct-connect radio function.

Ride The Ducks corporate policy allowed APV masters/drivers to carry personal cell phones as long as they were set for vibrate or silent mode and were never used on tour or in sight of guests except in an emergency. Ride The Ducks Philadelphia policy stated that personal cell phones were not to be used at work and could not be used or displayed at the ticket booth, while on the curb, or while on an APV with guests. If an employee needed to make a call using a personal cell phone, he or she was required to obtain permission from a manager or supervisor and to move out of the view of guests while making the call.

The deckhand in this accident acknowledged using his cell phone once to send a personal text message while he was on the *DUKW 34* bow after he deployed the anchor. He said he did not recall receiving any response to his text. The video recording of the accident captured the deckhand on the bow of the APV at 1431 taking out his cell phone and sending a text message. Records obtained from the deckhand‘s wireless service provider and from the service provider for the device to which the text message was sent confirmed that the deckhand sent an outgoing text message at that time. Those records also indicated that two incoming text messages were subsequently received by the deckhand‘s cell phone and that the deckhand sent another outgoing text message at 1436, about 1 minute before the collision.

Visibility Study

After the accident, NTSB investigators conducted a study to determine the extent of the visual field available to a mariner navigating the *Caribbean Sea* while the vessel was transporting an empty barge in a starboard hip tow. For purposes of comparison, and based on the height of eye of the *Caribbean Sea* mate, investigators assessed the visual fields available from the tugboat‘s upper and lower wheelhouses.

The study used tugboat and barge loading and trim conditions similar to the accident configuration. Based on vessel draft measurements and drawings, investigators determined that the barge bow and stern freeboards were 19.8 feet and 16.2 feet, respectively, on the day of the accident. Investigators calculated that the height of eye (above the water) of the *Caribbean Sea* mate when operating from the upper wheelhouse was 31.3 feet. Height of eye when operating from the lower wheelhouse was 20.5 feet.

The study determined that, from the lower wheelhouse, the mate would have had the last full view of *DUKW 34* when the APV was about 5,400 feet ahead of the barge bow. From that point, the APV would have remained partly visible until it was about 3,500 feet away, at which time it would have been completely obscured by the barge. These distances equate to a

forward-over-the-barge-bow ―blind zone" of 14 barge lengths, with an additional 7.5 barge lengths of partially obstructed view.

For the upper wheelhouse, *DUKW 34* would have remained completely visible to the mate until it was 360 feet ahead of the barge bow. It would have remained partially visible until it was about 230 feet away. In this case, the forward-over-the-barge-bow blind zone distance is less than one barge length, with less than one-half barge length of partially obstructed view.[53] At a speed of 6 knots, the tow combination traverses one barge length in about 25 seconds.

Coast Guard Oversight of Ride The Ducks Operations

Initiation of Operations

On April 27, 2003, the Ride The Ducks director of operations e-mailed the chief of the Inspection Department at Coast Guard Sector Delaware Bay proposing operation of amphibious sightseeing excursions on the Delaware River. The e-mail indicated that all voyages would begin at the Ride The Ducks ramp adjacent to the Benjamin Franklin Bridge (refer to figure 2), then continue into the channel and proceed southward along Penn's Landing for not more than 1 nm. The APV would then return along the same track line and exit the water at the ramp, with the entire time traveled on the water not to exceed 30 minutes.

The initial proposal also stated that the APVs' distance from the east end of the piers would not exceed 300 yards and that the vessels ―shall stay well clear of the shipping lane traffic upon the Delaware River." The proposed course, along with planned areas of potential passenger egress in case of an emergency, was identified on a chart extract enclosed with the e-mail. The following day, Ride The Ducks provided the Coast Guard with a letter asking to have new-to-zone inspections performed on five APVs, each of which had an existing COI issued by other Coast Guard jurisdictions.[54]

Following Coast Guard approval for passenger service in the Delaware River, Ride The Ducks began operations in Philadelphia on Memorial Day 2003. During that first year, the Coast Guard limited the vessels to a route between the Benjamin Franklin Bridge and Pier 31. The vessels were not to operate more than 1,000 feet from shore, and the duration of each waterborne excursion was not to exceed 30 minutes. Each APV was authorized to be operated with one licensed master and was allowed to carry up to 38 passengers.

On January 22, 2004, Coast Guard Sector Delaware personnel met with Ride The Ducks personnel to discuss safety concerns that had arisen during the first year of operation. The Coast Guard's concerns included two instances of loss of propulsion due to floating debris; an instance

[53] These blind zone calculations are conservative because investigators did not take into account wheelhouse cabin structures and barge superstructure obstructions.

[54] The vessels had been in tour service elsewhere and had been relocated to Philadelphia to make up the initial fleet of vessels.

of delayed notification of a marine casualty; marginal results during man overboard drills, which was attributed to the presence of only a single crewmember combined with the APV's slow maneuvering; and incidents of children being allowed to sit at the helm. Before the 2004 operational season, the Coast Guard increased the required manning level to include one deckhand and reduced the maximum number of passengers to 37. The Coast Guard also reduced from 1,000 feet to 300 feet the distance from shore that the APV was authorized to operate and mandated that the APVs carry a VHF marine radio.

Inspection History of *DUKW 34*

DUKW 34, as a small passenger vessel under 100 gross tons, was subject to annual inspection by the Coast Guard, in accordance with 46 CFR Parts 175–185. Marine inspectors from Coast Guard Sector (formerly Marine Safety Office) St. Louis, Missouri, performed the plan review, construction oversight, and initial inspection of *DUKW 34,* which led to the issuance of the original COI and the stability letter for the APV on September 18, 2003. The initial COI required that the APV be manned by one Coast Guard-licensed master and allowed the carriage of 38 passengers. The stability letter indicated that the APV had adequate stability for 39 persons when operating on protected waters (such as the Delaware River). Ride The Ducks subsequently moved the APV to the Miami, Florida, area where inspectors from Coast Guard Sector Miami successfully performed a new-to-zone inspection on the APV on December 3, 2003, after which the vessel began operations on an inland portion of the waterways.

In March 2004, Coast Guard marine inspectors conducted a damage survey of the APV and noted fractures in the hull plating near the APV's propeller shaft caused by the rudder assembly striking the launch ramp. The APV was pulled from service and repaired. The Miami operation was subsequently closed, and *DUKW 34* was removed from certificated small passenger service and sent back to Amphibious Vehicle Manufacturing in Branson. On or about April 29, 2004, Coast Guard marine inspectors from St. Louis approved a redesigned rudder assembly configuration, and the APV was relocated to Philadelphia. Coast Guard Sector Delaware Bay marine inspectors completed the APV's second inspection for certification on May 28, 2004, and a new COI was issued.

The APV remained in continuous certificated service in Philadelphia until late summer 2008. On September 13, 2008, a Coast Guard inspector noticed that the APV was overdue for the required annual inspection, which was to have been completed within 90 days of the anniversary date of the COI, or no later than August 28, 2008. A two-person Coast Guard team comprising one investigator and one inspector visited the Ride The Ducks Philadelphia maintenance facility on October 8, 2008, with regard to the overdue inspection. At that time, company representatives informed the Coast Guard team *DUKW 34* had experienced a problem with a bearing in its transfer case around the first of September while in operation on the road, and because it was no longer needed for the remainder of the season, it had been taken out of service. The Coast Guard team removed the COI that had been issued for *DUKW 34*, and on November 3, 2008, the chief, Prevention Department, informed Ride The Ducks by letter that the APV's COI had been deactivated because of the missed required annual inspection.

On March 12, 2009, inspectors from Coast Guard Sector Philadelphia completed a COI examination and issued the APV's third COI. The COI authorized the carriage of 37 passengers, and required both a master and a deckhand, for a total of 39 persons. The APV was authorized to resume passenger service at that time.

The most recent Coast Guard annual inspection of *DUKW 34* before the accident began on March 12, 2010, and was completed on March 31, 2010. Inspectors identified three deficiencies on the initial visit. Addressing the deficiencies required repairing the APV's propeller engagement system, relocating a coolant overflow hose that was contacting the port muffler, and removing an unused starter solenoid wire. All deficiencies were resolved before the inspection was completed, at which time the APV was determined to be fit for service.

Safety Management at K-Sea Transportation and Ride The Ducks

General

In an effort to ensure safety at sea, prevent human injury or loss of life, and avoid damage to the environment, the International Maritime Organization (IMO) developed the International Safety Management (ISM) Code. The ISM Code was adopted by the International Convention for the Safety of Life at Sea (SOLAS) in 1994 and incorporated into SOLAS Chapter IX.

On December 24, 1997, the Coast Guard issued final regulations for implementing the ISM code, and the final rule became effective on January 23, 1998. The regulations included standards that would allow companies to satisfy international certification requirements for developing a vessel safety management system (SMS), and also provided a means for voluntary certification of SMS for U.S. domestic vessels.

According to 33 CFR 96.230, the fundamental objectives of a SMS are to provide for safe practices in vessel operation and a safe working environment on board the vessel. The SMS must establish and implement safeguards against all identified risks and provide a means to continuously improve safety management skills of personnel ashore and on board vessels, including preparation for emergencies related to both safety and environmental protection. An SMS should also provide a means to ensure compliance with mandatory rules and regulations.

Under the existing regulations, vessel operators that are not required to comply with the ISM code can voluntarily meet the standards and have their systems certificated. Guidance for voluntary compliance is provided in Coast Guard NVIC 5-99. As stated in the NVIC, "33 CFR 96 is the basis for the requirements of a voluntary safety management system." As outlined in the Coast Guard's *Marine Safety Manual*, an equivalent to ISM code compliance has been established for vessels not engaged in foreign voyages. The Coast Guard has prepared guidance documents (booklet and computer disc) for use in developing safety management systems. Vessel operators must apply in writing to participate in the "equivalent" SMS program.

In the Coast Guard and Maritime Transportation Act of 2004, Congress added towing vessels to the list of vessels subject to Coast Guard inspection and authorized the agency to establish an SMS appropriate for towing vessels."[55] In response to this mandate, the Coast Guard sought and obtained input from the Towing Safety Advisory Committee (TSAC), as well as from interested members of the public and other maritime stakeholders, to develop the draft of the proposed regulations.[56] The effort resulted in the draft regulations known as 46 CFR, Subchapter M, which are expected to be released as a notice of proposed rulemaking (NPRM) in mid-2011.[57]

The Coast Guard Authorization Act of 2010 amended the existing law and provided the Coast Guard with the authority to require SMS on certain U.S. domestic passenger vessels and small passenger vessels, with the requirement based on the number of people who could be killed or injured in a marine casualty.[58] The applicability of SMS is also based on vessel characteristics, methods of operation, and nature of the vessel's service. The enabling regulations for the new authority have not yet been developed by the Coast Guard.

K-Sea Transportation and the *Caribbean Sea*

Although the *Caribbean Sea* operated domestically, K-Sea Transportation did operate some of its vessels in international waters, making the company subject to the applicable provisions of SOLAS and the ISM Code. The American Bureau of Shipping (ABS) issued K-Sea Transportation a 5-year Document of Compliance (with the ISM code) on October 18, 2008, and completed its first annual verification audit of compliance on October 21, 2009.[59] K-Sea Transportation was also a member of The American Waterways Operators (AWO) industry association's Responsible Carrier Program[60] and had successfully completed a third-party audit under that program on March 7, 2010.

[55] Public Law 108-293, dated August 9, 2004, which amended 46 *United States Code* Sections 3301 (15) and 3306 (j).

[56] TSAC was established by Congress to advise the Coast Guard on matters concerning shallow draft inland and coastal waterway navigation and towing safety. Its members include representatives from the barge and towing industry, the offshore mineral and oil supply vessel industry, and from maritime shippers and labor forces, port stakeholders, and the general public.

[57] To facilitate the implementation of these regulations and to ease the industry's transition into inspected service, which will affect over 5,200 vessels, the Coast Guard has developed the Towing Vessel Bridging Program and established the Towing Vessel National Center of Expertise in Paducah, Kentucky. For more information, see Coast Guard Memorandum from Commandant (CG-543) dated June 12, 2009, Towing Vessel Bridging Program, and <http://www.uscg.mil/tvncoe>.

[58] Public Law 111-281, enacted October 15, 2010.

[59] If an initial audit determines that the company has developed safety management procedures that meet the ISM code requirements, the company is issued a 5-year Document of Compliance (DOC). Annual audits are required to verify continued compliance.

[60] The AWO established the Responsible Carrier Program as a guide for developing company-specific safety and environmental programs tailored to the barge and towing industry. The program incorporates best industry practices in the three primary areas of company management policies, vessel equipment, and human factors. The program requires that participating companies undergo a third-party audit by an AWO-certified auditor to verify compliance.

On September 7, 2010, NTSB investigators visited the corporate offices of K-Sea Transportation and interviewed personnel involved with the company's SQMS program. These included the president; the health, safety, quality, and environmental officer; the chief operating officer; and the Philadelphia operations manager. During this visit, investigators examined the results of the previous audits performed by ABS and AWO auditors; the management reviews for the last three quarterly meetings of the company's safety, quality, and environmental team held before the accident; near-miss and nonconformity reports submitted from vessels in the fleet for the preceding year, including the analysis performed of the incidents; and corrective actions and the follow up measures. Investigators also reviewed the captain and vessel superintendent inspection reports for the *Caribbean Sea* and other vessels, as well as documentation associated with the company processes related to vessel inspection, vessel maintenance, and training of maritime personnel. No deficiencies were identified.

Ride The Ducks

At the time of the accident, Ride The Ducks operated passenger vessels on limited domestic routes. Therefore, neither the company nor its vessels were required to comply with the domestic regulations or the SOLAS provisions that required development and implementation of an SMS. Ride The Ducks did have a series of written corporate safety, operations, and procedures manuals[61] that outlined company expectations for safe vessel operational practices and safe working environments, identified risk and implemented appropriate safeguards, provided for training of personnel, and ensured compliance with rules and regulations.

According to company policy, any Ride The Ducks employee was empowered to stop any operation when it was deemed a hazard or not consistent with company safety standards. The company also had a hotline to link local operators with corporate managers and had established an internal website containing information, service bulletins, announcements, various forms, and links to the above guidance manuals. In addition, the Philadelphia office had established its own standard operating procedures[62] that provided staff with local and site specific policy and guidance.

Besides periodic statistical analysis of the company's accident and injury data, Ride The Ducks used internal and independent, third-party audits, both scheduled and random, as an on-going monitoring and measurement tool. The president, director of fleet operations, company safety specialist, operations manager, maintenance manager, and local general managers all were assigned specific audit responsibilities that were to occur at certain intervals. Locally, each general manager was required to conduct random bi-monthly audits of employees in safety critical positions to evaluate and monitor the implementation of and compliance with the company's safety procedures. According to Ride The Ducks representatives, from the beginning of the 2010 operating season until the time of the accident, the general manager in Philadelphia performed eight audits of employees in safety-critical positions. None of the internal audits

[61] Ride The Ducks *Fleet Operations Manual* dated January 2, 2010; *Safety Procedures Manual* dated February 16, 2010; *Captains' Operations Manual* dated February 20, 2010; and *Authorized Operator's Manual* dated January 27, 2010.

[62] *Ride The Ducks Philadelphia Standard Operating Procedures* dated February 25, 2010.

resulted in any documented nonconformity with emergency procedures or other safety concerns. At the time of the accident, no independent, third-party mechanical, safety, or procedural audits had been performed at the Ride The Ducks Philadelphia location to validate or confirm the internal findings of the general manager.

On September 9, 2010, NTSB investigators visited Ride The Ducks company headquarters and interviewed management personnel, including the company president, the safety specialist, and the director of fleet operations. Investigators also examined internal audit reports, reviewed meeting minutes from the last three quarterly management safety review meetings held at the corporate level before the accident, and explored relevant elements of the company's policy and guidance to employees found in the company's guidance manuals. The company president told investigators that about three times each month he would make unscheduled and unstructured visits to various company locations to observe operations. During these site visits, he would interact with company personnel at all levels and get under way on board a company APV to assess the quality of the tour and the crew interaction.

Other Information

Postaccident Actions—Ride The Ducks

Just over a week after the accident, the Coast Guard issued a requirement to all operational Ride The Ducks APVs in Philadelphia to cease operations in the Delaware River with passengers.[63] Per an operational plan submitted to and approved by the Coast Guard on August 27, 2010, the company is required to have a pre-staged rescue boat that is either manned and in operation or is in a ready-to-deploy status at all times while APVs are in operation on the river. In addition, a maximum of three APVs may be in operation on the river at any time. The revised routing for the water portion of the tours will not take the APVs more than 100 feet from the bulkhead (which will keep the vessels out of the navigation channel). Water tours are limited to 15 minutes. APVs are also prohibited from entering the river and performing the water portion of the tour if deep draft, or tugboat/barge combinations are approaching within 1/2 mile of the APV's designated route. APV operations are prohibited if the master cannot establish radio communication with the rescue boat or if there is a loss of visual contact between the APV and the rescue boat. The APV master and the rescue boat operator are both required to monitor VHF channels 13, and 16, and the Ride The Ducks VHF working channel. Additionally, the rescue boat operator will also be monitoring AIS data transmitted by other vessels in the area.

According to Ride The Ducks management, the city of Philadelphia initially expressed a preference that Ride The Ducks not resume operations on the Delaware River and instead move the waterborne tours to the nearby Schuylkill River. In January 2011, the city denied Ride The Ducks' proposal that it be allowed to operate on the Schuylkill River. The city of Philadelphia

[63] The Coast Guard issued inspection requirements, dated July 16, 2010, to each of the remaining 14 operational APVs in the Philadelphia fleet. By the form CG-835, the Coast Guard de-authorized Ride The Ducks vessels to operate in the Delaware River while carrying passengers. The inspections were completed and the Form CG-835s were resolved by August 31, 2010.

subsequently approved a revised operating plan for passenger service in the Delaware River. Ride The Ducks Philadelphia resumed APV operations on the Delaware River with passengers for hire on April 21, 2011.

According to Ride The Ducks officials, the company took the following additional actions after the accident:

Immediate Actions. Immediately following the accident, Ride The Ducks suspended operations at all locations and initiated a review of safety and operational procedures. The company also held training classes for all its masters, drivers, and mechanics. Operations remained suspended until each of the company's APVs could undergo an inspection of the engine compartment, fire-fighting systems, and safety equipment. Company representatives stated that the few minor (non-safety) discrepancies that were found were corrected immediately.

Safety Equipment. A full review and inspection of all onboard safety equipment was conducted. Some safety equipment was repositioned to make it more visible and accessible to the master.

Horns. The fixed horn was re-wired to support operation regardless of ignition switch position. A second hand-held air horn was added and mounted in the helm area.

Radios. All Ride The Ducks vehicles have been equipped with hand-held VHF radios in addition to the existing hard-wired, dash-mounted radio to provide maritime communication redundancy and monitoring capability. Company representatives affirmed and clarified, both internally and with the Coast Guard, communication requirements and procedures regarding APVs and any response boat dispatched in the event of an on-water incident. Radios and horns were evaluated for effectiveness, and radio procedures were enhanced. In one city, radio repeaters were installed to enhance radio communication.

Safety Briefing. Ride The Ducks standardized and re-scripted the complete pre-water-entry safety briefing for all locations to include, among other things, a standardized, formal, live demonstration of how to don a personal flotation device (appendix B).

Response Boat. Ride The Ducks has purchased and staffed a custom-built, dedicated response boat to maintain line-of-sight of the entire Delaware River operating area during tour operations and to provide coordination and rapid assistance, including towing when necessary. This boat carries multiple VHF radios, is equipped with AIS, and is manned by a licensed master.

Waterways Management. Ride The Ducks has joined the Marine Advisory Committee of the Maritime Exchange for the Delaware River and Bay to improve communication with other river users and to receive local notice of pertinent river conditions and planned vessel activity. The company has consulted with third-party marine consultants, participated in safety conferences, and solicited industry partners for marine safety. Additionally, Ride The Ducks has formed mutual-aid pacts with local marine operators and has held meetings with vessel operators in all of its operating cities so that all parties are aware of one another's routes and operating

patterns. Ride The Ducks also coordinates with other industry members and organizations to increase awareness of these issues.

Routes. Company managers and operations personnel conducted a route study at each of its locations.

Procedures Review. Ride The Ducks conducted a full review of all of the company's manuals, forms and procedures, with the intent of clarifying procedures and facilitating training. All locations contributed content particular to their operations.

Safety Management System. Ride The Ducks compared the company's safety procedures and directives to the SMSs used by other operators. In the interest of clarity in the marine industry, the company has begun translating its procedures, processes and safety systems into the SMS-type format. Additionally, the company is working with the Passenger Vessel Association (PVA) to assist other passenger vessel owners with the same task.

Audits. Ride The Ducks contracted with an engineering firm to conduct comprehensive audits at all of its locations. These audits covered paperwork procedures, daily operations, occupational safety and health compliance, driver safety, and mechanical procedures. Any deficiencies noted have been corrected, and ongoing evaluations continue.

Engine Bay Attention Signs. The company has installed placards near the engine compartment of each APV reminding mechanics to ~~–~~ensure all fluid caps are securely fastened . . . before closing engine hood."

Training Program. The company reviewed its 2011 training program for operations personnel, masters, safety representatives, and mechanics and made changes as follows:

- All masters/deckhands must complete training in bridge resource management and situational awareness in addition to their safety training, emergency procedures training, and driver's training.

- All company mechanics will enter training for ASE certification[64] or ASE M&I,[65] as appropriate.

- Operations personnel will complete Federal Emergency Management Agency (FEMA) crisis management training. The company's safety director has already completed this course.

- Visual and/or tactile training aids are being developed for more comprehensive operator education of the propulsion and steering systems.

[64] ASE certification is awarded by the National Institute for Automotive Service Excellence (ASE). To achieve certification, a candidate must pass an ASE examination and provide proof of at least 2 years of relevant mechanical work experience. To maintain certification, the individual must be retested every 5 years.

[65] The ASE maintenance and inspection (M&I) program consists of online training and test modules intended primarily for prospective or entry-level mechanics.

- An enhanced training program has been established for new-hire mechanics and masters.

Personnel Actions. Ride The Ducks promoted a safety specialist to the position of safety director. The safety director has reviewed all procedures for the 2011 operating season and has made site visits to or audits of all Ride The Ducks locations. The company has identified a specific "safety representative" at each location to be a point of contact for any safety issues.

Postaccident Actions—K-Sea Transportation

After the accident, the city of Philadelphia terminated its sludge transport contract with K-Sea Transportation, but later reinstated the contract. When the contract was reinstated, K-Sea Transportation replaced the *Caribbean Sea* with another company vessel and relocated the *Caribbean Sea* to New York. The company has opened its own internal investigation, and that investigation remains open.

According to K-Sea Transportation officials, after the accident, the company held seminars that addressed distractions while on duty, reviewed company policies regarding cell phone use and watchstanding, and hired a consultant to observe barge movements and to make safety recommendations.

In October 2010, the sludge transport contract between the city of Philadelphia and K-Sea Transportation was amended to add, among others, the following provisions:

- Designated tug boats shall be equipped with an upper pilot house.

- The helmsman shall pilot from the upper wheelhouse when maneuvering an empty barge.

- In addition to the requirements of the Inland Navigational Rules, at any and all times while transporting a barge pursuant to this agreement, [K-Sea Transportation] shall ensure that an experienced and proficient lookout be posted on the barge with radio communication capabilities and clear line of sight of the waterways in the immediate path of the vessel(s).

- The tug boat will have 2 radios in both the upper and lower wheel houses and the galley. One will be keyed to Channel 13 and the other to Channel 16. Both channels will be monitored by the helmsman or his designee at all times when the barge is in tow.

- The tug boat must be equipped with radar. The helmsmen or mate on watch must have received training on how to interpret radar and effectively use it for navigation and must hold a radar observer endorsement on his/her U.S. Coast Guard License.

- At no time during the operation of the tug boat with barge in tow may the helmsman or designated lookout use a cell phone for personal reasons. The off-watch is to be alerted if watch stander is distracted for any reason.

- Voyage Plan to favor course on Eastern limit of channel.

A placard with all the new contract provisions is posted on board the tugboat assigned to the contract.

According to K-Sea officials, the above provisions apply only to this contract. Fleet-wide, the requirement remains for watchstanders to ~~–m~~aintain a proper lookout."

Analysis

The four individuals most directly involved with this accident—the master and the deckhand of *DUKW 34* and the master and the mate of the *Caribbean Sea*—met all state and Federal requirements applicable to their positions.

A review of the government- and company-maintained medical records of the crewmembers of both vessels revealed no medical conditions that would have affected the crewmembers‘ ability to perform their jobs safely on the day of the accident. Postaccident toxicological tests conducted on each individual were negative for the presence of alcohol, illegal drugs and prescribed or over-the-counter medications.

The National Weather Service reported visibility as 10 statute miles at the time of the accident. Winds were light to moderate, and river current was as predicted. The width of the navigation channel to the north and south of the accident site was about 400 feet, with no obstructions that would have prevented either vessel‘s crewmembers from seeing the other vessel in time to prevent the collision.

At the site of the accident, the navigation channel was also 400 feet wide. The anchored APV was in the approximate center of the channel, allowing sufficient room for the tugboat/barge combination to maneuver around the APV and still remain within the navigation channel. Had it not been possible for the tow combination to remain within the channel, sufficient water depth was available outside the right (east) boundary of the channel to allow the tug/tow combination to safely make any maneuvers necessary to avoid the accident.

The propulsion and steering systems of the salvaged *DUKW 34* were tested to the extent possible. No significant deficiencies were found in the steering system other than those that could be attributed to the damage caused by the accident. Function testing of the nonpropulsion mechanical systems on board the APV revealed no defects or indications of mechanical failure that would have caused or contributed to the accident.

Postaccident inspection and testing of the steering and propulsion systems of the *Caribbean Sea* revealed no defects. A third-party electronics service company tested the electronic and communications equipment on board the vessel and found no significant deficiencies. In postaccident statements to investigators, neither the vessel master nor the mate mentioned any problems they had detected in shipboard systems. Although investigators found an approximate 11 degree bias in the satellite compass heading information, when small vessels navigate on narrow rivers during clear visibility conditions, precise heading information, whether derived from the satellite compass, magnetic compass, or GPS, is not essential to safe navigation.

The NTSB therefore concludes that the following were not factors in this accident: qualifications of crewmembers on board the *Caribbean Sea* and *DUKW 34* for the positions they held; use of alcohol, illicit drugs, or prescribed or over-the-counter medications by the master and the mate of the *Caribbean Sea* or by the master and the deckhand of *DUKW 34*; meteorological conditions; river conditions and waterway configuration; functioning of the

mechanical, electronic, and communications systems on board the *Caribbean Sea*; and functioning of the nonpropulsion mechanical systems on board *DUKW 34*.

Investigators interviewed personnel on both vessels about their work and sleep schedules leading up to the accident. No one interviewed reported being tired or having reason to be fatigued on the day of the accident; however, the sleep/rest information collected was limited, and crew fatigue or wakefulness could not be verified.

Fire Emergency on Board *DUKW 34*

The master and the deckhand of *DUKW 34* told investigators that about 10 minutes into the water portion of the accident tour, they saw smoke entering the passenger cabin. Fearing an engine fire, the master shut down the engine. Postaccident examination of the engine compartment of the APV revealed no evidence of fire or smoke damage. The examination did, however, reveal that the pressure cap was not in place on the radiator surge tank. The cap was found in the bottom of the engine compartment.

A radiator or surge tank pressure cap is a critical component in an engine cooling system. By raising the boiling point of the coolant, the pressure cap allows the coolant to operate at higher temperatures without being converted to steam, which would cause it to lose its effectiveness as a heat-transfer agent.

The *DUKW 34* pressure cap was rated at 13 psi. At 13 pounds of pressure, water, which at standard atmospheric pressure boils at 212° F, will not boil until it reaches 245° F. The presence of antifreeze solution in the water raises the boiling point even higher. Thus, under pressure, the *DUKW 34* engine coolant should not have begun to boil away even at the 220° F temperature the deckhand reported seeing on the vessel‘s temperature gauge. At atmospheric pressure, however, which would have been the case if the pressure cap was not installed, the coolant solution could easily have begun to boil at that temperature and evaporate as steam.

This was confirmed by the test run investigators conducted in Branson, Missouri, of an APV similar to *DUKW 34*. During that testing, with the surge tank pressure cap removed and a coolant temperature of 220° F, the vapor from the boiling coolant filled the passenger cabin of the APV in a manner similar to that described by the master and the deckhand as having occurred on the day of the accident. The NTSB therefore concludes that the *DUKW 34* surge tank pressure cap was not in place at the time of the accident, and the missing pressure cap allowed the engine coolant to boil and create steam that entered the passenger compartment and prompted the master to shut down the engine because he believed he had an onboard fire.

The NTSB could not determine why the *DUKW 34* coolant temperature rose to 220° on the accident trip or why it had not reached a similar temperature on earlier tours that day. No defects were found in the engine‘s mechanical and cooling systems during postaccident inspections, suggesting that the overheating was likely due to a combination of high ambient temperature, slow speeds (reducing the flow of cooling air across the engine), high water temperature (reducing the efficiency of the vessel‘s keel cooler), high engine load caused by operating with a full load of passengers northbound against the current, and a loss of coolant due

to evaporation during the period in which the APV was operating with an improperly secured or missing pressure cap.

Performance of Ride the Ducks Maintenance Personnel

The missing pressure cap was found in the bottom of the engine bay when *DUKW 34* was salvaged. Given the fact that the APV's engine compartment was documented as having been inspected the evening before the accident, the misplaced cap could be explained by two possible scenarios.

First, the cap could have been removed to check or add to the coolant level and then reinstalled improperly so that, as a result of vibration or pressure within the cooling system, it worked loose until the spring pressure within the cap caused it to separate from the surge tank filler neck.

Another possibility is that a mechanic may have removed the cap to replenish the coolant and become distracted and forgotten to finish the task. The cap would have fallen to the bottom of the engine bay after the vehicle left the maintenance facility for the Visitor Center.

The mechanic who performed the post-trip inspection of *DUKW 34* the evening before the accident told investigators that he had used the coolant level markings on the expansion tank to check the coolant level in the APV. He said that the coolant was "right at the level it should have been" and that he had not removed the pressure cap from the surge tank. But *DUKW 34* was one of four APVs that the mechanic inspected that evening, and it is possible that his recollection was faulty about which actions he had performed on which vehicle. If his recollection was correct, he simply may not have noticed if the cap had been improperly installed.

Thus, Ride The Ducks mechanical personnel either failed to reinstall the cap after removal or failed to install the cap properly to prevent it from becoming dislodged during vehicle operation. In any event, the mechanics who were responsible for inspecting Ride The Ducks APVs allowed *DUKW 34* to be put into service with a missing or improperly installed pressure cap.

The NTSB therefore concludes that the mechanics who performed post-trip inspections of *DUKW 34* failed to ensure that the surge tank pressure cap was securely in place before allowing the vehicle to enter passenger service.

Ride The Ducks hired mechanics experienced in heavy-vehicle maintenance and gave them on-the-job training that highlighted the difference between an APV and other commercial or heavy vehicles. Although APVs must be able to function in two very different operating environments and are thus equipped with components and systems that are not found on trucks or buses, learning to perform effective routine inspections of APVs should not be difficult for any competent and experienced vehicle mechanic. In this accident, the inspection failure involved a common component (surge tank or radiator pressure cap) found on almost all gas- or diesel-driven highway vehicles.

To assist its mechanics with inspection and maintenance duties, Ride The Ducks had written maintenance procedures and checklists in place to guide the mechanics in their work. The company had also developed information resources, such as ―DuckCentral," which it made available to fleet maintenance managers and mechanics to track maintenance issues and procedures. The company also established a mechanic exchange program to encourage knowledge-sharing among the various company operating locations and identified a dedicated point of contact at company headquarters for maintenance and repair issues.

Ride The Ducks has reported to the NTSB that, after the accident, the company reviewed its 2011 training program for mechanics and now requires that its mechanics enter training for ASE or ASE M&I certification, as appropriate. The company reports that it has also established an enhanced training program for its mechanics. Also since the accident, the company has modified its mechanics' checklists and has posted a placard on the underside of the APV hoods reminding mechanics to makes sure all fluid caps are secured before they close the engine compartment cover.

The NTSB acknowledges the proactive steps that Ride The Ducks has taken to improve its maintenance program. Although ASE certification of its mechanics will not assure the company that mistakes and oversights in the inspection and maintenance of APVs will not occur in the future (no amount of training and no type of certification can make such an assurance), requiring such training reflects the company's recognition that an effective maintenance program is a key to safe operations, and it should elevate the professionalism of the maintenance staff. Similarly, the other changes the company has made in the maintenance area should provide additional protection against the type of low-level error that was implicated in this accident.

Performance of the Operating Crews Before the Accident

At the first sign of what he believed to be a fire, the *DUKW 34* master immediately shut down the APV's engine and anchored. But this loss of propulsion and subsequent anchoring, even occurring as it did in the center of a navigation channel, should not have led to a collision because crewmembers of the APV and the tugboat/barge combination had opportunities after that time to take actions that may have prevented the accident. The NTSB evaluated the performance of the crewmembers in an attempt to determine why this did not happen.

Location of Mate While Navigating the *Caribbean Sea*

At the time of the accident, the *Caribbean Sea* was being navigated by the mate. The mate was an experienced mariner who had about 118 days of service on either the *Caribbean Sea* or the *Falcon* as those vessels made the daily sludge barge run between two wastewater facilities. Both the *Caribbean Sea* and the *Falcon* were outfitted with an upper wheelhouse above the main wheelhouse that provided improved visibility. The *Caribbean Sea* master told investigators that before the accident trip he had spoken with the mate about using the upper wheelhouse during the northbound voyage. The master said that the mate had assured him that this was where he

would be. In a postaccident interview with Coast Guard investigators, the mate said that he was operating from the upper wheelhouse when the accident occurred.

Because of the number of tourists in the area at the time and the prevalence of digital cameras, this accident was well documented photographically. A number of individuals who had been on the bulkhead at Penn‘s Landing at the time of the accident provided the NTSB with photographs taken just before, during, and just after the collision.

At least two of the still photographs (included as figures 3 and 4 in this report) provide fairly clear images of the upper wheelhouse of the *Caribbean Sea* just before and just as the barge struck the APV. Figure 11 shows enlargements from figures 3 and 4 that provide close-up views of the upper wheelhouse just before and after the accident. The enlargement from figure 3 shows the upper wheelhouse in a profile view. The door is open, and the wheelhouse appears to be empty. Anyone at the helm would have been visible through the un-tinted windows. The enlargement from figure 4, taken just after the bow of the barge *The Resource* struck the APV, shows the upper wheelhouse from almost a rear 3/4 view. A portion of the interior of the wheelhouse is visible through the open door. In this image, too, the upper wheelhouse appears to be empty.

Figure 11. (Left) Enlargement from figure 3, showing the *Caribbean Sea*’s upper wheelhouse about 45 seconds before the collision. (Right) Enlargement from figure 4, showing the *Caribbean Sea*’s upper wheelhouse just as the bow of the barge strikes *DUKW 34*.

Almost immediately after the accident, based on their interview statements, the *Caribbean Sea*‘s deckhand No. 1 and engineer ran to the aft portion of the main deck. The engineer said that he then climbed the ladder on the aftermost bulkhead to the upper deck and went forward along the port side to notify the master (refer to figure 5). He said when he opened the exterior door leading to a passageway between the master‘s stateroom and the ladder to the lower wheelhouse, he saw the mate standing in front of the master‘s stateroom door.

To get from the upper wheelhouse to the master‘s stateroom, the mate would have had to descend two exterior ladders that terminated on the upper deck near the same aft ladder used by the engineer immediately after the incident. He then would have had to proceed forward along the same route as the engineer and enter the same exterior door into the passageway. But neither deckhand No. 1 nor the engineer saw the mate at this time. Given the brief time that elapsed between the time the engineer and the deckhand (who were in the galley) felt the engine rpm decrease and emerged from the galley onto the main deck, it is unlikely that the mate would have had time to travel from the upper wheelhouse, down two ladders, then forward to the exterior door without being seen by the other two crewmembers.

The master said that the mate, after he had alerted the master to the collision, left the master‘s stateroom. The master said that he got dressed and went to the upper wheelhouse, where he found the mate. The master said that when he arrived, he found the throttle active for operation from the upper wheelhouse. He said he also found that both VHF radios and the radar were turned on. But there was sufficient time for the mate, after leaving the master‘s stateroom, to have gone to the upper wheelhouse and activated the valve to change the throttle control location from the lower to the upper wheelhouse before the master arrived. The NTSB therefore concludes that, contrary to the master‘s instructions and contrary to his own postaccident statements, the mate of the *Caribbean Sea* was not navigating the vessel from the upper wheelhouse at the time of the collision.

Based on the postaccident statements of the engineer and deckhand No. 1, engine rpm was reduced almost immediately when the bow of the barge struck the APV, which indicates that at the moment of impact, the mate was in a position to respond quickly with a throttle manipulation. Other than the upper wheelhouse, only two locations on the vessel would have permitted the mate to respond so quickly: the aft deck station and the lower wheelhouse. When the engineer and the deckhand exited the galley and went toward the stern of the tugboat, neither saw the mate near the aft deck control station. When the engineer went forward to notify the master, the mate was already standing at the master‘s stateroom door. He could have been able to reach this position within that time frame and without being seen by other crewmembers only if he had been operating the vessel from the lower wheelhouse at the time of the accident. From the lower wheelhouse, the mate would also have been able to see the bow of the APV (and recognize it as a DUKW vehicle) as it swung to the port side of the barge after it had been struck. This could explain how the mate became aware of the collision so quickly (indicated by his timely throttle response) and how he was instantly aware of the type of vehicle that had been struck (as indicated by his statement to the master).

Lack of Attention to Duty by the *Caribbean Sea* Mate

Had an upper wheelhouse not been available, the mate could have navigated the tow combination safely from the lower wheelhouse. The lower wheelhouse was equipped with radars and radios that would have helped the mate monitor his surroundings and avoid hazards. Despite the presence of these navigation aids, however, with the limited visibility ahead because of the high freeboard of the barge, the mate would have needed to assign the deckhand, with a radio, as an additional lookout on the bow area of the barge.

In this case, the mate moved from the upper wheelhouse to the lower one without posting an additional lookout to ensure adequate visibility in the direction of travel. Based on the results of the NTSB's visibility study, from the lower wheelhouse, the mate's view of *DUKW 34* would have begun to be at least partially obstructed when the APV was still about 5,400 feet, or about 21 barge-lengths, away. Once the barge approached within 3,500 feet, or about 14 barge-lengths, the mate would have had no view of the anchored APV. At a barge speed of 6 knots, the mate's view of the APV would have begun to be partially obstructed about 9 minutes before the collision and would have been totally obstructed about 6 minutes before. Thus, from about the time *DUKW 34* was firmly anchored (at 1433) until the collision, it was partially or completely out of the view of the mate in the lower wheelhouse. By contrast, had the mate been navigating from the upper wheelhouse, the anchored APV would have been at least partially visible until it was less than one barge-length away.

Evidence also indicates that the mate was not actively monitoring the radars and radios while in the lower wheelhouse. Even if the DUKW master did not make a securité radio call[66] immediately when the APV was shut down and anchored (the lack of recorded transmission indicates that he did not), he and other mariners clearly radioed warning calls to the tugboat and barge about a minute before the collision. Had the mate been monitoring the radios and radar, even from within the lower wheelhouse, he would have been alerted to the presence of the APV and may have been able to take action to avoid the collision. Based on the mate's own postaccident statements to the Coast Guard, however, he was not aware of the presence of the anchored APV until after the barge had struck it.

The NTSB attempted to determine why, on the day of the accident, a trained, experienced, and otherwise competent mariner failed to effectively carry out routine, but highly crucial, tasks central to his profession. No evidence indicates that the mate was fatigued, and his postaccident toxicological tests showed no signs of alcohol or illegal drugs.

Personal Use of Cell Phone and Laptop Computer by the *Caribbean Sea* Mate

The mate's cell phone records revealed a likely explanation for his poor judgment and inattentiveness to his duties on the day of the accident. The records showed that the mate was engaged in voice communications with several family members beginning just 22 minutes after he assumed the watch and continuing up until the time of the accident. The mate's cell phone records indicated 65 minutes of activity during the 135-minute period from the time he made the first call at 1222 (after relieving the watch at 1200) until the time of the accident at 1437. Eighteen outgoing or incoming calls totaling about 53 minutes were made after 1315 while the mate was solely responsible for navigating the tugboat and barge. Even allowing for the fact that the call durations on the records are rounded up to the next minute, the mate spent from one-third to almost one-half of his time making or taking calls when he should have been attending to the safe passage of his vessel. The last call initiated before the accident, as indicated by the phone records as having started at 14:32, could actually have been initiated up to 1 minute earlier

[66] A securité radio call, usually broadcast on a common frequency, such as VHF channel 16 or medium frequency (MF) 2182 kilohertz, is used to alert shore stations and vessels that important safety information is about to be transmitted. Such radio transmissions begin with "securité, securité, securité," which is followed by the safety-critical information.

(14:31:01), according to the mobile carrier. Based on the reported 6-minute duration of this call, the earliest it could have ended would have been 14:36:02 (actual duration 5 minutes 1 second rounded up to 6 minutes). This would have been about 10 seconds before the master of the APV made the first of his series of calls just before the collision. But this calculation represents the extremes. It is not likely that this call began and ended at the earliest possible times, making it likely that the mate was using his cell phone at least during the time of the radio calls from the APV master and possibly at the time of the collision itself. Moreover, he simultaneously conducted Internet searches on the company laptop computer, which further distracted him from his navigational responsibility. The NTSB therefore concludes that the mate of the *Caribbean Sea* failed to maintain an appropriate lookout, including monitoring the radios, while navigating the vessel because he was distracted by personal use of his cell phone and the company laptop computer in dealing with a serious family medical emergency.

As a result of its preliminary investigations of two marine accidents that occurred in December 2009 and involved collisions between Coast Guard and civilian vessels, the NTSB, on August 11, 2010, issued Safety Recommendation M-10-3 to the Coast Guard:

> Issue a safety advisory to the maritime industry that (1) promotes awareness of the risk posed by the use of cellular telephones and other wireless devices while operating vessels and (2) encourages the voluntary development of operational policies to address the risk.

In response to Safety Recommendation M-10-3, the Coast Guard, on October 29, 2010, issued Marine Safety Advisory 01-10, *Distracted Operations–Don't let it be you*, which warned mariners of the danger and potential for distraction from duty caused by the use of a cellular telephone or wireless device for purposes unrelated to vessel operation. That safety alert specifically mentioned the risk of using these devices when mariners were performing navigation duties alone, as was the mate on the *Caribbean Sea*. Based on this response, Safety Recommedation M-10-3 was classified "Closed—Acceptable Action" on December 14, 2010.

The mate had been an employee of K-Sea Transportation since late December 2000. As early as March 22, 2002, the company had issued a memorandum to its personnel prohibiting mariners from using personal cell telephones while on watch. This policy was reinforced with a second memorandum issued to all personnel on February 10, 2004, and by a third memorandum issued on July 17, 2006. Additionally, the company's policy prohibiting personal use of cell phones while on watch was specifically discussed at a 2-day seminar that the mate attended in 2007 as part of his training. K-Sea Transportation also prohibited personal use of company-provided laptop computers while on watch. The NTSB concludes that the mate of the *Caribbean Sea* should have been aware of his employer's prohibition of personal use of cell phones and company-provided computers while on watch, but on the day of the accident, he did not follow the policy. The NTSB therefore recommends that K-Sea Transportation review its existing safety management program and develop improved means to ensure that the company's safety and emergency procedures are understood and adhered to by employees in safety-critical positions. Because K-Sea Transportation is a member of the AWO's Responsible Carrier Program, the NTSB further recommends that the AWO notify its members of the circumstances of this accident, and

encourage them to ensure that their safety and emergency procedures are understood and adhered to by employees in safety-critical positions.

A K-Sea Transportation official told investigators that the mate had met with him briefly after the accident and told him about a serious medical emergency that affected the mate's child. The NTSB confirmed that such an emergency had occurred less than an hour before the mate reported for duty at 1200 on the day of the accident.

All of the calls on the mate's cell phone were of relatively short duration and were to or from an immediate family member, which suggests that all of the calls were in regard to the medical emergency. The fact that the calls involved an emotionally troubling event that was likely evolving over a period of time increased the likelihood that the calls would distract the mate from his duties. Although such a distraction is understandable, personal concerns cannot be allowed to create risks for others. If the mariner is unable to fully carry out his responsibilities, for whatever reason, his duty is to turn over those responsibilities to someone else.

No one else on board the *Caribbean Sea* was aware of the emergency that the mate was dealing with. Had he informed the master of the situation and asked for relief, at least temporarily, the master likely would have acceded to the request. The company provided the NTSB with 15 instances during the 12- to 18-month period before the accident in which crewmembers had been granted emergency relief from duty to attend to a family emergency or other family matter. But rather than seek relief, which would have been justified under the circumstances, the mate erroneously attempted to attend to his duties while dealing with the distractions presented by a serious personal issue and frequent cell phone use. The NTSB therefore concludes that, had the mate of the *Caribbean Sea* informed the master or K-Sea Transportation management of the serious family medical emergency, he would likely have been granted relief from the watch.

Performance of the *Caribbean Sea* Master

At the time of the accident, the *Caribbean Sea* master was off watch and asleep in his stateroom. After the master was awakened by the mate and went to the upper wheelhouse, he immediately relieved the mate of his navigational duties, and swung the tug and barge around to assist with locating the survivors from *DUKW 34*. He positioned the barge in such a manner that deckhand No. 1 and the engineer could take advantage of the height of *The Resource*'s deck from the water to scan for survivors. He also actively monitored the ongoing search and rescue effort of the many first responders and stood ready to assist as directed. Because of the limited maneuverability of the barge and tug combination, and the number of other smaller craft performing rescue functions, the master did not engage the *Caribbean Sea* in any rescue activities. The NTSB concludes that the actions of the *Caribbean Sea* master, before and after the accident, were appropriate.

Performance of the *DUKW 34* Master and Deckhand

On seeing and smelling what he believed to be smoke from a fire in the APV's engine space, the *DUKW 34* master took action to mitigate the emergency situation as he understood it. His actions included securing the fuel source, the electrical supply, the ignition switch, and the ventilation closures to the engine compartment. He also directed the deckhand forward to the bow to deploy the anchor to stop the APV from drifting uncontrollably in the river current. Although anchoring in a navigational channel is never preferred and is typically prohibited by regulation during normal operations, it is appropriate in an emergency. The master's actions in this regard did keep the vessel from drifting with the river's current (which could have delayed assistance by the APV that was being dispatched as a tow vessel) and reduced the potential for the APV to be damaged by contact with fenders, bulkheads, and other structures along the west side of the river. The NTSB therefore concludes that the *DUKW 34* master's initial response (shutting down the engine and anchoring) to what he believed to be a fire on board the vessel was reasonable given his perception of the nature of the emergency.

But although the master's initial actions were reasonable given his understanding of the situation, his subsequent actions were not. The Ride The Ducks *Captains' Operations Manual* contains procedures to be followed in the event of an onboard fire during waterborne operations and in the event of a loss of propulsion. They included that the master, ~~–i~~mmediately notify the USCG [Coast Guard] by radio." However, the master did not notify the Coast Guard that he had lost propulsion and anchored in the navigation channel. Thus an opportunity was missed to have the Coast Guard issue an early securité call on channel 16 using the agency's high-wattage VHF output capability as well as to make the Coast Guard aware of a potentially hazardous situation. Other than the four VHF marine radio transmissions from the master attempting to contact the *Caribbean Sea* on channels 13 and 16 when the collision was imminent, the NTSB was unable to verify that the master actually transmitted any securité or other callouts on either channel 13 or channel 16 to inform vessel traffic in the area of the situation on board *DUKW 34*.

Anchoring in the middle of an active navigation channel placed the APV and its occupants in a vulnerable position because of the deep-draft or limited-maneuverability vessels that routinely use the channel. Awareness of that vulnerability and its associated risk to the APV occupants should have prompted the master to maintain the highest levels of alertness with regard to vessel traffic and to fully employ the deckhand to assist in that effort. Nevertheless, the master never specifically directed the deckhand—who in accordance with Coast Guard regulations was on board to assist the master—to serve as lookout once he had deployed the anchor. During the 8 minutes that passed between dropping the anchor and the collision, the master did not task the deckhand to perform any safety-related function, such as assisting passengers with donning lifejackets in preparation for the planned tow or explaining emergency egress.

Furthermore, in the event of either an onboard fire or a loss of propulsion, Ride The Ducks procedures called for masters to ask passengers to remain calm and don lifejackets. Although this incident involved both a fire on board (as believed by the master) and a loss of propulsion (by way of the master's shutting down the engine), the master did not immediately direct passengers to don their lifejackets, nor did he make any attempt to apprise the passengers of the situation. It may be argued that the master's first actions were rightly directed toward containing what he believed to be a fire; nevertheless, his belief that there was a fire on board

should have been enough to prompt him to prepare the passengers for an evacuation of the vessel. If the master felt that he needed to continue working to contain the fire, he could have directed the deckhand to have passengers take the lifejackets down from their overhead storage and prepare to put them on.

Only when the collision was imminent did the master direct passengers to don lifejackets. Even then, not all the passengers heard the master's order. As described by the passengers, the last few moments before the collision were chaotic as passengers tried to secure lifejackets from the overhead storage and put them on. Because of the delay in the master's order, which came less than 1 minute before the collision, no passengers had time to fully put on a lifejacket or evacuate the vessel before the barge struck. Some passengers were able to hang onto a lifejacket as the vessel was forced under water; others were able to grab a floating jacket when they surfaced. As a result of the master's combined failures to (1) notify the Coast Guard of anchoring in the channel, (2) direct the deckhand to perform safety-related functions after deploying the anchor, and (3) instruct passengers to don lifejackets, the NTSB concludes that the *DUKW 34* master did not fully appreciate or appropriately respond to the risk of a collision that faced *DUKW 34* and its occupants once he had shut down the vessel's engine and anchored in the navigation channel.

Personal Cell Phone Use by the *DUKW 34* Deckhand

While standing on the bow, the deckhand was the individual on board with the greatest height of eye and a 360° unobstructed field of view. He could have used this vantage point to continuously monitor the position of the approaching tugboat/barge combination and, at a minimum, keep the master informed about its progress. Instead, according to the deckhand, he only acted as lookout in the upriver direction (forward), assuming that the master was covering the lookout responsibilities downriver (aft). Additionally, cell phone records reviewed by the NTSB revealed that, while the deckhand was on the bow, he transmitted two text messages and his phone received two others. The last text message that the deckhand sent was about 1 minute before he jumped into the water, just before the collision. The deckhand's use of his cell phone to send text messages diverted his attention away from what should have been his duty of maintaining a proper lookout. The NTSB therefore concludes that the *DUKW 34* deckhand's use of his cell phone to send text messages while he was on the bow of the vessel distracted him from effectively performing his duty as a lookout.

Nonoperational Use of Cell Phones and Other Wireless Devices

Using cellular telephones and other wireless electronic devices has been demonstrated to be visually, manually, and cognitively distracting.[67] Talking on cell phones can have serious consequences in safety-critical situations, and sending or reading text messages is potentially

[67] For research information, see U.S. Department of Transportation website on distracted driving <http://www.distraction.gov>.

even more distracting than talking because texting requires visual attention to the display screen of the device.

Cell phone use has been a factor in accidents in all transportation modes. For example, the NTSB has investigated several fatal railroad accidents in which use of a wireless device was identified as causal or contributing. In its investigation of a May 28, 2002, head-on collision of a coal train with an intermodal train near Clarendon, Texas,[68] in which the engineer of the intermodal train was killed, the NTSB determined that the probable cause of the accident was the coal train engineer's use of a personal cell phone during the time he should have been attending to the requirements of the track authorization under which his train was operating. As a result of that accident investigation, the NTSB made the following safety recommendation to the Federal Railroad Administration:

> Promulgate new or amended regulations that will control the use of cellular telephones and similar wireless communication devices by railroad operating employees while on duty so that such use does not affect operational safety. (R-03-1)

In its investigation of the September 12, 2008, head-on collision of a westbound commuter train with an eastbound freight train near Chatsworth, California,[69] in which 25 people were killed, the NTSB determined that the probable cause of the accident was the failure of the engineer of the commuter train to observe and appropriately respond to a red signal aspect because he was engaged in prohibited use of a wireless device, specifically text messaging, that distracted him from his duties.

Inappropriate use of cell phones or other wireless electronic devices has also been cited as a causal or contributing factor in highway accidents that the NTSB has investigated.[70]

In this accident, the *Caribbean Sea* mate was operating the vessel from the lower, rather than the upper, wheelhouse when the accident occurred, an action possibly explained by his desire for an environment favorable for using his cell phone and accessing K-Sea's laptop computer for Internet searches. On *DUKW 34* leading up to the collision, the deckhand was using his personal cell phone to send text messages instead of performing his duty as lookout.

The NTSB was unable to determine the extent to which cell phone use by mariners has caused or contributed to marine accidents. Coast Guard investigations typically have not verified nonoperational cell phone use following marine accidents. As a result, the Coast Guard's marine

[68] *Collision of Two Burlington Northern Santa Fe Freight Trains Near Clarendon, Texas May 28, 2002*, Railroad Accident Report NTSB/RAR-03/01 (Washington, DC: National Transportation Safety Board, 2003).

[69] *Collision of Metrolink Train 111 with Union Pacific Train LOF65–12, Chatsworth, California, September 12, 2008*, Railroad Accident Report NTSB/RAR-10/01 (Washington, DC: National Transportation Safety Board, 2010).

[70] See (a) *Ford Explorer Sport Collision with Ford Windstar Minivan and Jeep Grand Cherokee on Interstate 95/495 near Largo, Maryland, on February 1, 2002*, Highway Accident Report NTSB/HAR-03/02 (Washington, DC: National Transportation Board, 2003) <http://www.ntsb.gov/publictn/2003/HAR0302.pdf>; (b) *Motorcoach Collision With the Alexandria Avenue Bridge Overpass, George Washington Memorial Parkway, Alexandria, Virginia, November 14, 2004*, Highway Accident Report NTSB/HAR-06/04 (Washington, DC: National Transportation Safety Board, 2006) <http://www.ntsb.gov/publictn/2006/HAR0604.pdf>.

accident database does not explicitly record instances in which nonoperational use of a cell phone or other wireless device has been causal in an accident. The ability to determine the extent of inappropriate cell phone or other wireless device use will provide investigators and policymakers with important information about this form of distracted operations on board marine vessels, but this information will have been gathered after accidents have occurred. The NTSB believes that critical measures can be taken to keep those accidents from happening. These include a continuing outreach program of information and education to the maritime industry on this issue, regulations to prohibit nonoperational use of communication devices, and enforcement mechanisms to ensure that the regulations are being adhered to.

The NTSB recognizes the difficulty of this task. Establishing that a wireless communication device was actually used leading up to an accident can be an involved and time consuming process. Additionally, the devices in question are small and therefore easily concealable, and those individuals or employees wishing to circumvent the prohibitions on their use can frequently do so undetected. But the consequences that can result from such use, as shown by this accident, are serious enough to demand that every feasible action be taken to prevent it. Because cell phones and other wireless electronic devices have come to play such a prominent role in the day-to-day activities of people in all walks of life and because their use has been implicated in accidents across all transportation modes, the NTSB concludes that increased Coast Guard focus on and oversight of mariners‘ use of cell phones and other wireless electronic devices will prevent accidents and save lives. The NTSB therefore recommends that the Coast Guard develop and implement an investigative protocol that directs its investigation officers to routinely check for nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions involved in marine accidents. In addition, the NTSB recommends that the Coast Guard revise its commercial vessel accident database (MISLE) to maintain a record of nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions when such use is causal or contributory to marine accidents. Further, the NTSB recommends that the Coast Guard regulate and enforce the restriction on nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions so that such use does not adversely affect vessel operational safety. Finally, the NTSB recommends that until the Coast Guard can develop regulations governing nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions, the Coast Guard continue its outreach program of information and education to the maritime industry on this issue.

Survival Factors

Emergency Response

At impact, *DUKW 34* rolled to starboard and across the bow of *The Resource* before being pushed underwater at the port side of the barge‘s bow. It therefore escaped the crushing damage it would have received had it ridden under the barge. As a result, most of the passengers, even though submerged in the vehicle, were able to escape from the almost-intact APV (refer to figure 6).

Other vessels were operating in the area at the time of the accident. Also, various Coast Guard, marine police, and U.S. Navy resources were on duty close by. As a result, within minutes of the accident, a variety of vessels, including Good Samaritans (most notably the ferry *Freedom* and small U.S. Navy boats that were on temporary duty nearby), Coast Guard rescue boats, and marine police boats were on the scene rescuing passengers. The combined efforts of these responders resulted in all passengers on the surface of the river quickly being recovered and accounted for. Those requiring medical attention were transported to local hospitals. The NTSB therefore concludes that the emergency response to this accident was timely and effective.

Safety Briefing

Coast Guard regulations and Ride The Ducks policy required that DUKW masters provide a safety briefing to passengers before taking a vessel onto the water. By regulation, the briefing must include the location of emergency exits, the location of lifejackets, and the proper method of donning and adjusting lifejackets, including a demonstration. As related by the master and confirmed by passenger interviews and a passenger video, the master of *DUKW 34* gave the passengers a safety briefing before the APV left the Visitor Center on the accident trip.

The briefing that the master gave was presented in a jocular tone, but it did cover the essential information regarding the location of lifejackets. The master held the lifejacket up and showed how the clip worked, but he did not actually put on and fasten a jacket. Partly as a result, two Hungarian passengers told investigators that, after hearing the master‘s safety briefing, they did not know how to put on a lifejacket.

The passengers on board *DUKW 34* at the time of the accident included a group of 15 Hungarian students and teachers with different levels of familiarity with or fluency in English. Eleven of the 13 Hungarian passengers who survived the accident commented negatively about the quality of the safety briefing. Some of the comments centered on the fact that the master had not demonstrated how to don a lifejacket, but the fact that none of the native English-speaking passengers had negative comments on the quality of the briefing suggests that at least some of the negative comments of the Hungarian passengers reflected a lack of fluency in spoken English.

It is critical for passenger safety that the safety briefing (1) include the specific information that passengers will need in the event of an emergency, and (2) be presented in a way that is understood by everyone affected by it. In this case, the safety briefing the master gave was ineffective in that it did not convey the importance of the information and did not fully explain what passengers may need to do in the event of an emergency. The deficiency was exacerbated by the fact that the information was not presented in a way that made it fully comprehensible to passengers with limited fluency in English. The NTSB concludes that the *DUKW 34* master‘s safety briefing before the accident trip was ineffective and did not adequately convey to the passengers the critical information they needed to be prepared to respond effectively to the emergency. After the accident, Ride The Ducks standardized and re-scripted the complete pre-water-entry safety briefing for all the company‘s locations. The briefing now includes, among other things, a standardized, formal, live demonstration of how to

don a lifejacket. The new briefing was implemented before the start of the 2011 operating season.

Safety Management Systems and Corporate Safety Culture

K-Sea Transportation

At the time of the accident, the *Caribbean Sea* was not required to meet the provisions of the ISM code because the vessel was engaged in domestic trade. However, K-Sea Transportation had an SQMS in place to meet the provisions of the ISM Code, and also participated in the AWO's Responsible Carrier Program. With regard to both the ISM Code and the Responsible Carrier Program, K-Sea Transportation had a history of independent and successful audits performed by qualified ABS surveyors (in the case of the SQMS), and independent AWO auditors (in the case of the Responsible Carrier Program).

When interviewed by the NTSB, the president, the COO, and the vice president for health, safety, quality, and environment expressed an in-depth knowledge of both the ISM and AWO programs and provided examples of actions they had taken to ensure that elements of each program were successfully implemented. These elements included fleet-wide implementation of the policy and procedure related to safety and environmental protection, safe ship operation, personnel training, communications between ship and shore, procedures for reporting and evaluating accidents, addressing nonconformities, and trends analysis.

Safety on any vessel depends largely on the competence and professionalism of the mariners on board, and an SMS must minimize the risks associated with human error. Effective implementation of an SMS is achieved when it leads to the development of a safety culture in which each individual employee internalizes the need to keep safety as the first priority when performing any task. Based on its assessment of K-Sea Transportation's actions with regard to implementing an SMS and its interactions with the four *Caribbean Sea* crewmembers who cooperated with investigators, the NTSB found that an effective safety culture was in place within K-Sea Transportation and that the company's programs met the intended objectives of a SMS.

The mate on the *Caribbean Sea* was properly licensed by the Coast Guard and had been appropriately trained by the company. Of the two licensed mariners on board the *Caribbean Sea* at the time of the accident (the other being the master), the mate was the more experienced in making the daily transits between the water treatment facilities and should have been aware of the potential for encounters with APVs and other small vessel traffic near the Penn's Landing area. The master, crew, and the company had no reason to believe that the mate would not conduct his watch in accordance with the master's direction and company policy, with law and regulation, and with good marine practice.

Ride The Ducks

At the time of the accident, Ride The Ducks operated passenger vessels on limited U.S. domestic routes; therefore neither the company nor its vessels were required to comply with domestic regulations or international treaties with regard to establishing or implementing an SMS. Ride The Ducks did, however, have systematic and comprehensive processes in place that met some elements of an SMS. The company‘s manuals and guidance provided established practices for safe vessel operation and a safe working environment. Ride The Ducks identified the potential risks related to operation of APVs both on the road and on the water, and outlined specific actions that were to be taken by personnel in each instance to mitigate that risk. Personnel received annual training in these written safety and emergency procedures. Additionally, for employees in safety-critical positions such as the master and the deckhand of *DUKW 34*, the company provided periodic safety and emergency procedure reviews that were intended to reinforce the actions learned during the initial pre-season training.

Audits can never guarantee that a true safety culture exists within an organization or ensure the safe performance of individuals within that organization. However, audits that are conducted properly by knowledgeable and unbiased personnel can help reduce risk and ensure compliance with applicable procedures and regulations. The overall intent of a safety audit, whether it is performed internally by company personnel or externally by an independent third party, is to identify potential hazards or other safety concerns so that preventative measures can be implemented. If an audit is to be carried out internally, it should be carried out by personnel who are independent of the areas being audited.

In the months preceding the accident, the general manager in Philadelphia had performed eight random, internal audits of safety-critical positions to ensure that the employees under his direction understood the emergency procedures required of their respective positions and that they performed them as trained. Those internal audits resulted in no documented non-conformities with the company‘s safety or emergency procedures. Both internal and independent third-party audits are integral elements of recognized quality systems. Before the accident, no independent, third-party audits had been performed at the Philadelphia location to validate or confirm the general manager‘s audit findings.

The effectiveness of the company‘s internal audits in ensuring adherence to written safety procedures became questionable on the day of the accident when personnel in safety-critical positions did not take emergency actions consistent with their training and did not implement important elements of the company‘s safety and emergency procedures. For example, the master did not immediately issue a securité call as soon as he shut down the APV engine and began to drift within the navigation channel; the master did not properly prepare the passengers for the risk they faced by having them don lifejackets while awaiting a tow; both the master and the deckhand failed to effectively monitor vessel traffic; and neither the master nor shore-side personnel immediately notified the nearest Coast Guard office of the possible fire and the subsequent loss of propulsion, as required by Federal regulation and by company policy.

After *DUKW 34* was anchored in the channel and the urgency of the perceived fire situation had diminished, the master had sufficient time to evaluate the risk of being anchored in

a navigation channel with passengers on board and to prioritize his next actions based on his emergency procedures training. But he failed to do so.

If the failures to perform critical elements of the company‘s emergency procedures had been limited to the master, those failures could be attributed to poor judgment or lack of experience with this type of emergency. However, other Ride The Ducks personnel—such as the manager-on-duty who did not notify the Coast Guard of the incident, the deckhand who did not maintain an effective lookout and inappropriately used a personal cell phone while on duty, and the line mechanics who did not perform effective inspections of the APV before the accident—also failed to properly execute company procedures in accordance with their training. If a more effective safety culture existed at the Ride The Ducks Philadelphia operation, these and other noted systemic failures to properly execute company safety procedures may have been detected. The NTSB concludes that Ride The Ducks International‘s written procedures for safe operational practices and emergency procedures on the water were comprehensive and exceeded requirements; however, they were not fully implemented by the crew of *DUKW 34* or the shore-side personnel on the day of the accident. The NTSB therefore recommends that Ride The Ducks International review its existing safety management program and develop improved means to ensure that the company‘s safety and emergency procedures are understood and adhered to by employees in safety-critical positions.

Conclusions

Findings

1. The following were not factors in the accident: qualifications of crewmembers on board the *Caribbean Sea* and *DUKW 34* for the positions they held; use of alcohol, illicit drugs, or prescribed or over-the-counter medications by the master and the mate of the *Caribbean Sea* or by the master and the deckhand of *DUKW 34*; meteorological conditions; river conditions and waterway configuration; functioning of the mechanical, electronic, and communications systems on board the *Caribbean Sea*; and functioning of the nonpropulsion mechanical systems on board *DUKW 34*.

2. The *DUKW 34* surge tank pressure cap was not in place at the time of the accident, and the missing pressure cap allowed the engine coolant to boil and create steam that entered the passenger compartment and prompted the master to shut down the engine because he believed he had an onboard fire.

3. The mechanics who performed post-trip inspections of *DUKW 34* failed to ensure that the surge tank pressure cap was securely in place before allowing the vehicle to enter passenger service.

4. Contrary to the master‘s instructions and contrary to his own postaccident statements, the mate of the *Caribbean Sea* was not navigating the vessel from the upper wheelhouse at the time of the collision.

5. The mate of the *Caribbean Sea* failed to maintain an appropriate lookout, including monitoring the radios, while navigating the vessel because he was distracted by personal use of his cell phone and the company laptop computer in dealing with a serious family medical emergency.

6. The mate of the *Caribbean Sea* should have been aware of his employer‘s prohibition of personal use of cell phones and company-provided computers while on watch, but on the day of the accident, he did not follow the policy.

7. Had the mate of the *Caribbean Sea* informed the master or K-Sea Transportation management of the serious family medical emergency, he would likely have been granted relief from the watch.

8. The actions of the *Caribbean Sea* master, before and after the accident, were appropriate.

9. The *DUKW 34* master‘s initial response (shutting down the engine and anchoring) to what he believed to be a fire on board the vessel was reasonable given his perception of the nature of the emergency.

10. The *DUKW 34* master did not fully appreciate or appropriately respond to the risk of a collision that faced *DUKW 34* and its occupants once he had shut down the vessel's engine and anchored in the navigable channel.

11. The *DUKW 34* deckhand's personal use of his cell phone to send text messages while he was on the bow of the vessel distracted him from effectively performing his duty as a lookout.

12. Increased Coast Guard focus on and oversight of mariners' use of cell phones and other wireless electronic devices will prevent accidents and save lives.

13. The emergency response to this accident was timely and effective.

14. The *DUKW 34* master's safety briefing before the accident trip did not adequately convey to the passengers the critical information they needed to be prepared to respond effectively to the emergency.

15. Ride The Ducks International's written procedures for safe operational practices and emergency procedures on the water were comprehensive and exceeded requirements; however, they were not fully implemented by the crew of *DUKW 34* or the shore-side personnel on the day of the accident.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the mate of the *Caribbean Sea* to maintain a proper lookout due to (1) his decision to operate the vessel from the lower wheelhouse, which was contrary to expectations and to prudent seamanship, and (2) distraction and inattentiveness as a result of his repeated personal use of his cell phone and the company laptop computer while he was solely responsible for navigating the vessel. Contributing to the accident was the failure of Ride The Ducks International maintenance personnel to ensure that *DUKW 34*'s surge tank pressure cap was securely in place before allowing the vehicle to return to passenger service, and the failure of the *DUKW 34* master to take actions appropriate to the risk of anchoring his vessel in an active navigation channel.

Recommendations

As a result of this accident investigation, the National Transportation Safety Board makes the following safety recommendations:

To the U.S. Coast Guard:

Develop and implement an investigative protocol that directs your investigation officers to routinely check for nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions involved in marine accidents. (M-11-1)

Revise your commercial vessel accident database (MISLE) to maintain a record of nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions when such use is causal or contributory to marine accidents. (M-11-2)

Regulate and enforce the restriction on nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions so that such use does not adversely affect vessel operational safety. (M-11-3)

Until you can develop regulations governing nonoperational use of cell phones and other wireless electronic devices by on-duty crewmembers in safety-critical positions, continue your outreach program of information and education to the maritime industry on this issue. (M-11-4)

To Ride The Ducks International, LLC:

Review Ride The Ducks International‘s existing safety management program and develop improved means to ensure that your company‘s safety and emergency procedures are understood and adhered to by employees in safety-critical positions. (M-11-5)

To K-Sea Transportation Partners L.P.:

Review K-Sea Transportation‘s existing safety management program and develop improved means to ensure that your company‘s safety and emergency procedures are understood and adhered to by employees in safety-critical positions. (M-11-6)

To The American Waterways Operators:

Notify your members of the circumstances of this accident, and encourage them to ensure that their safety and emergency procedures are understood and adhered to by employees in safety-critical positions. (M-11-7)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

DEBORAH A.P. HERSMAN
Chairman

ROBERT L. SUMWALT
Member

CHRISTOPHER A. HART
Vice Chairman

MARK R. ROSEKIND
Member

EARL F. WEENER
Member

Adopted: June 21, 2011

Chairman Hersman filed the following concurring statement on July 1, 2011. She was joined by Vice Chairman Hart and Members Sumwalt, Rosekind, and Weener.

Chairman Hersman, consenting:

It is time to change public tolerance for distracted operations, and elevate society‘s opprobrium for transportation operators who use personal electronic devices.

This behavior is unsafe and unacceptable.

On July 7, 2010, the *Caribbean Sea* tugboat/barge combination ran over a sightseeing boat loaded with passengers on the Delaware River in Philadelphia. Although the mate made 13 outgoing calls and received 5 incoming calls in the 80 minutes prior to the accident, the tugboat‘s crewmembers did not report the mate‘s repeated use of his personal cell phone. They likely did not report it because they are used to this type of behavior. The fact that the mate repeatedly made and received calls unrelated to vessel operations showed that he, too, was comfortable with this behavior.

Further, the mate spoke on his cell phone when other people were nearby. The potential for coworkers to observe him violating company policy did not deter his inappropriate behavior. Nor was the company‘s clear policy against using personal electronic devices a deterrent.

The NTSB has seen pervasive use of personal electronic devices across all modes of transportation. Perhaps the best known aviation instance was when two airline pilots were out of radio communication with air traffic control for more than an hour because they were using their personal laptop computers. They overflew their destination by more than 100 miles and only realized their error when a flight attendant inquired about their arrival over the intercom.

The NTSB identified distraction due to text messaging as the cause of a September 12, 2008, commuter train engineer running a red signal near Chatsworth, California. The result: a head-on collision with a freight train. Twenty-five people died and dozens were injured. The engineer,

who had a history of using his cell phone for personal communications, sent 136 and received 114 text messages while on duty during the 3 days leading up to the accident.

Distractions, as we all know, are a growing concern in our motor vehicles, especially as the handheld and infotainment options in our vehicles increase. The consequences can be deadly. In one accident the NTSB investigated, in the 24 hours preceding the accident, the driver of a tractor-trailer truck made 97 calls and received 26 calls. In the half hour preceding the crash, the driver spent 14 minutes—nearly half his time—on the phone. Ten people died that day after the truck crossed the median.

Even with company policies, widespread public education campaigns, and, in some places, laws to minimize distractions like cell phone use, many people continue to think, ―I'll make this quick call or I'll send a brief text message."

The technology that created these problems also offers the potential to provide solutions. But, as a society, how do we convey to manufacturers and operators that distractions at the wheel/helm/controls are just as unacceptable as driving under the influence? When will we say, ―This must stop; we cannot do this anymore."

Here's a long view of transportation that may shed light on a path to address distracted operations. In 2006, the NTSB received a request from a historian to reconsider one of the first aviation accidents that the Board investigated. The 1967 accident involved a Piedmont Airlines Boeing 727 and a private twin-engine aircraft that had a mid-air collision over North Carolina. All 82 people on board both planes were killed.

The cockpit voice recorder identified that shortly after takeoff, the flight crew of the 727 discussed one of the cockpit ashtrays being on fire. As they put out the fire, the crew joked with the captain about burning his steak at that night's barbecue. However, smoking or burning cigarette ashtrays were such a common occurrence back then that the Board did not even mention the event in the final report.

In this time and culture, can you even begin to imagine smoking in an airplane, much less in the cockpit?

What changed since 1967? The culture changed. We do not allow smoking on airplanes. It is not even remotely considered. The consequence—society's disapproval—is that strong.

I want our society to reach the point when texting or telephoning—whether you're operating a vessel, a train, or a motor vehicle—is just as unacceptable as smoking in a cockpit, or not wearing a seat belt, or driving under the influence of alcohol.

Culture change is possible. It has happened before. It must happen again—now. How many more lives will be lost before our society corrects its deadly acceptance of distractions?

Appendixes

Appendix A

Investigation

The NTSB learned of this accident from the Coast Guard Command Center on the afternoon of July 7, 2010. A team of three investigators launched to the accident and arrived on scene later that same day. The Board Member on scene was Member Robert L. Sumwalt. The investigative team was also accompanied by a public affairs officer and a family affairs specialist.

Parties to the investigation were the U.S. Coast Guard, Ride The Ducks International, LLC, and K-Sea Transportation Partners L.P. The on-scene portion of the investigation was completed on July 16. Follow-on interviews of company managers were conducted at the offices of K-Sea Transportation and Ride The Ducks on September 7 and 9. A team of four investigators returned to the scene January 12-13, 2011, to collect information needed for a tugboat visibility study and an accident 2-D animation. Additionally, a team of four investigators visited the *Caribbean Sea* in Norfolk, Virginia, on April 15, 2011, to take additional measurements on the vessel in support of the visibility study.

Public Hearing/Depositions

No public hearing was held, and no formal depositions were taken during the course of this accident investigation.

Appendix B

Ride The Ducks International Guidance for Safety Briefings

Safety Briefing is to be delivered at the beginning (or prior to water entry) of all tours. This briefing should be delivered in a serious manner with no jokes.

The components of a required safety briefing are: Must be delivered in a serious manner with no jokes. Communicate and show where PFDs are located and the appropriate PFD based on guest weight. Communicate and show that additional PFDs are also available for an infant under 30 pounds. Communicate and show how to retrieve the PFD from its storage area. Communicate and demonstrate step by step the entire process of donning a PFD. The individual delivering the message must be wearing a PFD at the end of the demonstration. Identify and point out the exits to be used by guests in the case of an emergency. Identify and point out the location of the two ring buoys. Identify and point out the location of the fire extinguishers. Ask that guests keep their arms and heads inside the duck, remain seated unless instructed to move by the Captain and refrain from smoking while onboard. In Branson, instruct guests to brace for splashdown and if seated in the middle of the last row fasten the seat belt.

The following is an example of how this safety briefing can be delivered.

“Please take note of the Personal Floatation Devices above your heads. The ones located on this side (point to and touch the appropriate PFDs) are for people 90 pounds and over and the ones located on this side (point to and touch the appropriate PFDs) are for people 90 pounds and under. In addition, we do have available a Personal Floatation Device for infants under 30 pounds. These can be found… … (point to their location).

In case of an emergency you will be instructed to pull the strap above your head releasing the flotation device. They are easy to use. (Driver will demonstrate all actions and will be wearing a PFD at the end of the demonstration). First, pull the strap to release the PFDs. Place your head through the opening. The PFD is reversible and your head can be placed through the opening from either side. Now wrap the strap around your body and place the black hook into the D ring pulling the T strap tight. A placard demonstrating the use of the personal floatation device is located at the rear of the vessel where you entered the Duck.

In case of an emergency, the nearest opening to your seat should be considered your emergency exit. (Driver will point out exits.)

We are equipped with two ring buoys- one located here at the Captain’s station, and the other on the outside rear of the Duck. (Driver will point out ring buoy closest to him/her during this segment.)

Finally, I’d like to point out the location of the fire extinguishers. One is located next to the Captain’s station, and the other is located in the rear of the Duck on the floor. (Driver will point out extinguishers during this segment, and if a guest is sitting near the other extinguisher have that guest acknowledge its location.)

Please keep your arms and heads inside the Duck, remain seated unless instructed to move by the Captain and refrain from smoking while onboard.

Appendix C

Summary of Interview with the *Caribbean Sea* Mate

As noted in the report, the NTSB attempted to interview the *Caribbean Sea* mate as part of its investigation of this accident, but he declined. On June 24, 2011, 3 days after the NTSB Board Meeting at which this report and its conclusions and recommendations were adopted, the NTSB was notified that the mate was willing to be interviewed regarding this accident. NTSB investigators interviewed the mate on July 11, 2011, and relevant portions of that interview are summarized below. Because the information that the mate provided during that interview did not alter the findings already contained in the final report, the additional information is being appended to the report rather than being incorporated within it.

With regard to his work/rest cycles, the mate said that he normally went to bed about 2300 and awakened about 0700 on his days off. He said that he followed this same pattern leading up to the day of the accident and that he felt well-rested that day. He said that the only medication he was taking was for a thyroid condition that he took daily and that he had no other physical or medical conditions that would have affected his ability to perform his work.

According to the mate, his young child was scheduled for corrective eye surgery on July 7, 2010. The mate said that this date would have occurred during his normal off-duty rotation schedule; however, about a week before the scheduled surgery, K-Sea Transportation contacted him and asked if he could return to duty a week early. The mate said that he spoke with the child's doctor and was assured that the surgery was routine and that the mate did not need to be concerned if he had to be at work that day. Consequently, he did not decline to comply with K-Sea Transportation's request that he return to duty a week early.

The mate stated that he typically operated the tugboat from the upper wheelhouse when the barge was light. With regard to his operating location on the day of the accident, the mate recalled that the master had said for him to "take it up there," as the mate normally did.

The mate said that the first cell phone call he received after going on duty was from a family member informing him that the surgery was successful and that the child was in the recovery room. The mate said that later, about the time the tugboat and barge entered the Delaware River from the Schuylkill River, he received a call from his wife informing him of serious complications that had developed. He said that shortly afterwards, he moved from the upper wheelhouse to the lower wheelhouse to be more comfortable and to hear his wife better when she called him back. He explained to investigators that because the barge was on the starboard side, he thought that it would be "pretty safe to navigate up the river." He said that, while in the lower wheelhouse, he made and received several other phone calls to discuss his child's condition with family members. He said that he also used the company computer in the lower wheelhouse to search the internet for information related to the medical emergency.

The mate said that he did not notify the master or other crewmembers of his personal emergency because he was "generally in shock . . . nauseous . . . [and his] legs were shaking." He said that he "wasn't thinking clearly." He went on to say that it was very warm in the upper

wheelhouse; that it was "pretty gassy" from the nearby smoke stacks and that there was no fresh air. He "didn't feel comfortable at all."

The mate also acknowledged that he knew at the time that he could have requested relief to deal with his personal emergency because K-Sea Transportation is "pretty reasonable [and] understanding . . . they do the best they can to get you off the boat and home" to handle emergency or family situations.

The mate said that sometime afterwards, he received another call from his wife saying that their child was being discharged from the hospital, and he was then able to speak with the child. He said that he was in tears and happy to hear the child's voice. He said that he then called his parents to inform them of the development. About this time, the accident occurred.

Asked if, at the moment of the collision, he was on his cell phone, the mate replied, "It's very hard to say. I would have to say it was—I would have to say yes. It's hard to say, though. I didn't—I never saw the boat collide with the DUKW boat. . . ."

III. Case Law

a. *In re Omega Protein*, 548 F.3d 361 (5th Cir. 2008)
b. *Holzhauer v. Golden Gate Bridge Highway & Transp. Dist.*, 2016 U.S. Dist. LEXIS 173732, 2017 AMC 125 (N.D. Cal. Dec. 15, 2016)
c. *In re Fire Island Ferries, Inc.*, 2018 U.S. Dist. LEXIS 18599 (E.D.N.Y. Feb. 5, 2018)

IN THE UNITED STATES COURT OF APPEALS
FOR THE FIFTH CIRCUIT

United States Court of Appeals
Fifth Circuit

FILED

November 10, 2008

Charles R. Fulbruge III
Clerk

No. 07-30725

In re: In the Matter of the Complaint of OMEGA PROTEIN, INC, as Owner of Fishing Vessel GULF SHORE, for Exoneration from or Limitation of Liability.

OMEGA PROTEIN INC., as Owner of Fishing Vessel GULF SHORE,

Plaintiff-Appellee,

v.

SAMSON CONTOUR ENERGY E & P LLC,

Defendant-Appellant.

Appeal from the United States District Court
for the Western District of Louisiana

Before KING, DeMOSS, and PRADO, Circuit Judges.

DeMOSS, Circuit Judge:

In the early morning hours of October 4, 2004, Plaintiff-Appellant Omega Protein, Inc's ("Omega") vessel struck an oil platform owned by Defendant-Appellee Samson Contour Energy E & P LLC ("Samson"). On appeal, we must consider whether the district court erred in assigning fault equally between Omega and Samson, and whether the court erred in allowing Omega to limit its liability under 46 U.S.C. § 30505. Finding no error, we affirm.

I.

Omega's vessel F/V GULF SHORE ("GULF SHORE") is a 396-ton steel hulled fishing vessel used to catch and process menhaden, a fish found in the Gulf of Mexico. GULF SHORE had various navigational aids, including an autopilot, a Furuno Model 1731 Mark-3 radar, and a Pinpoint Navigational Chart System. The radar was equipped with an anti-collision alarm, which emits a sound when an obstacle enters a field specified by the operator. The Pinpoint system shows computerized navigational charts on a screen and displays the vessel's progress across the chart. Between midnight and 1 a.m. on October 4, 2004, GULF SHORE left its base of operations in Cameron, Louisiana to proceed to fishing grounds at Freshwater Bayou, Louisiana. At the helm was Captain Luther Stewart. Before that night, Stewart had served as a menhaden pilot and captain for approximately twenty accident-free years. Omega did not provide Stewart with training on how to use the radar, and had no policy requiring him to use the anti-collision alarm. Stewart had not read the radar's manual and was unaware of the alarm's capabilities. GULF SHORE proceeded in an easterly direction at a speed of between nine and eleven knots. The weather was good, seas were calm, and visibility was seven to eight miles.[1]

After GULF SHORE had been underway for several hours, the vessel's chief engineer entered the wheelhouse to inform Stewart that a component of the vessel's refrigeration system had malfunctioned. Stewart scanned the horizon to see if any obstacles were in the vessel's path. Seeing none, he turned on the wheelhouse lights to examine the part. He agreed that the part was broken, and unless it was replaced, the vessel could not fish and would have to return to port. Stewart used his cell phone to call Omega's plant in Cameron, hoping to arrange

[1] Samson contends that conditions were "hazy," based upon a Report of Marine Accident, Injury or Death filed with the Coast Guard. It is unknown who filled out that portion of the report (which is, of course, hearsay). Stewart's uncontradicted testimony at trial was that visibility was seven to eight miles.

an air drop of a replacement part. Stewart only reached a security guard at the Cameron plant, and left a message for the marine department. Stewart then called Omega's plant in Abbeville, Louisiana to see if the part was in stock there. While Stewart was on the phone, and some ten to fifteen minutes after he turned on the wheelhouse lights, GULF SHORE struck Omega's oil platform ("Platform 17B"). The platform is situated near a cluster of oil platforms known as the Joseph's Harbor Rigs.

After the allision,[2] GULF SHORE circled Platform 17B. Stewart observed no lights and heard no sounding devices. Three other crew members of GULF SHORE likewise testified that the platform lacked functioning lights or a fog horn. Herbert Fisher, captain of F/V ANNA AMY, a vessel owned by Omega, testified that he passed Platform 17B prior to the allision on the morning of October 4, 2004. He stated that the platform lacked operational lights and sounding devices. Another captain, Lawson Schools of F/V COTE BLANCHE BAY, also an Omega vessel, testified that after the allision, he saw no lights operating on Platform 17B. He testified that when he had passed the same platform at night on other occasions, it was unlit.

Following the allision, various employees and agents of Samson boarded Platform 17B and inspected its lighting systems. Baker Energy was in charge of maintaining the lights on the platform. Baker's employee, Troy Whetstone, testified that he conducted tests just a few hours after the allision. Whetstone placed a piece of electrical tape over the photocell of each of the four lights to simulate darkness. In each case, the light turned on as intended. Terry Smith, Operations Manager of Wet Tech Energy (a third-party contractor hired by Samson to perform quarterly inspections of Platform 17B's lights) arrived at the

[2] "An allision is a collision between a moving vessel and a stationary object." In re Mid-South Towing Co., 418 F.3d 526, 528 n.1 (5th Cir. 2005) (quoting THOMAS J. SCHOENBAUM, ADMIRALTY & MARITIME LAW § 14-2 (4th ed. 2004)).

platform several hours after Whetstone conducted his inspections. He performed tests on the electrical currents, batteries, solar panels, foghorn, and lights, and found no evidence to suggest that the lights and horn had not been working the previous night. Smith also performed some routine maintenance. Both Smith and Whetstone testified that they did not repair the platform's lights.

Additionally, Samson hired George Hero, an electrical engineer, to test the lighting systems on October 11, 2004 (one week after the accident). Hero was to determine "whether there was evidence of any recent modifications or repairs to the lighting and foghorn systems or any evidence that the systems should not have been operational on October 4, 2004." Hero opined that he saw no evidence that the lights had been repaired, and no evidence that the lights had been inoperative one week earlier.

II.

The district court conducted a three-day bench trial in February 2007. In its judgment of March 9, 2007, the court found that "Omega sufficiently proved that platform 17B did not have operational lights on the morning of the accident." The court discredited the testimony adduced by Samson, noting that Baker Energy had not kept monthly maintenance reports for Platform 17B. Moreover, the court disregarded the testimony by Smith and Hero, noting that "it is entirely possible that the lights were repaired prior to their inspections," namely by Whetstone. The court found that Samson had committed a statutory violation by failing to have operable lights on a fixed structure. See 33 C.F.R. §§ 67.01-1, 67.05-1. Consequently, the vessel was not presumed to be at fault for the allision, and the burden remained on Samson to prove negligence.

The court next found that Samson carried its burden because it proved that Captain Stewart violated the International Regulations for Preventing

Collisions at Sea ("COLREGS"). See 33 U.S.C. § foll. 1602.[3] Namely, Stewart violated Rule 5 by failing to maintain a proper lookout by sight and hearing, as well as all other available means. See COLREGS, R. 5. Turning on the wheelhouse light created a "mirror effect" which greatly diminished Stewart's night vision. Use of a cell phone likewise prevented Stewart from maintaining a proper lookout. Moreover, the court found that Stewart had violated Rule 7 by failing to use all available means (i.e., the vessel's radar) to determine if a risk of collision existed. See COLREGS, R. 7. Namely, the "mirror effect" prevented Stewart from seeing the radar display. The court emphasized that "there was substantial testimony that Captain Stewart did not make effective use of his radar while navigating through the Joseph's Harbor Rigs."

Once Samson proved Stewart's negligence, the court noted that the burden shifted to Omega to prove that it did have knowledge or privity of Stewart's acts. Because the court characterized the cause of the allision as a "mistake of navigation," it asked "whether Omega exercised reasonable care in selecting a qualified and competent master?" The court noted that Stewart had all of the requisite licenses to operate GULF SHORE, and Stewart's record from twenty years of working on and operating menhaden vessels for Omega was clean. The court found that Omega had exercised reasonable care in selecting Stewart as captain. Consequently, the court found that Omega lacked privity or knowledge of Stewart's negligence, and was therefore entitled to limit its liability. In light of these findings, the court apportioned fault for the allision and resulting damages equally to Omega and Samson (50%–50%).

Samson moved for a new trial, or to alter or amend judgment. It contended that: (1) the court's verdict was against the weight of the evidence; (2) the court erred by failing to apply Trico Marine Assets Inc. v. Diamond B Marine Services,

[3] The COLREGS' text has been removed from the U.S. Code and the Code of Federal Regulations, but remains in force. See 33 U.S.C. § 1602, West Electronic Research Notes.

Inc., 332 F.3d 779 (5th Cir. 2003); and (3) the court had failed to make findings of fact or consider facts tending to show that GULF SHORE was unseaworthy. After briefing and oral argument, the court entered a Memorandum Ruling on July 2, 2007, denying Samson's motions. Samson appeals both the district court's judgment and its denial of post-trial relief. We have jurisdiction over this appeal because it seeks review of an interlocutory decree determining the rights and liabilities of parties to an admiralty case. See 28 U.S.C. § 1292(a)(3); Astarte Shipping Co. v. Allied Steel & Export Serv., 767 F.2d 86, 88 (5th Cir. 1985) (holding that appellate jurisdiction is present if the district court's order has "the effect of ultimately determining the rights and obligations of the parties with regard to the merits of the litigation").

III.

As with any bench trial, following a maritime limitation case tried to a district court, the appellate court reviews findings of fact for clear error and questions of law de novo. See In re Mid-South Towing, 418 F.3d 526, 531 (5th Cir. 2005). Questions of fault, including determinations of negligence and causation, are factual issues, and may not be set aside on appeal unless clearly erroneous. Id.; Trico Marine Assets, 332 F.3d at 786. "If the district court's account of the evidence is plausible in light of the record viewed in its entirety, the court of appeals may not reverse it even though convinced that had it been sitting as the trier of fact, it would have weighed the evidence differently. Where there are two permissible views of the evidence, the factfinder's choice between them cannot be clearly erroneous." Anderson v. Bessemer City, 470 U.S. 564, 573-74 (1985). "Findings based on the credibility of witnesses demand even greater deference." Tokio Marine & Fire Ins. Co., Ltd. v. FLORA MV, 235 F.3d 963, 970 (5th Cir. 2001) (citing Fed. R. Civ. P. 52(a); Anderson, 470 U.S. at 575). "If a finding is based on a mixed question of law and fact, this court should only reverse 'if the findings are based on a misunderstanding of the law or a clearly

erroneous view of the facts.'" Bertucci Contracting Corp. v. M/V ANTWERPEN, 465 F.3d 254, 259 (5th Cir. 2006) (quoting FLORA MV, 235 F.3d at 966). The appellate court likewise reviews the grant or denial of limited liability for clear error. *See* Trico Marine Assets, 332 F.3d at 789; In re Hellenic Inc., 252 F.3d 391, 394 (5th Cir. 2001).

IV.

We first consider whether the district court's findings regarding the cause of—and comparative fault for—the allision are clearly erroneous before asking whether limitation of liability was proper.

Samson contends that (1) the lights of Platform 17B were operational on the night of the allision; (2) the allision could have been prevented if (a) the vessel had been equipped with functional navigational aids or updated charts, or (b) if Stewart had used his radar's anti-collision alarm; and (3) the district court erred in its apportionment of fault. Samson casts the court's alleged missteps as errors of law which should be reviewed de novo. Omega responds that the court in all instances properly stated the controlling legal standard, and merely rendered findings of fact that were contrary to Samson's preferences. Consequently, argues Omega, the court's findings regarding fault and the cause of the allision are subject to reversal only if they are clearly erroneous.

A.

First, Samson recites the evidence tending to show that the lights on Platform 17B were operational. Troy Whetstone testified that he tested the lights following the allision by placing a piece of electrical tape over the photocell, and found that the lights turned on. Samson also emphasizes that Terry Smith of Wet Tech Energy believed that the lights had been operational, and George Hero, an expert on electrical engineering, opined that there was no evidence of post-allision repairs. Nevertheless, the district court discredited this theory, noting that it appeared that Whetstone had repaired the lights. The

district court instead relied on the testimony of six witnesses who viewed the platform on the night of the allision, both before and after GULF SHORE hit it, and testified that the lights were off. All of those witnesses were affiliated with Omega in some way, while the witnesses presenting the contrary view were agents of Samson: there simply were no neutral witnesses present at the scene of the allision. Because the evidence regarding the lighting of Platform 17B is at best in equipoise, we may not overturn the district court's findings (and credibility determinations subsumed therein) as clearly erroneous. See Bertucci Contracting, 465 F.3d at 258-59 (citing Anderson, 470 U.S. at 575); In re Mid-South Towing, 418 F.3d at 535 ("Credibility determinations are the province of the trier of fact, which in this case is the district court.") (citations omitted).

In line with its theory that the lights of Platform 17B were operational, Samson contends that the court misapplied the presumption that when a moving vessel allides with a stationary object, the vessel is presumed to be at fault, and has the burden of demonstrating a contributing fault by the stationary object. See The Oregon, 158 U.S. 186, 197 (1895). However, this presumption only applies in the absence of evidence of fault. See In re Mid-South Towing, 418 F.3d at 531. Here, because Omega proved that Platform 17B was unlit, the district court concluded that Samson committed a statutory violation. In light of this finding, the court was correct to disregard the presumption of The Oregon. See id. The district court did not operate under a "misunderstanding of the law" and its findings were not based on "a clearly erroneous view of the facts." See Bertucci Contracting, 465 F.3d at 259. There was no error on this point.

B.

Despite finding Platform 17B at fault, the district court still held that Samson proved that Stewart's negligence was a contributing cause of the allision: Stewart failed to maintain a proper lookout and failed to make effective use of the radar. Samson agrees that Stewart was at fault for the allision, yet

contends that the district court's findings regarding the cause of the allision are incorrect. Namely, Samson avers that Stewart "only made the decision to turn on his wheelhouse lights" because the Pinpoint navigational chart and the Furuno radar "did not show Samson's Platform 17B—or the cluster of twenty platforms in which it stands—2-3 miles dead ahead." Samson contends that the evidence proves that the navigational aids were defective or outdated. Moreover, Samson notes that Omega failed to train Stewart in how to use his navigational aids, specifically the anti-collision alarm. It thus lays the blame for the allision not on Stewart's "mistake of navigation," but rather on "Omega's hands-off approach to management of the GULF SHORE, particularly the training and supervision of Stewart . . . ." Additionally, Samson insists that even if Platform 17B had no operational lights, this did not contribute to the allision, because the "mirror effect" caused by the wheelhouse lights would have prevented Stewart from seeing the platform's lights. Samson presses causation because this issue bears on whether Omega can limit its liability.

Omega responds that there is no evidence that the navigational aids aboard GULF SHORE were out-of-date or defective. According to Omega, the evidence shows that Stewart failed to use the aids prior to the allision, not that the radar and Pinpoint system failed to show Platform 17B. Omega notes that the platform had been in place for over twenty years, and would have been on any nautical chart of the area. It submits that the district court's finding, that the allision was caused by a combination of Stewart's failure to maintain a lookout or properly use his (functional) navigational aids, together with the platform's lack of lighting, is not clearly erroneous.

On direct examination, Stewart testified that he did not look at his radar or Pinpoint chart prior to turning on the wheelhouse lights. He testified that he relied solely on his visual scan of the horizon to determine if any objects lay in GULF SHORE's path. On cross examination, however, Stewart appeared to

testify that he did not see the platform on the radar or Pinpoint system before or after the allision. Stewart also stated that he "never used the chart for that," and that he did not use his radar "to specifically look for [Platform 17B] after [the allision] happened. I think that was probably the furthest thing from my mind at the time."

In denying Samson's motion for post-trial relief, the court rejected the theory that the radar or Pinpoint system were defective or out-of-date, and also rejected Samson's argument that Stewart's lack of training in the use of the radar's anti-collision alarm caused or contributed to the accident.[4] The court expressly found that the lack of operational lights on Platform 17B precluded Stewart from seeing the platform before he turned on the wheelhouse lights, contributing to the allision. In light of Stewart's testimony that visibility was seven to eight miles on the night of the allision, if the platform's lights had been on, they would have been visible when Stewart last scanned the horizon, when GULF SHORE was two to three miles away from Platform 17B.

Having reviewed the entire record, we are not left with the firm conviction that the district court made a mistake in finding that Stewart's failure to use his navigational aids caused the allision. See Transorient Navigators Co. v. M/S SOUTHWIND, 714 F.2d 1358, 1364 (5th Cir. 1983). The evidence simply does not compel the conclusion that outdated or defective navigational aids were a factor. Cf. In re Mid-South Towing, 418 F.3d at 533. We affirm the district court's rulings, which are plausible in light of the record as a whole.

C.

Samson also argues that the district court's apportionment of fault was clearly erroneous. Samson posits that the court failed to make detailed and

[4] The court referenced testimony that anti-collision alarms are of limited utility in the portion of the Gulf of Mexico where GULF SHORE was navigating, owing to a profusion of obstructions which would constantly trigger the alarm.

specific findings of fact to support its conclusions. Cf. Fed. R. Civ. P. 52(a). The district court made the following finding in apportioning fault: "Based on the foregoing facts, the court finds that the apportionment of fault for the allision and resulting damages is: Omega 50% and Samson 50%."

In admiralty cases, federal courts allocate damages based upon the parties' respective degrees of fault. United States v. Reliable Transfer Co., 421 U.S. 397, 411 (1975). The "clearly erroneous standard governs a trial court's allocation of damages among vessels." Mac Towing, Inc. v. Am. Commercial Lines, 670 F.2d 543, 547 (5th Cir. 1982) (citations omitted). "Where both parties to a collision are in violation of statutes designed to prevent collisions, the court may apportion fault between the parties, unless either party proves that its statutory violation was not a substantial contributing cause of the collision." Stolt Achievement, Ltd. v. DREDGE B.E. LINDHOLM, 447 F.3d 360, 364 (5th Cir. 2006) (citation omitted). Moreover, "the calibration of culpability simply is not susceptible to any real precision." Id. at 370 (quotation omitted). The trial court does not mechanically tally errors, but "must determine, based upon the number and quality of faults by each party, the role each fault had in causing the collision." Id.

Samson does not indicate what relative percentage of fault it believes was appropriate—aside from its insistence that Omega was solely at fault for the allision. While the court did not provide a detailed explanation for its 50-50 apportionment of fault, it made such apportionment "[b]ased on the foregoing facts." The adduced facts established statutory violations by both Omega and Samson which caused the allision. A court may apportion fault equally in a close case. See Mac Towing, 670 F.2d at 547 ("That a court divided damages equally among the parties does not mark a failure to follow Reliable Transfer. If the court finds the parties equally at fault, so be it. In establishing comparative negligence in admiralty, the Supreme Court certainly did not delete the number

'50' from the federal courts' vocabulary."); cf. Reliable Transfer, 421 U.S. at 411 (holding that liability "is to be allocated equally only when the parties are equally at fault or when it is not possible fairly to measure the comparative degree of their fault"). The district court carefully weighed the evidence in reaching its decision, and correctly found that both parties' violations contributed to the allision. We do not believe that the court's equal apportionment of fault was clearly erroneous, and affirm.

V.

Samson contends that the district court erroneously granted limitation of liability to Omega. Seeking de novo review, Samson avers that the court applied an incorrect legal standard. The crux of this argument is that the court "ignore[d] the plethora of evidence of Omega's negligence and the unseaworthiness" of GULF SHORE. Samson insists that if the court had properly applied the law, it would have denied Omega's petition. As we explain below, we believe that the district court correctly applied circuit precedent to the facts. Because there was no misunderstanding of the law, we review for clear error. See FLORA MV, 235 F.3d at 966.

A.

Under the Limitation of Liability Act, a vessel owner may limit its liability for maritime casualties to "the value of the vessel and pending freight." 46 U.S.C. § 30505(a).[5] "However, if the vessel's negligence or unseaworthiness is the proximate cause of the claimant's loss, the plaintiff-in-limitation must prove it had no privity or knowledge of the unseaworthy conditions or negligent acts." Trico Marine, 332 F.3d at 789 (citing Cupit v. McClanahan Contractors, Inc., 1

[5] In 2005, Congress recodified portions of title 46, United States Code. See Pub. L. No. 109–304 (2005). Section 30505 was previously numbered as § 183(a) of the Appendix to title 46. Congress's intent was to "codif[y] existing law rather than creating new law." See H.R. Rep. 109–170, at 2 (2005), reprinted in 2006 U.S.C.C.A.N. 972, 973. Therefore, pre-amendment cases applying former § 183(a) are treated as having full force of law.

F.3d 346, 348 (5th Cir. 1993)); see § 30505(b). We have stated that "privity or knowledge" "implies some sort of 'complicity in the fault that caused the accident.'" Brister v. A.W.I., Inc., 946 F.2d 350, 355 (5th Cir. 1991) (quoting Nuccio v. Royal Indem. Co., 415 F.2d 228, 229 (5th Cir. 1969)). The owner has privity "if he personally participated in the negligent conduct or brought about the unseaworthy condition." Trico Marine Assets, 332 F.3d at 780 (quoting Pennzoil Producing Co. v. Offshore Express, Inc., 943 F.2d 1465, 1473 (5th Cir. 1991)). A corporate owner is assumed to know what the corporation's managing officers knew or "should have known with respect to conditions or actions likely to cause the loss." Id. at 789-90 (quoting Pennzoil, 943 F.2d at 1473-74). "The question of 'privity or knowledge must turn on the facts of the individual case.'" Brister, 946 F.2d at 355-56 (quoting Gibboney v. Wright, 517 F.2d 1054, 1057 (5th Cir. 1975)).

In Brister, we surveyed Supreme Court and circuit court cases, and noted that knowledge of an unseaworthy or negligent condition is normally imputed to a corporate owner if the "condition could have been discovered through the exercise of reasonable diligence." Id. at 356. Moreover, "a finding of negligence indicates complicity in the cause of the accident sufficient to make limitation unavailable." Id. (citations omitted). However, this Court also noted two exceptions to this rule. First, mere "mistakes of navigation" by an otherwise competent crew do not bar limitation of liability. Id. (quoting In re Hellenic Lines, Ltd., 813 F.2d 634, 638 (4th Cir. 1987)).[6] Second, whether negligence may

[6] Samson argues that Brister is dicta for present purposes because that was a Jones Act case. Yet no subsequent cases have called into question the correctness of Brister's 'dicta.' Cf. In re Kristie Leigh Enters., Inc., 72 F.3d 479, 481 (5th Cir. 1996); see also In re Hellenic Inc., 252 F.3d at 396. The rule for mere mistakes of navigation also has a considerable pedigree; the Supreme Court noted in Coryell v. Phipps, 317 U.S. 406, 412 (1943), that "[o]ne who selects competent men . . . and who is not on notice of any defect . . . cannot be denied the benefit of limitation . . . ." Additionally, the Fifth Circuit applied this rule prior to Brister. See, e.g., Cont'l Oil Co. v. Bonanza Corp., 706 F.2d 1365, 1377 n.15 (5th Cir. 1983) (en banc) (noting that "no court has previously denied a corporate shipowner limitation of liability for a master's

be imputed can be determined in reference to the negligent employee's stature within the corporate hierarchy; if sufficiently high, limitation of liability is precluded. Id. Samson does not advance this theory.

B.

Only the first "privity or knowledge" exception noted in Brister—for mere mistakes of navigation—is relevant in the present case. The district court characterized Stewart's decision to turn on the wheelhouse lights and his failure to maintain a lookout or use his radar as mistakes of navigation. Samson argues that this conclusion is wrong, and that GULF SHORE was unseaworthy. Unseaworthiness and mistakes of navigation are related yet distinct matters. *See* Farrell Lines Inc. v. Jones, 530 F.2d 7, 10 n.2 (5th Cir. 1976). Seaworthiness is "reasonable fitness to perform or do the work at hand." Id. When unseaworthiness exists due to equipment that is defective at the start of a voyage, and the defects can be discovered through the exercise of reasonable diligence, limitation of liability is less likely to be available—but not necessarily precluded. *See* Brister, 946 F.2d at 357 & n.5. In contrast, "[e]rrors in navigation or other negligence by master or crew are not attributable to (the vessel owner) for limitation purposes." Mac Towing, 670 F.2d at 548 (quotation omitted). Ultimately, regardless of whether a mistake of navigation or unseaworthiness caused the allision, the question of whether Omega lacked privity or knowledge, and thus may limit its liability, is fact-specific and subject to reversal only if clearly erroneous. *See* Trico Marine Assets, 332 F.3d at 789.

Samson contends that the district court committed legal error by misapplying circuit precedent from Trico Marine Assets. Reprising its arguments

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navigational errors at sea when the owner has exercised reasonable care in selecting the master"); Mac Towing, Inc., 670 F.2d at 548 ("Ordinary 'errors in navigation or other negligence by master or crew are not attributable to (the shipowner) for limitation purposes.'") (quoting Tittle v. Aldacosta, 544 F.2d 752, 756 (5th Cir. 1977)). Therefore, the statement of the rule in Brister in actuality reflects well-established, binding precedent.

regarding causation, Samson alleges that GULF SHORE allided with Platform 17B because the vessel's radar was defective or its charts were out-of-date. Additionally, Samson submits that because Omega did not train Stewart in the use of the radar's anti-collision alarm, which might have prevented the allision, the vessel was unseaworthy. Unseaworthiness would have existed prior to GULF SHORE departing on the night of the allision, and unlike a mistake of navigation, would be within Omega's privity or knowledge. Thus, concludes Samson, the court committed legal error by allowing Omega to limit its liability. Omega points to the finding that the allision was caused by Stewart's mistake of navigation, and not unseaworthiness. Omega argues that the district court did not commit legal error by asking whether Omega proved that it exercised reasonable care in selecting a competent master, and then answering this question affirmatively. Omega insists that this case is factually distinguishable from Trico Marine Assets.

In Trico Marine Assets, a vessel departed port in heavy fog. 332 F.3d at 783. The captain did not post a lookout, and ran at full speed—eighteen knots—although this generated enough noise to drown out the noise of other vessels and fog signals, and made it difficult to hear the radio. Id. at 783-84. The captain misread his radar and attempted to conduct an improper passing maneuver, leading to a collision. Id. at 784. The district court found that the captain had no training in how to use the radar, and had not otherwise received safety training. Id. at 790. The vessel owner had not evaluated the vessel's seaworthiness or the captain's qualifications, had not inspected the vessel logs, and did not employ a safety manager. Moreover, the owner knew that the captain had previously operated the vessel in a reckless manner in the fog, yet did not prevent the captain from doing so again. The district court denied limitation of liability. Id. We affirmed. We noted that navigational errors alone typically do not justify denying limitation of liability, but "the present case

presents far more than mere navigational errors." Id. at 790. The vessel owner was aware that the captain had trouble hearing his radio. Moreover, the captain had so little familiarity with his radar system that he could not determine other vessels' directions of travel, and this ignorance led to a collision. Under the facts of that case, we held that the owner knew or should have known that the vessel was unseaworthy and the captain incompetent. Id.

We believe that the present case is distinguishable. Stewart did not have a pattern of improper or unsafe behavior. Rather, he had a spotless record in his twenty years of working the menhaden fishery as a pilot and captain. While Omega did not train Stewart on how to use the anti-collision alarm, the district court found that this feature was not very useful because the Gulf is littered with obstructions. Crucially, as discussed above, the district court did not find that defects in the radar or Pinpoint system caused the allision. Rather, the "mirror effect" caused by the wheelhouse lights prevented Stewart from seeing out the windows or viewing the radar. In contrast, the captain's failure in Trico Marine Assets to understand what he saw on his radar display was a proximate of the collision. See 332 F.3d at 790. Because that captain was making a blind run through the fog, radar was the sole means by which he could see obstacles in his vessel's path. Here, because defective navigational aids played no role in the allision, they are irrelevant to whether Omega may limit its liability. See In re Hellenic Lines, Ltd., 813 F.2d at 639 ("Only conditions of unseaworthiness that contribute to the collision are relevant to determining whether the shipowner is entitled to limitation.") (citation omitted).

Samson is not the first to ask us to reverse a district court's findings and hold on appeal that unseaworthiness, rather than mistakes of navigation, caused a casualty. In Mac Towing, we considered—and rejected—a similar argument concerning seaworthiness and limitation of liability. See 670 F.2d at 547-48. In that case, which arose out of the collision of barges towed by two tugs, the

district court held that both tugs made errors in navigation. One owner moved for limitation of liability, which the court granted. The adversary appealed. Id. at 546. We emphasized that a captain's or vessel's minor deficiencies do not necessarily add up to unseaworthiness:

> Alamo argues that Captain Higgerson was ignorant of the most basic facts of navigation and speculates that perhaps he lacked a chart of the area. Such defects allegedly rendered [the vessel] unseaworthy. This point the trial judge rejected in his findings of fact. The record sustains his decision. It demonstrates that Higgerson was a qualified pilot with long experience piloting similar tugs in that area. We agree with the District Court that his deficiencies did not rise to the level of unseaworthiness and thus does not constitute 'privity or knowledge.'

Id. at 548.

The Eighth Circuit recently applied similar reasoning in rejecting an argument that a pilot's failure to make effective use of his radar *per se* rendered his vessel unseaworthy. In re Mo. Barge Lines, Inc., 360 F.3d 885, 891 (8th Cir. 2004). There, two vessels collided because one pilot believed that a "mass of lights" he saw at night on the Mississippi River was a construction site, not another vessel. Id. The pilot would have realized that the lights were a vessel if he had increased the range on his radar. However, the pilot's failure to use the radar effectively did not mandate a finding that the vessel was unseaworthy. Id. at 891-92. Instead, the evidence supported a finding that the pilot's "decision not to increase his radar's range when he first noticed the lights was navigational error rather than an example of unseaworthiness." Id. at 892. Similarly, in this case, Stewart committed navigational error by failing to look at his radar and Pinpoint system. Merely because better use of the navigational aids might have helped prevent the allision does not compel a finding that Stewart was an incompetent master or that GULF SHORE was unseaworthy.

C.

To recap, Samson has demonstrated that Omega did not do everything within its power to ensure that Stewart knew the full capabilities of the vessel's radar, nor did it have a protocol in place dictating when features such as the anti-collision alarm were to be used. This may not be the most prudent way to run a ship. However, the "privity or knowledge" standard does not require a vessel owner to take every possible precaution; it only obliges the owner to select a competent master and remedy deficiencies which he can discover through reasonable diligence. The district court found that Omega selected a competent master and rejected the contention that the vessel was unseaworthy. Those findings are supported by the record.

Samson has doggedly insisted that the district court committed legal error. After carefully considering the parties' arguments, it is apparent that "[o]nce again, we are urged to second guess the factual findings of the trial court in an admiralty matter." See Mac Towing, 670 F.2d at 544. Because the district court correctly determined that Stewart's mistakes of navigation and Platform 17B's lack of functioning lights caused the allision, Samson's theory regarding unseaworthiness of GULF SHORE is untenable. After reviewing the record as a whole, we are not "left with a definite and firm conviction that a mistake has been committed." Cf. Transorient Navigators, 714 F.2d at 1364. We therefore affirm the district court's grant of limitation of liability to Omega.

VI.

The district court properly applied the law, and its findings of fact are not clearly erroneous. Its rulings are therefore in all respects

AFFIRMED.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

MARY HOLZHAUER,

Plaintiff,

v.

GOLDEN GATE BRIDGE HIGHWAY & TRANSPORTATION DISTRICT,

Defendant.

AND RELATED CROSS-CLAIMS.

Case No. 13-cv-02862-JST

ORDER DENYING DEFENDANT'S PETITION FOR LIMITATION OF LIABILITY

On February 16, 2013, the ferry SAN FRANCISCO collided with a speedboat on the San Francisco Bay. The collision killed the driver of the speedboat, Harry Holzhauer, and seriously injured his fellow passenger and owner of the boat, David Rhoades. At trial, a jury found Defendant Golden Gate Bridge, Highway & Transportation District ("District") partially responsible for the accident.

The District now petitions the Court to limit its liability in this action to the value of the ferry SAN FRANCISCO, arguing that it lacked privity or knowledge of the acts that caused the accident. Claimants Mary Holzhauer (Harry Holzhauer's widow) and David Rhoades ("Claimants") dispute the District's contention. They further argue that, even if the District has proven a lack of privity and knowledge, it places too low a value on the ferry.

For the reasons set forth below, the Court concludes that the District has not met its burden of showing a lack of privity and knowledge. It therefore denies the petition without reaching the question of the ferry's value.

I. BACKGROUND

In the late afternoon on February 16, 2013, Harry Holzhauer and David Rhoades were travelling in Rhoades' speedboat on the San Francisco Bay. Holzhauer was operating the boat with Rhoades' permission. At the same time, the ferry SAN FRANCISCO was crossing the Bay, making its customary voyage from Sausalito to the District's terminal in San Francisco. The two boats collided, killing Holzhauer and seriously injuring Rhoades. Both Rhoades and the captain of the ferry SAN FRANCISCO, Captain Shonk, claimed not to have seen each other's vessel until it was too late. The evidence showed that Captain Shonk was using his cell phone immediately before the collision.

Harry Holzhauer's widow, Mary Holzhauer, and David Rhoades filed negligence claims against the District following the accident. The District filed a Complaint for Exoneration From or Limitation of Liability pursuant to 46 U.S.C. §§ 30501-30512 (the Limitation of Liability Act). ECF No. 1 in Case No. 3.13-cv-05875-JST. On November 24, 2014, the District's Limitation action was consolidated with the Claimants' claims against the District and the related crossactions. ECF No. 50. Thereafter, the parties agreed that "the issues raised by the District's Limitation of Liability Complaint are to be decided by the Court." ECF No. 105.

The agreed-upon limitations issues are as follows: (1) whether the District had "privity and knowledge" of the conduct on which the District's liability is predicated; (2) if not, then what the fair market value of the ferry was at the conclusion of the voyage during which the accident occurred (i.e., the limitation fund); and (3) how to allocate the limitation fund. ECF No. 105 at 3. The parties proposed that the limitation of liability issues be bifurcated and tried to the court following a jury trial on the underlying liability case, id. at 22, which proposal the Court adopted, ECF No. 145.

At trial, a jury returned a verdict in favor of Claimants and awarded damages to Claimants totaling $5,276,306. ECF No. 261. The jury found the District 30 percent liable for Claimants' injuries and the speedboat operator, decedent Harry Holzhauer, 70 percent liable. Id. The District now asks the Court to limit its liability, pursuant to the Limitation of Liability Act, to the value of the SAN FRANCISCO at the end of its voyage on February 16, 2013.

II. LEGAL STANDARD

The Limitation of Liability Act,[1] 46 U.S.C. §§ 30505 *et seq.*, "allows a vessel owner to limit liability for damage or injury, occasioned without the owner's privity or knowledge, to the value of the vessel or the owner's interest in the vessel." Lewis v. Lewis & Clark Marine, Inc., 531 U.S. 438, 439 (2001). First, the plaintiff or claimant must establish what act or condition caused the loss. In re BOWFIN M/V, 339 F.3d 1137 (9th Cir. 2003). Next, the shipowner has the burden of proving that the act or condition was outside its privity or knowledge. Id. If the shipowner meets this burden, "the owner's liability is limited to the value of the ship." In re: Santa Maria Fishing Inc., No. CV1501257BROJPRX, 2015 WL 12662335, at *2 (C.D. Cal. July 2, 2015) (quoting In re City of N.Y.C., 522 F.3d 279, 283 (2d Cir. 2008)). Whether a defendant was without privity or knowledge is a question of fact. Coryell v. Phipps, 317 U.S. 406, 411 (1943) ("Privity like knowledge turns on the facts of particular cases.").

If the shipowner's liability is limited to the value of the vessel, that amount becomes a fund from which all claims against the shipowner must be paid. In re: Santa Maria Fishing Inc., No. CV1501257BROJPRX, 2015 WL 12662335, at *2 (C.D. Cal. July 2, 2015) (citing 46 U.S.C. § 30511(c)).

The Act has been subject to substantial criticism. Judge Kozinski has called the Act "an anachronism, a holdover from the days when encouraging commerce by sea was considered more important than providing full redress to victims of maritime accidents," and has stated that "such a law no longer makes sense." Delta Country Ventures, Inc. v. Magana, 986 F.2d 1260, 1266–67 (9th Cir. 1993). Another district court in this circuit has noted that the Act is "little-used today" and

> has been described as "a relic of the clipper ship era in which it was launched," Craig H. Allen, The Future of Maritime Law in the Federal Courts: A Faculty Colloquium, 31 J. Mar. L. & Com. 263, 263 (2000), and "an 'anachronism, a principle which should be relegated to the era of wooden hulls,'" Mark A. White, The 1851 Shipowners' Limitation of Liability Act: Should the Courts Deliver the Final Blow?, 24 N. Ill. U.L.Rev.. 821 (2004) (quoting Carter T. Gunn, Limitation

[1] Readers seeking a colorful and informative history of the Act are directed to Judge Robart's opinion in In re Bell, No. C12-1126JLR, 2014 WL 129642 (W.D. Wash. Jan. 13, 2014).

of Liability: United States and Convention Jurisdictions, 8 Mar. 29, 29 (1983)). In re Bell, No. C12-1126JLR, 2014 WL 129642, at *1 (W.D. Wash. Jan. 13, 2014). Nonetheless, "despite its old age," id., and the expression of widespread disapproval, the Act remains good law.

III. JURISDICTION

The Court has admiralty jurisdiction pursuant to 28 U.S.C. § 1333.

IV. ANALYSIS

The first step in analyzing a petition for limitation of liability is to determine the negligent act or unseaworthy condition that caused the plaintiffs' harm. BOWFIN, 339 F.3d at 1137. The plaintiff or claimant bears the burden of establishing this element. Id. As the Ninth Circuit stated in In re Hechinger, 890 F.2d 202 (9th Cir.1989), "Once a proper limitation of liability petition has been filed, the court must first determine what acts of negligence or conditions of unseaworthiness caused the accident . . . . That is, a liability must be shown to exist." Id. at 207 (citations and modifications omitted).

The task is not difficult here. The parties agree that the most probable basis of the jury's finding that the District was negligent is Captain Shonk's use of a personal cell phone in the moments before the collision. See ECF No. 316 (District's Limitation of Liability Brief) at 3 ("The Claimants' closing arguments at the jury trial show that their focus was almost exclusively on urging the jury to find that Captain Stacy Shonk was distracted on a cell phone call during the time he was allegedly making a course and speed change as the overtaking vessel, and therefore he failed to see the speedboat."); id. at 7 ("[T]he 30% fault allocated to the District was most likely based on Claimants' arguments that Capt. Shonk was distracted by his cell phone call and therefore did not see the speedboat in time to prevent the collision."); ECF No. 331 (Claimants' Limitation of Liability Brief) at 14 ("[T] he parties agree that the most probable basis for the jury finding the District negligent was the Captain's use of his personal cell phone in the moments before the collision.").

This finding was supported by substantial evidence. Expert witness Captain Katherine Sweeney testified that it was not safe for Captain Shonk to use his cell phone and that she had never used her cell phone on the bridge. She further testified that it would never be safe for the

person serving as a lookout to use their cell phone. Captain Mitchell Stoller testified that a cell phone should not be used while serving as the dedicated lookout. The evidence at trial showed that the San Francisco Bay is a busy, highly crowded waterway used extensively by both recreational boaters and commercial vessels. On this evidence, the jury could easily conclude, and did conclude, that Captain Shonk's cell phone use contributed to the accident, and was the basis for its finding of partial fault on the part of the District. In short, the Court agrees with the parties' assessment, and finds that Captain Shonk's cell phone use was the "causative agent" of the injuries to Claimants. In re Bell, 2014 WL 129642 at *5.

The second step is for the Court to determine "whether the shipowner had knowledge or privity of those same acts of negligence or conditions of unseaworthiness" that caused the accident. Hercules Carriers, Inc. v. Claimant State of Fla., Dep't of Transp., 768 F.2d 1558, 1564 (11th Cir. 1985). The burden falls on the shipowner, who must prove the absence of privity or knowledge. In other words, the shipowner must prove the negative.

"Privity or knowledge has been frequently defined as follows:

> As used in the statute, the meaning of the words "privity or knowledge," evidently, is a personal participation of the owner in some fault, or act of negligence, causing or contributing to the loss, or some personal knowledge or means of knowledge, of which he is bound to avail himself of a contemplated loss, or a condition of things likely to produce or contribute to the loss, without adopting appropriate means to prevent it. There must be some personal concurrence, or some fault or negligence on the part of the owner himself, or in which he personally participates, to constitute such privity, within the meaning of the Act, as will exclude him from the benefit of its provisions.

Petition of M/V Sunshine, II, 808 F.2d 762, 763–64 (11th Cir. 1987) (quoting Lord v. Goodall, Nelson & Perkins S.S. Co., 15 F.Cas. 8,506 (C.C. Cal. 1877)).

The shipowner's "burden is not met by simply proving a lack of actual knowledge, for privity and knowledge is established where the means of obtaining knowledge exist, or where reasonable inspection would have led to the requisite knowledge." Hercules, 768 F.2d at 1564 (citation omitted). Thus, "knowledge" consists not only of what the shipowner actually knows, but also what it could discover if it conducted a reasonable investigation sufficient to apprise itself "of conditions likely to produce or contribute to a loss." Id. (citation omitted).

The Court finds that the District has failed to meet its burden of demonstrating a lack of

privity or knowledge. The District had no policy regarding the use of personal cell phones by its captains. R.T. 1717:24-1718:1. The District also knew that its captains carried personal cell phones while operating the District's ferries, and permitted their use. R.T. 1718:19-1719:16. In this case, Captain Shonk, while operating the ferry SAN FRANCISCO, was actually using his cell phone immediately preceding the collision to speak with shoreside personnel. Therefore, the District cannot claim that its own lack of training or policy regarding the foreseeable use of a cell phone was beyond its privity or knowledge. Id. at 1577. This is particularly true where, as here, the District had actual knowledge of the practice that led to the collision. Id. Accordingly, the Court finds that the District failed to meet its burden of demonstrating a lack of privity or knowledge.

CONCLUSION

For the foregoing reasons, the District's petition is denied.[2]

IT IS SO ORDERED.

Dated: December 15, 2016

JON S. TIGAR
United States District Judge

[2] In light of the Court's conclusions regarding privity, it declines to reach the question of the San Francisco's value.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK
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IN THE MATTER OF THE PETITION OF
FIRE ISLAND FERRIES, INC., AS
OWNER OF THE COURIER FOR THE EXONERATION FROM AND LIMITATION OF LIABILITY

MEMORANDUM & ORDER
11-CV-3475 (DRH)(ARL)

----------X

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HURLEY, Senior District Judge

By complaint filed on July 19, 2011, Fire Island Ferries Inc. ("Petitioner" or "FIF") seeks exoneration from liability or, if found at fault, to limit its liability to the value of its vessel.

The underlying action arises from a July 10, 2011

collision on the Great South Bay, just north of Atlantique, Fire Island, New York, between a pleasure craft, the My Day Off Too ("MDOT") and the Courier, a commercial water taxi owned by Petitioner. A bench trial was held before the undersigned on September 19, 20, 21, 23 and December 6, 2016 to determine the merits of the Courier's application.

The purpose of this decision is to provide my Findings of Fact and Conclusions of Law as required by Federal Rule of Civil Procedure 52.

Format of Decision

By way of format, a brief, largely undisputed, overview of the collision between the MDOT and the Courier, will be provided, followed by the contentions of the parties and the applicable law. Against that backdrop, detailed findings of fact and concomitant conclusions of law will be furnished vis-a-vis the adverse positions advanced by the parties.

Part I – Largely Undisputed Facts Pertaining to the Collision

1. As noted, the subject collision occurred on July 10, 2011. The Courier, with Captain Yolando Vannoni ("Vannoni") at the helm, left the Fire Island community of "Kismet at 2:30 [A.M.]" (Tr. at 440), then went to the neighboring village of "Saltaire," which was only a "[m]inute[;] two [or] three" away. (Id. at 440-41.) At Saltaire, he "picked up a passenger and headed back . . . east" towards "Ocean Bay Park" (id. at 441),

via the "Slew Way." The Slew Way is a commonly used unmarked navigation route with more than adequate depth to accommodate, inter alia, water taxies such as the Courier which measured 36' by 12',(id. at 411).

2. Captain Vannoni had used the Slew Way for around "25 years" prior to the subject accident (tr. at 445), and had previously "made [the] run from Saltaire to Ocean Beach . . . more than a hundred [but less than] a thousand" times. (Id. at 449.)

In any event, on this date just before 2:36 A.M., the Courier was about to collide with the MDOT. As explained by Vannoni:

> I left Saltaire heading northeast-bound up the slew way towards buoy number ten, almost getting ready to turn into my turn for ten, is when on the radar I visually addressed the same target as a boat going across my bow from starboard to port. I visually saw the boat, visually saw lights, navigation lights. Looked back down at the radar, GPS and - you know, my normal process.
>
> And at that moment I saw the bow of another boat. It was a white hull.
>
> I immediately turned the wheel as hard as I could to port and pulled back at the throttles at the same time. Made impact.
>
> At this point I'm not moving, or moving minimally, not under any power, of course — I think maybe the engines are stalled at this point — and noticed that the boat that was impacted is off to my starboard now kind of circling.

(Tr. at 450-51.)

3. The vessel Vannoni saw going across his bow from starboard to port was not the MDOT. Rather it "was a[n unknown] boat in front of" the MDOT that claimant Anastasio Vourdouris ("Vourdouris"), the skipper of the MDOT, was following in an effort to reach the "State Channel." (Tr. at 205.) As to that vessel, Vourdouris testified that "once I spotted that boat . . . I decided to follow him because I figured that would be a safe way to get out, you know, to maybe follow someone else." (Id.)

The second boat referenced in the above excerpt from Vannoni's testimony, viz. the one with a "white hull," was the MDOT which Vannoni did not see until an instant before the two vessels made contact.

4. Apparently at about the same time the Courier was leaving Saltaire, MDOT, a 20½ Grady-White owned and operated by claimant Vourdouris (tr. at 196), departed from Ocean Beach (id. at 201) heading "north, northwest" towards "Captree" State Park on the mainland. (Id. at 205.)

While Vourdouris was following the unknown vessel, one of his four passengers aboard the MDOT, claimant Kevin Diaz ("Diaz"), "tried to warn the driver" (tr. at 304) "a few seconds"[1] prior to impact, id. at 305, of a vessel approaching

[1] Diaz, on cross-examination, agreed that the number of seconds was "between five to ten" and that he told Vourdouris "a couple of times 'on your left' prior to the collision." (Tr. at

"on the left." (Id. at 206.) Vourdouris looked to his left, then "to [his] right" but saw nothing. (Id.) As he returned his head to a straight ahead position, the Courier "was right on top of [him]" and "hit [the MDOT] on [the] left side, right on [the] red [navigational] light." (Id. at 207.)

5. Immediately prior to the collision, the Courier was traveling at about "24 miles per hour" and the MDOT at slightly over 20 miles per hour. (Id. at 788.) Aboard the Courier, besides Vannoni and two passengers, was "deckhand" Caroline Curtin ("Curtin"). (Id. at 602.) Traveling with Vourdouris were his friends and co-claimants Diaz, Daniel Bustamonti ("Bustamonti"), Jennifer Ghany ("Ghany") and Paul LaPera ("LaPera"). The weather during the evening of July 9th and the early morning of July 10th was clear and the water calm. (Id. at 433 (Vannoni: "It was clear, very [c]lear, very calm"), 351 (claimant's expert Bates: "[the vessels] collided at night in clear visibility").)

Part II — Contentions of Parties

A. FIF's Position

Petitioner FIF contends that the operator of the MDOT "was solely at fault" for the collision on July 10, 2011. (FIF's Proposed Findings of Fact and Conclusions of Law (Doc. # 119) at p. 36.) That is so, petitioner posits, because (1) the MDOT's

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331.)

"navigation lights were not on at the time of the collision"(id. at p. 34), (2) the operator of the MDOT "was so focused on following [the] unknown vessel at a speed in excess of twenty (20) miles per hour that he never saw the Courier or took any action whatsoever to avoid a collision" (id. at p. 35), and (3) Vourdouris "failed to keep a proper lookout." (Id. at p. 36.)

Petitioner further maintains that "[i]n the alternative, if the Court concludes that Captain Vannoni was negligent, and that his negligence is imputable to Fire Island Ferries, Inc., . . . Fire Island Ferries, Inc. did not have privity or knowledge of such negligence" (id. at p. 38), and, accordingly, FIF as the owner of the Courier, is entitled to have its potential liability to claimants capped at the market value of the vessel.[2]

B. Claimants' Positions

Claimants Vourdouris, Diaz, Bustamonti and Ghany "contend that the collision . . . was due solely to the . . . negligence" of the Courier's operator, Vannoni, absent any "comparative negligence on the part of the operator of the [MDOT]." (PTO at 7.) Claimant LaPera takes a less categorical position "contending that the aforesaid collision was at least 90% the fault of the operator of the water taxi with some fault

[2] The parties have stipulated that the value of the Courier was $200,000. Amended Joint Pre-Trial Order (Doc. # 87)("PTO") at 15.

on the part of the operator of the [MDOT]." (Id.)

Claimants, from the inception of the litigation, have ascribed a litany of negligent acts and omissions to Vannoni and FIF. (See, e.g., PTO at 6.) Some of those theories were never adequately developed at trial (such as, e.g., proceeding at a "high rate of speed in unmarked channels") to warrant further discussion. Other arguments, though pursued at trial, fell far short of being convincing. Included within that category is, for instance, Captain Bates' testimony about Vannoni's supposedly improperly limiting the radar range to a half mile (tr. at 351-53).[3] What remains for determination as to the numerous positions urged by claimants are whether (1) Vannoni was "sending a text message on his cell phone at or about the time [the Courier] struck the MDOT" (Claimant LaPera's Reply to FIF's Proposed Findings of Fact and Conclusions of Law (Doc. # 122) at 1), (2) was there a lookout aboard the Courier, and (3) to the extent questions (1) or (2) is answered in the affirmative, is FIF's exposure limited to the value of the Courier?

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[3] Petitioner made an after-the-fact Federal Rule of Civil Procedure 26 objection to this portion of Bates' testimony, maintaining that the issue of "range" was absent from his written expert report and was never broached during his deposition. In response, I said that although petitioner seemed to have the better side of the argument, I would reserve decision until claimants' attorneys had a chance to review the deposition transcript and we discussed the matter further. (Tr. at 354-56.) I don't recall any such further discussion being conducted. Assuming that to be the case, the contested "range" testimony as things now stand remains part of the record.

Before supplementing the background findings of fact set forth in Part I by making additional factual findings vis-a-vis the above listed disputed issues as framed by the parties, a brief review of the applicable law will be provided.

Part III — Applicable Law

The law governing FIF's petition is well synopsized in the following excerpt from Holzhauer v. Golden Gate Bridge Highway and Transportation District, a district court decision from the Northern District of California:

> The Limitation of Liability Act, 46 U.S.C. §§ 30505 et seq., allows a vessel owner to limit liability for damage or injury, occasioned without the owner's privity or knowledge, to the value of the vessel or the owner's interest in the vessel. First, the plaintiff or claimant must establish what act or condition caused the loss. Next, the shipowner has the burden of proving that the act or condition was outside its privity or knowledge. . . . If the shipowner meets this burden, the owner's liability is limited to the value of the ship. If the shipowner's liability is limited to the value of the vessel, that amount becomes a fund from which all claims against the shipowner must be paid.
>
> . . . .
>
> The first step in analyzing a petition for limitation of liability is to determine the negligent act or unseaworthy condition that caused the plaintiffs' harm. The . . . claimant bears the burden of establishing this element. . . .
>
> . . . .
>
> The second step is for the Court to determine whether the shipowner had knowledge or privity of those same acts of negligence or conditions of unseaworthiness that caused the accident.

2016 WL 7242108, at *2-3 (N.D. Cal. Dec. 15, 2016)(internal citations and quotations marks omitted).

Part IV — Discussion and Concomitant Findings of Fact on Disputed Issues[4]

Given that the first step in addressing FIF's petition involves claimants "establish[ing] what act or condition caused the loss," claimants' allegations against FIF will be discussed initially. Which is to say, the position of the parties as set forth in Part II will be analyzed essentially in reverse order.

A. Claimant's Have Established That the Operator of the Courier was Texting When the Collision Occurred[5]

(6) At 2:36 A.M. on July 10, 2011, a text message from Vannoni's cell phone was received by his friend and co-worker Brian McNicholas ("McNicholas"). (See Tr. at 134:3-4, 137:2-8, 478:17-22; see also Claimants' Ex. I (Verizon Wireless Record).)

(7) The pivotal question, discussed infra, is whether the above referenced text was sent by Vannoni "a few milliseconds" prior its receipt (tr. at 581:9-13) – as claimants contend — or "minutes, or even hours" earlier as FIF maintains (id. at 566:3-18). Vannoni insists that he was not texting at

[4] In this portion of the decision concerning disputed issues of fact, cites to the trial transcript will include both pages and lines rather than just pages as in Part I.

[5] In this part of the decision, i.e. Part IV, Findings of Fact 6 through 37 are provided. The reader is reminded that Findings of Fact 1 through 5 are set forth in Part I supra.

the time of the accident. (Id. at 474:5-7, 477:14 to 478:2.)

(8) In support of its position, FIF called Roger L. Boyell ("Boyell") to the stand in an effort to show that Vannoni may have texted McNicholas sometime considerably earlier in the evening than a moment before 2:36 A.M.

Boyell, a New Jersey licensed electrical engineer and private investigator, was retained "to investigate the capabilities of a cell phone sending a text message under conditions that may have obtained at the time of the incident." (Tr. at 556:9-13 (emphasis added).) At trial, he explained, based on his examination of the phone used by Vannoni or one of the same make and model – to wit, "a Casio . . . flip phone" (id. at 558:3-4), – that 2:36 A.M. "is not necessarily the time at which the phone was manipulated or the keyboard operated to compose that message. That is only the time at which the network observed the connection and the transmission." (Id. at 565:16 to 566:2.)[6] "We know that the user operated the phone before the

[6] Claimants' attorney Hession moved to strike Boyell's testimony about Vannoni's "Casio . . . flip phone" (tr. 558:3-4), on the basis Boyell's testing was done on the assumption that "the phone was not connected to a network" (id. at 559:3-9), an assumption not rooted in the evidence. I received the evidence subject to connection under Fed. R. of Evid. 104(b).

While no direct evidence was thereafter elicited of Vannoni endeavoring to use his cell phone while in a dead zone, Boyell's testimony was helpful to the Court in explaining how a significant delay conceivably could occur between the time a Casio flip phone user hits the send button on the one hand and the time the intended recipient receives the message and the

2:36 A.M. transmission. We don't know how many seconds or minutes or even hours before . . . ."[7] (Id. at 566:8-11.)

Boyell explained the process that occurs when the user of the subject cell phone tries to send a text while in a dead zone thusly:

> If there is no network connection, this phone does not attempt to transmit a text message but displays, quote, Would you like to send when digital service is available,

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carrier records the transaction on the other. To that extent, the expert's testimony was germane vis-a-vis FIF's theory on the point and its accompanying "dead zones" proof, sparse as it was. Accordingly, claimants' motion to strike is denied.

[7] The proposition that the text could remain unsent for "hours" under the hypothetical scenario presented by Boyell is rendered problematic via the following clarifying testimony from the same source:

> A . . . . And the phone having queued the message transmits it without user attention. It then reports the message was sent. And that is the point at which the network recognizes the message has been transmitted. Not the point at which the user manipulated the phone, but the point at which it comes back into contact with the network.
>
> Q And that could be minutes or hours, wherever it connects back to the digital network.
>
> Is that correct?
>
> A Yes, it's at least minutes. I don't know if this particular phone will hold that queue for more than many minutes because I just didn't time it, but it's a matter of minutes.

(Tr. at 573:8-21.)

end quote.

> Pressing no cancels the message. While pressing yes, holds the message ready to send. If yes, the message is transmitted when the phone next connects to the network. This requires no user input . . . .

(Tr. at 572:6-14.)

9. But tellingly absent from Vannoni's testimony is any information to the effect that he endeavored to send a text to McNicholas prior to 2:36 A.M. but that his effort was met by the inquiry: "Would you like to send the message when digital service is available." That message, according to Boyell, would have materialized quickly after contact with the send button was made and, once appearing, would last "several minutes." (Tr. at 564:3 to 565:7.) And even if, hypothetically speaking, such a phone message appeared but was unseen by Vannoni, his nonresponse presumably would result in the intended text being deleted from the cell phone's queue thereby precluding its subsequent transmission upon contact being made with a cell tower.

Understandably, Boyell was unable to offer an opinion as to the interval separating contact with the send button and receipt of the text. (Tr. at 566:3-18.) Was it a milliseconds or minutes? For it to be measured in other than milliseconds, transmission had to be attempted initially in a dead zone. But as to that critical subject, Boyell, notwithstanding his obvious expertise, was essentially silent. He made reference to articles

he read about transmission problems on Fire Island and to purported testimony by Vannoni about such problems. But, proceeding in reverse order, Vannoni did not testify before me about the subject beyond saying "[t]here are spots on Fire Island and in the Great South Bay that are known to . . . lack . . . really solid surface [sic]" (presumably should read "service"); and the article Boyell mentioned attributed Fire Island coverage problems "to Superstorm Sandy which wiped out a portion of the island." (Id. at 567:9-15.) Sandy, however, post-dated July 10, 2011.

10. Other efforts by FIF to provide the necessary predicate for its hypothesis about a delayed transmission of Vannoni's text to McNicholas were similarly unavailing. For instance, Timothy Mooney ("Mooney"), "the president and owner of Fire Island Ferries" (tr. at 656:3-4), opined that "[w]ith regard to Kismet and Saltaire, it seems we were on the outer fringe of reception with regard to cell service." (Id. at 669:15-17.) But that testimony by its very nature is insufficient to support the theory advanced by FIF.

11. It is undisputed that Vannoni used his cell phone for personal purposes during his July 9th - July 10th tour of duty. He called his "daughters," and his "girlfriend,"[8] among

[8] Vannoni was in cell phone contact with his girlfriend's telephone number eight times during his July 9th - July 10th tour. (Tr. at 496:3 to 497:5.)

others. (Tr. at 482:9-16.) Single contacts as long as five and eight minutes are listed on the Verizon records. In some instances during the early morning hours of July 10th, Vannoni acknowledges that he may have used his "cell phone while the vessel was underway." (Id. at 480:11-18.) He insisted, however, that he did not use his cell phone in the interim between leaving Saltaire and point of impact near Buoy 10. (Id. at 481:6-9.)

12. Andrew Park, previously with Verizon as its "director of Network engineering and operations" (tr. at 147:12-25), testified via prior deposition, that there were no complaints "on July 10, 2011 regarding the service in the vicinity of Fire Island." (Id. at 179:4-10.) Given the totality of the evidence including what Vannoni had to say – and did not say – on the subject, FIF's theory that he encountered transmission problems is best characterized as rank speculation.

13. In sum, Verizon's records reflect that Vannoni sent a text message at 2:36 A.M. No countervailing evidence from any source is to be found in the trial transcript demonstrating that a delay in transmission – while technically possible – actually occurred separating the time the message was composed and the send button activated and the message's receipt at 2:36 A.M. Accordingly, the Court concludes that it is more likely than not that Vannoni was in the process of texting at the

time of the collision,[9] notwithstanding his disclaimers to the contrary.

14. The question arises whether Vannoni's texting was a proximate cause of the injuries alleged by claimants. That inquiry brings to the fore FIF's contention that the MDOT — traveling without illuminated navigation lights — was nondetectable to the Courier's radar given the obscuring wake, or trail behind the vessel MDOT was following. To the extent true, the collision by Buoy 10 arguably would have occurred even if Vannoni was not texting at the virtual moment of impact.

It does not take an expert to appreciate that the dimensions of the wake caused by a moving vessel depends on multiple factors. Among those factors is the vessel's size; by way of hyperbole, a motorized canoe will generate less water displacement than a naval destroyer both traveling at the same speed. And the speed of the lead vessel is also germane. Similarly, the visual impairment, if any, attributable to a wake

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[9] Parenthetically, the above finding of fact was reached after evaluating all relevant evidence including the testimony of Courier deckhand Caroline Curtin. On direct, she testified that, while in close proximity to Vannoni, she observed him during the brief trip from Saltaire to Buoy 10 and never saw him use his cell phone. (Tr. at 606:4-18.) But on cross-examination, she answered "I don't recall" to the following question: "Is it your contention that you had Captain Vannoni under continuous observation, say [for] two minutes before the collision"? (Id. at 609:4-7.) The same answer, "I don't recall," was given to a number of related questions, so much so that her testimony viewed in toto was afforded de minimus weight. (Id. at 609:13 to 610:9.)

upon a third-party observer or a device — such as Vannoni aboard the Courier, and presumably the Courier's radar — is influenced by the distance separating the lead and the following vessel. However, the evidence in the instant case is either absent or muddled on the pivotal issues of size, speed and distance.

The only concrete evidence on the masking effect caused by the lead-vessel comes from Vannoni, but his testimony is problematic given his contemporaneous texting. Beyond that, there's little. The size of the lead vessel remains a mystery. Neither skipper nor any passengers aboard the Courier or MDOT provided an estimate. As I recall, the only one who even addressed the issue was Vourdouris who explained: "It was probably like a 21 to 25 foot boat. I really couldn't tell you. It was hundred of yards ahead of me . . . ." (Tr. at 206:1-3.)

The estimated speed of the lead vessel itself is also non-decipherable. Whether it was going 30 mph, 20 mph or 10 mph or at some other velocity is unknowable from the trial record.

On the all important issue of the distance between the lead vessel and the MDOT, conflicting evidence was adduced. Vourdouris estimated the distance at "maybe two, three football fields, something like that." (Id. at 207:11-20.) Consistent with that estimate, he testified the MDOT was never within the "prop wash," i.e. wake of the boat he was following. (Id. at 224:16-23.)

Vannoni, on the other hand, testified that he observed the lead vessel, not visually, but "as a green target with a tail" on his radar (tr. at 451:18 to 452:2), and determined that he could "safely . . . pass behind him, 20 to 40 yards." (Id. at 453:2-3.) But as he endeavored to do so, he collided with the port side of the MDOT. Although Vannoni was never asked specifically to estimate the distance between the "green target" and the Courier at the point of impact, seemingly, in his view, it was forty yards or less. The accuracy of that testimony, however, is again highly suspect due to Vannoni's texting at 2:36 A.M., as is the corresponding proposition that the MDOT was not visible on Courier's radar screen because of the wake phenomenon. It also warrants mention that deckhand Curtin, though called by FIF to testify, was never asked any questions about the nature of the wake presently under discussion. (See id. at 601:18 to 642:19 (Curtin's trial testimony in toto).)

For the foregoing reasons, the Court does not accept as convincing the proposition that the presence of the MDOT was obscured from detection by the wake of the vessel it was following. Accordingly, Vannoni's transgression was a proximate cause of claimants' damages. Had the Captain of the Courier not been texting it is likely he would have seen the MDOT either visually or on radar earlier than he did thereby lessening, if not avoiding, the resulting collision and damages.

B. Claimants Have Established That the Courier was Being Operated Without a Proper Lookout

15. Title 33 C.F.R. § 83.05, entitled "Look-out (Rule 5)," provides that "[e]very vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision." Given the relatively small size of the Courier and that its captain was positioned close to the bow with virtually unobstructed views ahead (see Pet.'s Ex. 41), his service as both the Courier's operator as well as its lookout was not inconsistent with the requirements of Rule 5.

Claimants' argument that FIF was negligent in not using deckhand Curtin as an additional lookout is unconvincing based on both a reading of the rule and the attendant circumstances. Indeed, given that Courier was only carrying two passengers "no deckhand [was even] required to be onboard." (Tr. at 781:21-25.) Perhaps, with power of hindsight, it would have been better had Curtin been tasked with the additional responsibility of serving as a second lookout but the failure of FIF to augment her assignment to include that function has not been shown to constitute negligence.

16. The problem from FIF's perspective is not that Vannoni served as the sole lookout but that he did so negligently. By texting moments before impact he failed to see

what almost certainly would have been visible to a reasonable person exercising appropriate caution had he been looking ahead, viz. the "white hull"[10] of the MDOT approaching from his starboard.[11] Such a sighting would have been likely even though, as later discussed, the MDOT was operating absent illuminated running lights. That is so, not only due to the light color of its hull, but because, as Vannoni testified, the conditions were "clear, very [c]lear, very calm." (Tr. at 433:10; see also id. at 351:11 (testimony of claimants' expert Bates: "[the vessels] collided at night in clear visibility").)

16. For the foregoing reasons, I find that Vannoni negligently performed his function as a lookout.

Attention will next be focused on FIF's allegations of negligence by Vourdouris, to be followed by a discussion of FIF's effort to limit its potential liability to the Courier's value of $200,000.

C. MDOT's Navigation Lights Were Not Illuminated at the Time of the Collision

18. Vannoni testified that MDOT's navigation lights were not illuminated at the time of the accident. (E.g. tr. at 454:7-11.) He observed, however, that immediately after the

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[10] (See Tr. at 450:23-24.)

[11] Alternatively, as just discussed in the text, MDOT would have been seen on Courier's radar had Vannoni been watching the screen instead of texting.

collision, while the MDOT was "kind of spinning around . . . they put on a spotlight." (Id. at 455:12-14.)

19. Vannoni's testimony about MDOT's running lights not being illuminated dovetails with that of Christopher Kelly ("Kelly"). Kelly, at the time of the accident, was also a water taxi captain in the employ of FIF. (Tr. at 645:9-11.) Shortly after his shift ended "around 2:00 A.M.," and while waiting on Fire Island to be transported back to the mainland on board the Prowler, he heard the "captain of the Courier transmitting a Mayday off of buoy ten." (Id. at 646:2-24.) After an approximate "three minute run," the Prowler was alongside the Courier and the MDOT. (Id. at 647:6-21.) At that time no other vessels other than the Courier and MDOT were present. (Id. at 647:22-23.) Kelly, as both a first responder and an "EMT" boarded the MDOT for the purpose of assessing the condition of its passengers. (Id. at 648:8-17.)

Kelly was employed "as a firefighter with the Town of Greenwich, Connecticut and with the Ocean Beach police as a police officer" when he testified on September 22, 2016. (Tr. at 644:2-5.) I found him to be a particularly credible witness based, in part, on his demeanor while testifying and his background; that assessment is particularly important for present purposes since he said he saw no operational navigation lights on the MDOT when he arrived at the scene which was within minutes of

the accident. (Id. at 648:3-7.)

20. Sean Carlin, ("Carlin"), the "manager of [FIF's] water taxi company" (tr. at 703:4-8), was called to the stand by petitioner. On July 10th, he heard Vannoni's radio call for assistance and responded to Buoy 10, arriving "[r]oughly 15 minutes" later. (Id. at 713:6-18.) By then, there were multiple vessels at the scene, including "a Suffolk County Police Department boat . . . as well as a United States Coast Guard boat." (Id. at 713:21 to 714:1.)

Although Carlin saw "a search light [from the MDOT] shooting straight up in the air,"[12] he "didn't see any navigation lights on." (Id. at 714:5-8.)

21. As part of claimants' case, John Mullins, a police officer with the Suffolk County Police Department's Marine Bureau, provided information about his observations upon reporting to the accident scene. He saw that "there was some damage to the port side of the [MDOT and] there was [sic] numerous people on board all complaining of injuries." (Tr. at 283:20-22.)

22. Mullins was on the stand briefly with only one question being asked of him as to MDOT's navigational lights:

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[12] Carlin's testimony about the spotlight is consistent Vannoni's recollection that right after the accident he "heard a lot of chatter about smoking and turn lights on" (tr. at 456:17-23), and a "spotlight" being activated (id. at 455:12-14).

Q. Did you observe anything about the navigation lights on the Grady-White?

A. Not that I recall.

(Tr. at 283:23-25.)

Mullins also made reference to his July 10, 2011 police report (Claimants' Ex. AA) wherein the officer reported that Vannoni told him that "vessel number 2 [i.e., the MDOT] had no lights [and that] he did not see the vessel [until] just prior to the collision." (Tr. at 289:8-10.)

23. The only evidence that the MDOT's navigation lights were on comes from claimants Vourdouris, Diaz and LaPera. They claim that such was the case when they left Ocean Beach and inferentially continued to be on until contact was made with the Courier. (Tr. at 293:11-13, 302:20-22, 335:12-16.) That contact, claimants urge, may have rendered the navigational lights inoperable. "[M]ay" is the operative word in the last sentence for nothing beyond an unsubstantiated hunch has been furnished to support that proposition. Apparently no post accident inspection was done of the MDOT – notwithstanding Vannoni's contemporaneous complaint to Mullins about the vessel's navigational lights – in an effort by claimants to confirm their theory or, if done, the results were not shared with the Court.

24. There was testimony that the point of contact between the vessels was on MDOT's port side at, or near the

location of the port navigation light. (Tr. at 283:18-22.) But whether that contact produced the result posited by claimants – including destroying the light on the other, i.e. starboard side – remains problematic.

25. Vourdouris and his co-claimant-passengers left Captree State Park on the mainland for the trip across the bay at 9:48 P.M. on July 9th. (Tr. at 779:12-13.)

GPS evidence indicates they "arrived at Ocean Beach at approximately 10:21 P.M., a trip duration of 33 minutes. [at] an average speed of just over eight miles per hour." (Id. at 780:14-19.)

The MDOT left Ocean Beach at 2:30 A.M. Among claimants' activities during that their four plus hours on Fire Island, was time spent at a "couple of bars" to the point where Diaz and LaPera both reported being "drunk" upon their return to the MDOT. (Id. at 328:19-329:3 (as to Diaz), 338:11-20 (as to LaPera).)

26. As to Vourdouris, he admitted that he had "one or two" alcoholic beverages "at most" while on Fire Island. (Tr. at 202:9-16.) But there is no evidence that he was intoxicated or otherwise physically impaired that evening. (Id. at 285:11 to 286:15 (testimony provided by Police Officer Mullins).) However, he did lack situational awareness as evidenced by, e.g., (1) his uncertainty as to whether he departed from Atlantique or Ocean

Beach for the trip back to Captree (id. at 201:1-23), (2) by electing to navigate through unfamiliar waters in the dead-of-night by following an unknown vessel operated by an unknown helmsman whose destination was also unknown at a speed in excess of twenty miles per hour, and (3) failing to see the Courier even after being advised of its presence by Diaz.

27. Vourdouris' lack of situational awareness perhaps may help to explain his failure to activate the MDOT's navigational lights upon leaving Ocean Beach which I find to have been the case. In any event, a preponderance of the credible evidence establishes that MDOT's navigational lights were not illuminated at the time of the collision.

D. The MDOT was Operated Without a Proper Lookout

28. FIF contends, and I so find, that the Courier's navigational lights were on as it approached Buoy 10. Indeed claimants do not suggest otherwise.

29. Even though, as earlier noted, there was "clear visibility" on July 10th in the vicinity of Buoy 10, Vourdouris, who presumably was the lookout, failed to see the Courier approaching from his left. This was so even though Diaz warned Vourdouris several times over a period of up to ten seconds of the other vessel's presence prior to impact. Yet Vourdouris, after looking to his left and inexplicably not seeing the Courier, simply continued on course.

30. Simply put, Vourdouris' failure to see the properly illuminated Courier under the condition then prevailing, or to heed the relayed observations of Diaz, compels the conclusion that he conducted his function as lookout in a negligent fashion.

E. Petitioner is not Entitled to Exoneration nor has it Established That Vannoni's Negligence was Beyond its Privity or Knowledge

31. As earlier explained, claimants have established that the negligence of the Courier's Captain was a proximate cause of the July 10, 2011 collision and the alleged resulting injuries. Accordingly, FIF is not entitled to exoneration. Such being the case, attention will now be turned to the alternative form of relief sought by FIF, viz. to limit its liability to the $200,000 stipulated value of the vessel. For that cap to be put in place, FIF must prove that any damages or injuries caused to any one or more of the claimants occurred "without [its] privity or knowledge." 46 U.S.C. § 30505(b). The meaning of that statutory term is well synopsized in the following excerpt from In re Complaint of Messina:

> The phrase "privity or knowledge" is a term of art meaning complicity in the fault that caused the accident. Privity and knowledge under the statute have been construed to mean that a shipowner knew or should have known that a certain condition existed. In this case of individual owners, it has been commonly held or declared that privity as used in the statue means some personal participation of the owner in the fault or

> negligence which caused or contributed to the loss or injury . . . . Instead of being vicariously liable for the full extent of any injuries caused by the negligence of the captain or crew employed to operate the ship, the owner's liability is limited unless the owner himself had privity or knowledge of the negligent acts.

574 F.3d 119, 126 (2d Cir. 2009)(internal citations, quotation marks and emphases omitted.)

32. FIF endeavors to demonstrate its lack of privity and knowledge by noting that it has now, and had in July 2011, a general policy, well promulgated, albeit oral in nature, sufficiently broad to preclude texting in situations such as the present scenario. That policy, as explained by Carlin, the general manager of FIF's water taxi company, is that "if [a cell phone is] used, it would comply with the safe navigation of the vessel." (Tr. 716:17 to 717:1; see also id. at 433:16 to 434:1 (Vannoni's understanding of the policy as being basically to avoid all "unnecessary distractions while operating the vessel").) President Mooney amplified on that succinct description in responding as follows to a query from the company's counsel as to whether FIF had a cell phone policy:

> No, we don't. It's a tool within the wheelhouse, a tool that the captain has at his disposal. And we allowed the captains to make that decision on when there is appropriate time to use any device within his purview. We just treat it as another electronic device within the wheelhouse.

(Id. at 666:17-22.)

Is this oral omnibus policy without specific reference to cell phones, no less texting, sufficient to insulate FIF from potential liability beyond the value of the Courier? In arguing that it is, FIF underscores the absence of a statute or Coast Guard regulation prohibiting texting while commercially transporting passengers by boat. The absence of restricting regulations and statutes, however, can not, ipso facto, be dispositive of the issue for history tells us that there is often a significant time lag between development of new technologies and the enactment of measures to address associated dangers. For example, cell phone texting was commonplace for several years before New York State outlawed the practice in 2009 for motor vehicle operators. See N.Y. Veh. & Traffic Law, ¶ 1225-d.[13]

Admittedly the risk posed by using a cell phone while operating a motor vehicle on a roadway may differ from the danger created via similar conduct committed by the operator of a vessel. Motor vehicles, inter alia, often travel at higher rates of speed in closer proximity to multiple neighboring vehicles, on the one hand, but do so typically along clearer marked lanes of with adequate nighttime lighting. In addition, motorists are the

[13] It is not that the subject of cell phone usage has escaped the concern of mariners. Indeed Mooney acknowledged receipt of an advisory from the Coast Guard "about the danger of cell phone use by a vessel underway" (tr. at 678:20-21), and the subject of distracted operation has been "big issue" in boating circles since "before 2011" (id. at 678:1-3).

beneficiaries of effective braking systems in their vehicles unlike their boating counterparts. Whether texting at night while operating a car or a boat hold more potential danger may be debatable and presumably depends on the surrounding circumstances. But here it is undisputed that if the captain was texting at 2:36 A.M. as claimants have alleged that such conduct was negligent.

33. Petitioner has not shown that its oral omnibus no distraction policy was an adequate response to the cell phone problem, particularly its texting component. The proposition proffered by Mooney that a cell phone, is just another "tool" in the "wheelhouse," like "radar . . . GPS or the radio . . . ," and thus appropriately subject to the same oral policy, falls short of being convincing. (Tr. at 662:17-25.) It is roughly akin to the State of New York passing a statute requiring motorist to keep their "eyes on the road," and contending that such a broad-based admonition was an adequate legislative response to the driving while texting malady plaguing our communities.

34. Moreover, Petitioner's inferentially equating such potentially distracting events as viewing radar screens and other navigational aids while underway, on the one hand, with texting on the other, ignores the fact that texting, unlike the other activities, may or may not be geared to assist a captain in safely transport passengers. In fact, texting on personal

matters are, by the very nature, antithetical to that goal given the accompanying danger with no corresponding navigational benefit.

35. As far as the nature of the 2:36 A.M. text, Vannoni does not recall its content (tr. at 479:11-12), nor does its recipient (id. at 1034:25 to 1035:2). Petitioner is not in a position to fill that void because, notwithstanding the contemporaneous police and Coast Guard investigations, Vannoni was never asked by Petitioner to try and retrieve or otherwise uncover the substance of the text. (Id. at 734:8-9, 479:16-18.) That being said, no suggestion has been made that the text was other than personal in nature.

36. As noted supra, a shipowner will be unable to establish lack of knowledge "if it knew, or should have known that a certain condition existed," here, captains texting on personal matters while navigating FIF vessels.

Petitioner, which again bears the proof, did not present any evidence even suggesting that it was somehow unaware that its captains were engaging in the dangerous practice of using their cell phones for personal reasons while underway; to the contrary, what evidence there is on the subject indicates that FIF knew of the practice[14] and took no specific steps to address the associated dangers. That makes the company complicit

[14] (See, e.g., Tr. at 1032:17 to 1033:6.)

in the wrongdoing.

37. In sum, Petitioner's reliance on their "one size fits all" distracted operation policy is found to be insufficient to insulate FIF from potential liability in excess of the Courier's value.

Part V – Conclusion of Law

1. Petitioner is not entitled to exoneration for the injuries said to be sustained by claimants as a result of the July 10, 2011 collision because a proximate cause of the accident was Vannoni's negligently texting immediately prior to impact.

2. Vourdouris was also negligent in operating the MDOT without its navigational lights being illuminated and by not heeding the warnings provided by claimant Diaz of the approaching Courier near Buoy 10. Even though the MDOT was the stand-on vessel, had Vourdouris had a proper lookout or acted reasonably in response to Diaz's repeated warnings presumably he could have avoided or, at the very least, lessened the severity of the impact. His failure to do either, along with his operating MDOT sans navigational lights, constituted negligence.

3. Given that both helmsmen were negligent, the question arises as to their respective percentages of fault. John Hegedorn ("Hegedorn"), a maritime expert and claimants' first witness at trial opined that both were at fault (tr. at 89:21-22), with the primary blame resting with Vannoni (id. at

90:23-25). The Court agrees with the first part of that assessment but finds — based on the findings of fact provided earlier – that Vannoni and Vourdouris were equally at fault.

4. As explained supra, Petitioner has failed to establish that it lacked privity or knowledge and thus is not entitled to cap its potential liability to the value of the Courier.

Reported case law on the use of cell phones for personal reasons in situations similar to the one at bar vis-a-vis the issue of privity or knowledge — is virtually non-existent. The only decision cited by counsel or uncovered by the Court's research is Holzhauer, a district court case from another circuit which is presently pending appeal. However, I found its rationale and holding helpful. The following excerpt evidences some of similarities between the issues in Holzhauer and those before me:

> The Court finds that the District has failed to meet its burden of demonstrating a lack of privity or knowledge. The District had no policy regarding the use of personal cell phones by its captains. The District also knew that its captains carried personal cell phones while operating the District's ferries, and permitted their use. In this case, Captain Shonk, while operating the ferry SAN FRANCISCO, was actually using his cell phone immediately preceding the collision to speak with shoreside personnel. Therefore, the District cannot claim that its own lack of training or policy regarding the foreseeable use of a cell phone was beyond its privity or knowledge. This is

> particularly true where, as here, the District had actual knowledge of the practice that led to the collision. Accordingly, the Court finds that the District failed to meet its burden of demonstrating a lack of privity or knowledge.

2016 WL 7242108, at *3 (transcript citations omitted).

CONCLUSION

For the foregoing reasons, FIF's petition for exoneration or, in the alternative to limit is liability, is denied.

SO ORDERED.

Dated: February 5, 2018
Central Islip, New York

_____
DENIS R. HURLEY, U.S.D.J.

IV. Sample Cell Phone Policies

Sample 1 - Preventing Distraction

1 Summary and Responsibility

The purpose of this procedure is to eliminate conditions in which distractions might occur in order to prevent injury or accident.

Responsibility for compliance with this procedure rests with: the tug captain and all other personnel onboard.

2 Procedure

2.1 General

Distractions can affect the safe work practices of all personnel onboard a vessel by interrupting their concentration. A distraction can keep personnel from seeing or recognizing a potential hazard.

It is each individual crew member's responsibility to remove the possibility of distraction. It is ultimately the responsibility of the Captain to assure that each crew member is following this policy.

Work related distractions: Examples of work related distractions can include radios, TV, phone calls, interaction with other crew members, work which may produce loud noises (needle gunning, grinding), etc.

Non-work related distractions: Examples of non-work related distractions can include family matters, feeling ill, fatigue, games, socializing with other crew members or a secondary conversation going on within your vicinity, and keeping up with the outside world (news, social media sites, etc.).

2.2 Managing Distraction

Personnel should be aware of and manage distraction at all times.

Examples of ways to manage distractions can include letting your fellow crew members be aware of when you need to take a break, informing someone that they are distracting you or asking someone else to answer the phone for you.

While managing distractions, it is important to take micro-breaks from current tasks, in order to maintain concentration. Stretching, taking water breaks, or a walk around can help clear your mind to re-focus on the tasks at hand. Breaking the work into short periods helps enable micro-breaks.

It is understood that the use of cell phones, computers and radios is part of the work environment, but at times, must be ignored in order to complete a job safely. All personnel shall use their best judgment to determine if it is prudent to engage in such work-related communications and should stop any such work before placing or accepting a call or otherwise using a phone. If appropriate, stop what you are doing or ask someone else to manage the task while you address communications or other tasks that cannot be postponed. If acceptance of a call is unavoidable and stopping work is not an option, keep the call short, refrain from discussions of complicated or emotional topics, and stay focused on work. Under no circumstances are you allowed to place yourself or others at risk by using such communications to fulfill business needs.

2.2.1 Speak Up!

If you have something weighing on your mind or you aren't feeling well, or you perceive another crewmember exhibiting distracted behaviors that may compromise safety, speak-up, ask for relief, or ask if the person is okay to continue working. Offer an alternative, a break or even to talk about whatever might be on their mind.

2.2.2 Shore side Initiated Distraction

When attempting to contact tugs, shore side personnel, including dispatchers, should be aware that the person they are attempting to contact may be engaged in operations that are not conducive to interruptions. In particular, dispatchers should avoid calling tug operators while they are engaged in a job.

2.3 Personal Electronic Device Use

General: While on-duty and underway or getting underway, the use of cell phones, for personal calls, and electronic personal entertainment devices (PED), iPods, mobile games, computers etc., is prohibited. While ashore and off-duty at any Company property including shipyards, the use of such devices should be curtailed in places where there is a safety concern such as in vehicle traffic areas. This also applies to customer terminals and other third-party locations where use may create safety concerns and or violate terminal regulations. This includes electronic personal communications of any type, examples include but not limited to: Cell phone calls, texting, instant messaging (IM), Facebook postings, Skype etc.

Off-duty: While the use of PED's is permitted when off-duty where it will not distract those that are on-duty, it is important to remember that such distractions can impede rest that is critical to safe performance.

When going on-duty: Crewmembers are required to stow their personal electronic devices prior to going on-duty while underway or getting underway. An exception to this rule applies to the tug operator, who in the absence of a working company cell phone, may use their personal cell phone as an alternate means to conduct Company business.

Where work is taking place: Crewmembers that are off-duty are strictly prohibited from using personal cell phones in locations where they will introduce a distraction to ongoing work such as:

- In the pilothouse
- On deck while the vessel is engaged in fueling operations, alongside an oil barge, or while crewmembers on-watch are conducting drills, or other operational activities
- On the deck of any barge (not including a port's mooring barge)
- In the galley and mess area during meals, meetings or drills

Audio earphones/ear buds: While on duty or underway, personnel shall not listen to music from ear buds or earphones or any other type of sound isolating device.

Sample 2 – Portable Electronic Devices

1. Purpose

1.1 The use of portable electronic devices aboard vessels can be a distraction that poses safety hazards to both the vessel and the personnel aboard. This document sets forth the company policy for the possession and use of portable electronic devices aboard vessels to prevent such safety hazards.

1.2 This policy covers, but is not necessarily limited to the possession and use of the following devices:
• Cell phones • iPods • Blackberry devices • iPhones • Computers • iPads • Android tablets • Netbooks • Portable radios • CD and cassette players • Televisions • DVD players

2. Responsibility

2.1 The Captain is responsible for the implementation and enforcement of this policy.

3. Procedures

3.1 **General**. The ever-increasing number and types of portable electronic devices available provide users with myriad personal benefits to enhance shipboard living. Additionally, devices with communications capabilities expand the communications options available in emergencies. Regardless of personal or business related purpose, the inappropriate or unauthorized s use of such devices can cause distractions which compromise the safety of the vessel and those aboard.

3.2 **Conditions for Possession and Use**. Mindful of the benefits, as well as the safety hazards posed by portable electronic devices, the company permits individuals to bring such devices aboard its vessels, subject to these conditions:

3.2.1 Individual device owners/users must unquestionably comply with the usage rules forth in this document, with the understanding that failure to do so may result in disciplinary action, up to and including dismissal.

3.2.2 The company bears no responsibility for the loss or damage of any personal portable electronic device brought aboard.

3.3 **On Watch Use**. The following rules apply to the use of portable electronic devices by personnel on watch and are to be enforced by the Officer in Charge of the Navigation Watch (i.e., Captain or Mate).

3.3.1 Portable electronic devices shall not be used for personal purposes by anyone standing watch.

3.3.2 The Officer in Charge of the Navigation Watch may direct or authorize other personnel of the navigation or engineering watch to use portable electronic devices for specific business purposes such as:

- Relaying dispatch, vessel scheduling or crew orders;
- On-site communications with customers;
- Passing orders and information between the wheelhouse and lookouts; and,
- Passing orders and information between the wheelhouse and engine room.

3.3.3 When authorizing or directing the use of portable electronic devices, the Officer in Charge of the Navigation Watch must take into account the following critical operations and vessel maneuvers which may cause such use to be ill-advised.

- Docking or undocking;
- Meeting, crossing or overtaking other vessels;
- Entering or leaving port;
- Approaching and transiting bridges;
- Navigating in restricted waters such as canals and locks;
- Line handling;
- Making up to or disengaging from barges under tow;
- Oil transfers;
- Training. drills and exercises;
- Changing watch; and,
- When transporting or transferring cargoes that require the use of intrinsically safe devices.

3.4 **Off Watch Use**. Personnel not on watch may use portable electronic devices for business or personal purposes:

3.4.1 Within their own staterooms;

3.4.2 On deck when use is specifically requested and authorized by the Officer in Charge of the Navigation Watch;

3.4.3 Within common spaces in accordance with the provisions in paragraph 3.5; and,

3.4.4 Never within the wheelhouse, engine room or any other space or area occupied by those on watch.

3.5 **Other Safety Considerations**. In addition to the various restrictions for the use of portable electronic devices previously covered, there are other safety rules that must be followed.

3.5.1 Headphones. Many portable electronic devices require or have the option of using headphones (or ear buds). While helping to ensure that others in the vicinity will not be disturbed, headphones can also have the effect of isolating the wearer from his/her environment, an undesirable situation for personnel aboard a vessel. The following rules for the use of headphones must be followed to preclude this impairment to safety.

- Headphones may only be used while in a stateroom or the galley.
- Headphones must be fitted and adjusted to ensure that their use does not preclude the wearer's ability to hear the General Alarm and vessel public address system (if installed).

3.5.2 AC Adapters and Chargers. Most portable electronic devices are battery powered and require recharging. Most also have the option of using AC adapters. These rules must be followed to prevent AC adapters and battery chargers from compromising vessel and personnel safety.

- To preclude the possibility of electrical faults and fire, AC adapters and battery chargers must be connected directly to shipboard AC receptacles. The use of any type of receptacle adapter is prohibited.
- AC adapter and battery charger cables must be arranged so that they are clearly visible and do not cause tripping and/or access hazards for personnel.

3.5.3 Rest and Relaxation. Crew rest and relaxation are essential to ensure that individuals are alert and prepared to perform their duties or to respond in an emergency. The use of any portable electronic device by one person shall never infringe upon the ability of others to rest and relax without distraction or annoyance.

3.6 **Master's Authority**. The Captain is ultimately responsible vessel and personnel safety; therefore, may impose restrictions on the use of portable electronic devices in addition to those enumerated in this document.

Sample 3 – Bridge Procedures – Navigational Watch Duties – Deck Officers

SAFE NAVIGATION STANDARDS

. . .

While on watch, cell phone and internet use for non-operational purposes including texting, personal communications, or social media is prohibited. Watch personnel must not carry personal cell phones while on duty. During the Master/Pilot Exchange, the Master must inform pilots of the need to keep cell phone usage to a minimum, and only for operational necessity. Operational related calls must be kept to an absolute minimum. At no time may the aforementioned be allowed to interfere with the exercise of primary watchkeeping, navigation, and radio communications duties.[2]

….

2. Washington ECOPRO, Standard 1, 2008

Sample 4 – Incorporation of Cell Phone Policy into Other Rules

Bunkering Manual
Bunker Pre-Loading Plan
Pre-Transfer Conference/Declaration of Inspection

It is the responsibility of the PIC to ensure that a Pre-Transfer Conference takes place onboard either the receiving or delivering vessel or facility, in person between the PICs, before the bunkering operations begin.

. . .

A Declaration of Inspection Prior to Bulk Cargo Transfer shall be completed by the PIC and the bunker supplier's representative, which shall ensure, at a minimum, the following are addressed:

. . .

- Sufficient warning signs are displayed indicating transfer of bulk liquid, no smoking, no naked lights, and no mobile/cell phone use.

Cargo Ops. Manual
Responsibilities for the Safe Conduct of Cargo Operations
Officer of the Watch - Cargo Operations

The Officer of the Watch is responsible to the Master for the overall safety of the ship and shall comply with all Standing Orders.

In addition to tasks concerned with the cargo operations other responsibilities include:

. . .

While on watch, cell phone and internet use for non-operational purposes, including texting, personal communications, or social media is prohibited. Operational calls shall be kept to an absolute minimum.

Quality/Safety Procedures Manual
Administrative Procedures Driving Safety

Company Driver Requirements:

. . .

F. Drivers do not use a mobile phone or other two-way communication device while operating the vehicle except for answering operational urgent calls with the use of wireless hands free devices.

Element F: Drivers must not use hand-held mobile phones or two-way radio while operating the vehicle.

Intent: Use of cell phones without hands-free devices is prohibited. All Company shore-based employees will be provided with hands-free devices. Use of wireless hands-free technology is allowable to answer operational urgent calls only. If after answering the call, it is determined the caller can wait, the call should be terminated, the car pulled off the road and safely parked, and the call then returned. Another alternative is to arrange to take the call at a later time when not driving.

Scope: Applies to all Company employees in the conduct of Company business.

Requirements: Whenever a Company employee operates a vehicle in the conduct of Company business s/he must not use hand held mobile phones, or other two-way communication device, while a vehicle is in operation except for answering operational urgent calls with the use of wireless hands-free technology as described above.

Adherence

- A mobile phone/two-way communication device rule is in place.
- The above rule is included in induction, job orientations, and driver training programs.

. . .

Operational Urgent	A call from an emergency response organization, the Company emergency number, a person who works for an emergency response organization who is likely to be calling with information on an emergency, a call from a security company such as xxx or an xxx call, or a call from a duty phone while on duty.
Two-way Communication Device	Any device used for electronic communication between two or more persons, this includes Mobile phones (cell & satellite), personal digital assistants, two-way radios, & text messaging devices.

Element F: Hand-held Mobile Phones and Other Two-Way Communication Devices:

Questions	Answers
It says that a hand held mobile phone must not be used when a vehicle is in operation. Does this mean I have to turn that phone off?	This simple answer is no, the phone does not have to be turned off. However, one means of meeting the requirement is to have an "engine-on, phone-off" policy.
Can I operate a hand-held mobile phone, if I am outside my vehicle & the engine is running?	Yes, provided you are in an environment where the operation of a mobile phone outside of a running vehicle does not cause an additional hazard.
What is included within the definition of a two-way communication device?	See definition. (Two-way Communication Device)

What is "operational urgent" for mobile phone use?	See definition. (Operational Urgent)
Can I use a hand-held mobile phone while riding as a passenger in a vehicle?	Yes.
Can I use a hand-held mobile phone while parked at the side of the road?	Yes, if you are legally parked.
Can I use a hand-held mobile phone while stopped at a stop sign or traffic light?	No. The vehicle is deemed to be in operation & not legally parked.
If I use my personal hand-held mobile phone, while driving on non-Company business & I receive a company call, how should I handle this?	The Program only applies to the workforce while on Company Business; however, we strongly encourage following the Program in your personal life. We recommend that you do not talk on any mobile phone while driving. Tell the incoming caller that you are driving & will call back after you are in a safe location.
If I have a company hand-held phone & am driving on non-Company business, can I use the hand-held phone for personal calls?	The Program applies only when driving on Company business. We recommend that you do not talk on a hand-held mobile phone while driving.
If I have a company hand-held phone & am driving on non-Company business, can I use the hand-held phone for company calls?	If you receive a company call at any time while driving, the Program rules should be applied.
If I have a company vehicle, can I use a hand-held mobile phone while driving on non-business?	The Program applies only when driving on Company business; however, we strongly discourage this practice. We recommend that you do not talk on any mobile phone while driving.

V. Presentation PowerPoint

MLA Inland Waters and
Towing Committee Meeting

Cell Phone Use, Liability, and Cell Phone Policies for Marine Operators

May 2, 2018

VENTKER HENDERSON PLLC

Presenters:

XL CATLIN

Andrew H. Bumstead, Large Loss Specialist – Marine Claims, XL Catlin

VENTKER HENDERSON PLLC

Jeanne E. Noonan, Associate, Ventker Henderson

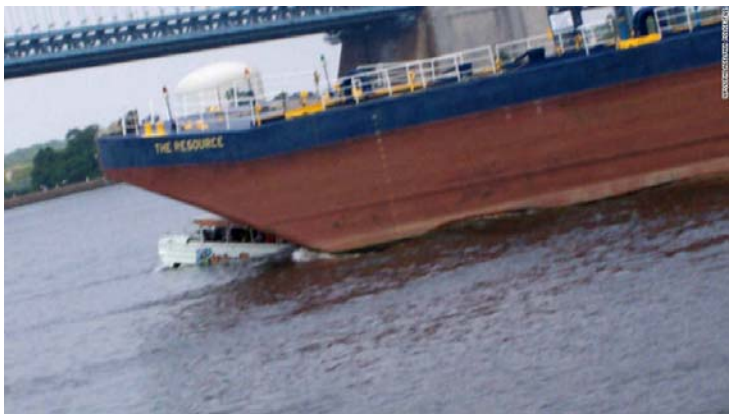
moran

Industry Perspective: Kurt C. Odell, Litigation Counsel, Moran Towing Corporation

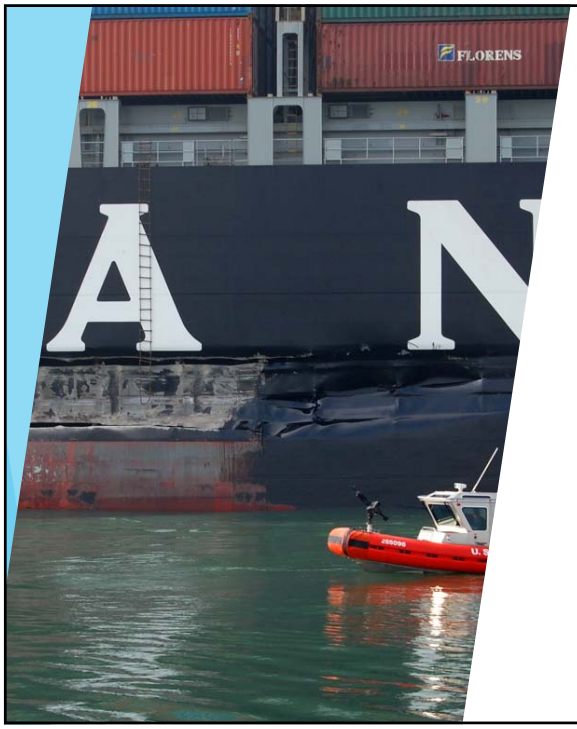
Cell Phone Usage in the Marine Industry

We know it happens . . .

We know it causes tragedies:



Despite increased awareness, accidents continue. . .



Investigations Into Cell Phone Use

After a Serious Marine Incident – NTSB Investigation

Collision Between U.S. Coast Guard Vessel *CG 33118* and Sea Ray Recreational Vessel CF 2607 PZ, San Diego Bay, California, December 20, 2009

"*CG 33118* crewmembers used their personal cell phones for voice calls and text messaging while under way, distracting them from effectively performing their duties as lookouts."

After the Duckboat Accident – NTSB Investigation

Collision of Tugboat/Barge *Caribbean Sea*/*The Resource* with Amphibious Passenger Vehicle *DUKW 34,* Philadelphia, Pennsylvania, July 7, 2010

- "The mate of the *Caribbean Sea* failed to maintain an appropriate lookout, including monitoring the radios, while navigating the vessel because he was distracted by personal use of his cell phone and the company laptop computer in dealing with a serious family medical emergency."
- "The mate of the *Caribbean Sea* should have been aware of his employer's prohibition of personal use of cell phones and company-provided computers while on watch, but on the day of the accident, he did not follow the policy."

After Any Marine Casualty Coast Guard Investigation

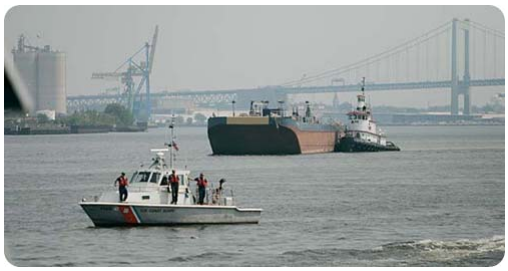
- Whenever a 2692 is filed, the Coast Guard will ask for or subpoena cell phone records.
- Coast Guard is on the look out for, and suspicious of, cell phone usage.
- Unsurprisingly, cell phone usage is a potential causal factor in the casualty.
- We always receive requests for cell phone numbers and providers after an incident.

Rules and Regulations

No Rules or Regulations Specific to Cell Phones… but there is Coast Guard Guidance:

- "The potential risk associated with improper use of cellular telephones and other devices in the marine environment while navigating or performing other vessel functions should be apparent to vessel owners and operators."
- "Consequently, the Coast Guard **strongly recommends** vessel owners and operators to develop and implement effective operational policies outlining when the use of cellular telephones and other devices is appropriate or prohibited."

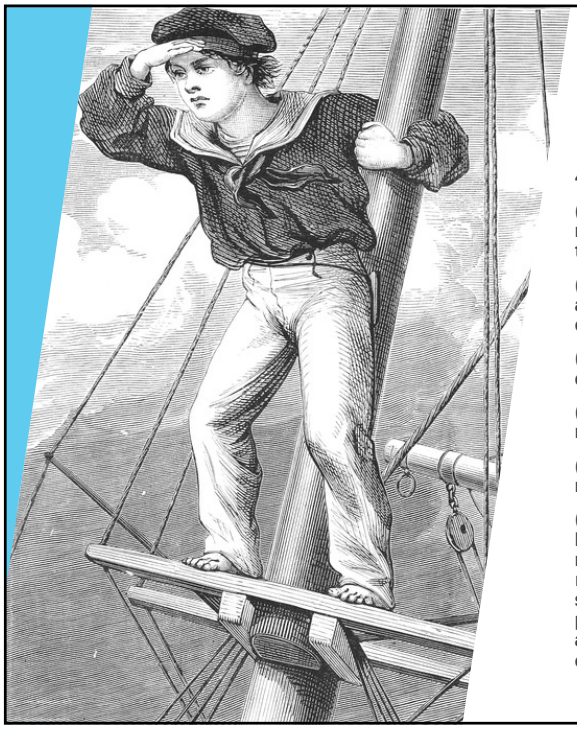
U.S.C.G. Marine Safety Advisory, Advisory 01-10



KEEP A PROPER LOOKOUT!

33 C.F.R. § 83.05 (Navigation Rules - Rule 5)

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.



Subchapter M – Additional Lookout Guidance

46 C.F.R. § 140.630 – Lookout

(a). . . A lookout in addition to the master or mate (pilot) should be added when necessary to:

(1) Maintain a state of vigilance with regard to any significant change in the operational environment;

(2) Assess the situation and the risk of collision/allision;

(3) Anticipate stranding and other dangers to navigation; and

(4) Detect any other potential hazards to safe navigation.

(b) In determining the requirement for a lookout, the officer in charge of the navigational watch must take full account of relevant factors including, but not limited to: state of weather, visibility, traffic density, proximity of dangers to navigation, and the attention necessary when navigating in areas of increased vessel traffic.

Cell Phone Policy Rulemaking

- "We received two comments suggesting the development of a policy to restrict the use of cell phones and other non-essential electronic devices by pilothouse watchstanders."
- The response was: The Coast Guard has added language in § 140.210(d) requiring the crew to **minimize distractions** when performing duties. This amendment is intended to prevent the non-essential use of cell phones and other distractions that take away from a crewmember's situational awareness. Given the commenters' focus on pilothouse watchstanders, we have amended § 140.640 to expressly require the officer in charge of a navigational watch to maintain situational awareness and minimize distractions.

81 FR 40041 (June 20, 2016).

MINIMIZE DISTRACTIONS!

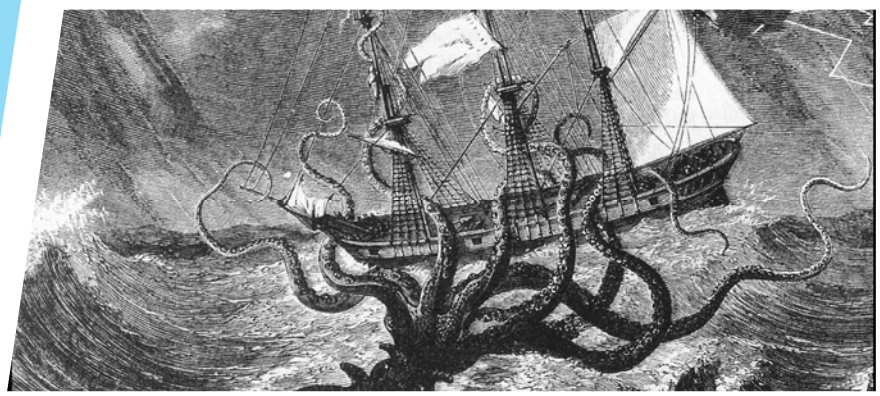
46 C.F.R. § 140.210(d) – Responsibilities of the Crew:

(5) Minimize any distraction from the operation of the vessel or performance of duty

46 C.F.R § 140.640 – Pilothouse resource management

(a) The officer in charge of a navigational watch must:

(5) Maintain situational awareness and minimize distractions.



Time for some hypotheticals!

Hypothetical 1:

- Captain of vessel is notified of a part failure while underway during the early morning hours.
- He scans the horizon and sees no obstructions.
- Captain turns on the wheelhouse lights to inspect the part, and begins to make cell phone calls to shore to have a replacement part air dropped to the vessel.
- While on the phone, the vessel runs into an oil platform.
- Can the vessel owner limit its liability?

Omega Protein v. Samson Contour Energy E&P LLC, 548 F.3d 361, 2009 AMC 245 (5th Cir. 2008)

This case involved the early morning allision of the F/V GULF SHORE with a fixed oil platform in the Gulf of Mexico. The fishing vessel had been underway for several hours when a component of the vessel's refrigeration unit failed. The captain, after scanning the horizon for obstructions, turned on the wheelhouse lights to examine the part, and he then used his cell phone to call his employer to locate a replacement part. While on the phone, the vessel struck the oil platform. The captain, who had been accident free for approximately twenty years, had not been trained to use the radar on the vessel. Also, the vessel owner had no policy that would require the captain to turn on the anti-collision alarm. In addition, there was (disputed) testimony from other Omega employees that the lighting system on the oil rig was unlit.

Omega Protein v. Samson Contour Energy E&P LLC, 548 F.3d 361, 2009 AMC 245 (5th Cir. 2008)

The Fifth Circuit affirmed the district court, which had allowed Omega to limit liability and apportioned fault equally between Omega and Samson. Interestingly, on appeal it does not appear Samson argued the captain should not have been on his cell phone. The district court found the captain failed to maintain a proper lookout, but the real focus was the failure to use the navigational aids rather than any distraction from a cell phone. Indeed, the real issue appears to have been the use of the wheelhouse lights and the "mirror effect" which prevented the captain from seeing out of the windows or viewing the radar.

Hypothetical 2:

- A ferry and a speedboat collide in a busy harbor. Both sides claim they did not see the other vessel. The captain was on his cell phone at the time speaking to shoreside personnel.
- At the time of the collision, captain was changing speed, changing course, and was in a crowded waterway.
- Vessel owner had no cell phone policy, and knew captains carried personal cell phones.
- The jury found the ferry 30% at fault.
- Can the vessel owner limit liability?

Holzhauer v. Golden Gate Bridge Highway & Transp. Dist., Case No. 13-cv-02862-JST, 2017 AMC 125 (N.D. Cal. Dec. 15, 2016)

In 2013, the ferry SAN FRANCISCO collided with a speedboat on the San Francisco Bay, seriously injuring the speedboat's owner, who was a passenger at the time, and killing the driver of the speedboat. Both sides claimed they did not see the other vessel, but the captain of the ferry was on his cell phone immediately before the collision.

A jury trial ensued, with the jury returning a verdict in favor of the widow of the speedboat driver and the injured speedboat owner, and apportioning fault by finding the ferry owner thirty percent liable and the speedboat driver seventy percent liable.

Holzhauer v. Golden Gate Bridge Highway & Transp. Dist., Case No. 13-cv-02862-JST, 2017 AMC 125 (N.D. Cal. Dec. 15, 2016)

In response to the issue of whether the ferry owner could limit liability, the California district court began by discussing Judge Kozinski's criticism of the Limitation Act.

The court was heavily persuaded by expert testimony, including the testimony of Captain Mitchell Stoller, that a cell phone should not be used while serving on the bridge or as a lookout.

The court then concluded the ferry owner failed to prove a lack of privity or knowledge of the cell phone usage. In particular, **the ferry owner had *no* cell phone policy**, and the ferry owner had actual knowledge of the cell phone usage as the captain had been using his cell phone to speak with shoreside personnel immediately before the collision. Accordingly, the ferry owner could not limit its liability.

Hypothetical 3:

- A vessel and a recreational boat collide at 2:30 a.m. The evidence shows the rec boat operator was drinking and did not have navigational lights. The evidence also shows the vessel's captain was texting at almost the same time as the collision.
- The vessel owner had a cell phone policy – which allowed cell phone usage *if* it "would comply with the safe navigation of the vessel."
- Can the vessel owner limit liability?

In re: Fire Island Ferries, Inc., Case No. 11-CV-3475 (DRH)(ARL), 2018 U.S. Dist. LEXIS 18599 (E.D.N.Y. Feb. 5, 2018)

- Thus far, this is the only decision after *Holzhauer*, and it cites to that decision frequently.
- The underlying action involved a collision just north of Fire Island, New York between a recreational boater and a commercial water taxi.
- The owner of the water taxi argued the recreational boat was solely at fault because the boat's navigation lights were not on at the time of the collision, and the boat's operator was following an unknown vessel in an effort to reach the state channel and failed to see the water taxi.
- In turn, the recreational boat owner argued, in part, that the water taxi was at fault as the captain was sending texts at about the same time of the collision.
- In the alternative, the water taxi owner argued it could limit liability because it lacked privity and knowledge as to the captain's cell phone use.

In re: Fire Island Ferries, Inc., Case No. 11-CV-3475 (DRH)(ARL), 2018 U.S. Dist. LEXIS 18599 (E.D.N.Y. Feb. 5, 2018)

The district court noted the evidence that the recreational boat lacked navigational lights, that its operator had been drinking, and that the operator did not know where he was going. Ultimately, the court apportioned fault equally between the two vessels.

What is interesting here is the court's analysis of whether the water taxi owner was entitled to limitation. The water taxi owner made an interesting argument regarding its cell phone policy – which allowed the captain to use a cell phone if it "would comply with the safe navigation of the vessel." The water taxi owner explained they viewed cell phones as they would any other electronic device in the wheelhouse (i.e., a cell phone was no more distracting than a radar screen or other navigational aid).

However, the court was unpersuaded by the argument that a cell phone was simply another tool to be used by a captain. Indeed, the court discussed the danger of using cell phones and the New York state law banning cell phone use by motor vehicle operators before concluding the owner could not limit liability and its "one size fits all distracted operation policy" was insufficient to shield the vessel owner from liability.

Sample Cell Phone Policy Language

Cell Phone Policies – Words Matter

Sample – Personal Electronic Device Use

General: While on-duty and underway or getting underway, the use of cell phones, for personal calls, and electronic personal entertainment devices (PED), iPods, mobile games, computers etc., is prohibited. While ashore and off-duty at any Company property including shipyards, the use of such devices should be curtailed in places where there is a safety concern such as in vehicle traffic areas. This also applies to customer terminals and other third-party locations where use may create safety concerns and or violate terminal regulations. This includes electronic personal communications of any type, examples include but not limited to: Cell phone calls, texting, instant messaging (IM), Facebook postings, Skype etc.

Off-duty: While the use of PED's is permitted when off-duty where it will not distract those that are on-duty, it is important to remember that such distractions can impede rest that is critical to safe performance.

When going on-duty: Crewmembers are required to stow their personal electronic devices prior to going on-duty while underway or getting underway. An exception to this rule applies to the tug operator, who in the absence of a working company cell phone, may use their personal cell phone as an alternate means to conduct Company business.

Where work is taking place: Crewmembers that are off-duty are strictly prohibited from using personal cell phones in locations where they will introduce a distraction to ongoing work such as:

- In the pilothouse
- On deck while the vessel is engaged in fueling operations, alongside an oil barge, or while crewmembers on-watch are conducting drills, or other operational activities
- On the deck of any barge (not including a port's mooring barge)
- In the galley and mess area during meals, meetings or drills

Audio earphones/ear buds: While on duty or underway, personnel shall not listen to music from ear buds or earphones or any other type of sound isolating device.

Sample – Portable Electronic Device Use – On Watch

On Watch Use. The following rules apply to the use of portable electronic devices by personnel on watch and are to be enforced by the Officer in Charge of the Navigation Watch (i.e., Captain or Mate).

- Portable electronic devices shall not be used for personal purposes by anyone standing watch.
- The Officer in Charge of the Navigation Watch may direct or authorize other personnel of the navigation or engineering watch to use portable electronic devices for specific business purposes such as:
  - Relaying dispatch, vessel scheduling or crew orders;
  - On-site communications with customers;
  - Passing orders and information between the wheelhouse and lookouts; and,
  - Passing orders and information between the wheelhouse and engine room.
- When authorizing or directing the use of portable electronic devices, the Officer in Charge of the Navigation Watch must take into account the following critical operations and vessel maneuvers which may cause such use to be ill-advised.
  - Docking or undocking;
  - Meeting, crossing or overtaking other vessels;
  - Entering or leaving port;
  - Approaching and transiting bridges;
  - Navigating in restricted waters such as canals and locks;
  - Line handling;
  - Making up to or disengaging from barges under tow;
  - Oil transfers;
  - Training, drills and exercises;
  - Changing watch; and,
  - When transporting or transferring cargoes that require the use of intrinsically safe devices.

Sample – Portable Electronic Device Use – Off Watch

Off Watch Use. Personnel not on watch may use portable electronic devices for business or personal purposes:

- Within their own staterooms;
- On deck when use is specifically requested and authorized by the Officer in Charge of the Navigation Watch;
- Within common spaces in accordance with the provisions in paragraph 3.5; and,
- Never within the wheelhouse, engine room or any other space or area occupied by those on watch.

Sample – Navigational Watch Duties

While on watch, cell phone and internet use for non-operational purposes including texting, personal communications, or social media is prohibited. Watch personnel must not carry personal cell phones while on duty. During the Master/Pilot Exchange, the Master must inform pilots of the need to keep cell phone usage to a minimum, and only for operational necessity. Operational related calls must be kept to an absolute minimum. At no time may the aforementioned be allowed to interfere with the exercise of primary watchkeeping, navigation, and radio communications duties.

Sample – Minimize Personal and Electronic Distractions

Speak Up! If you have something weighing on your mind or you aren't feeling well, or you perceive another crewmember exhibiting distracted behaviors that may compromise safety, speak-up, ask for relief, or ask if the person is okay to continue working. Offer an alternative, a break or even to talk about whatever might be on their mind.

Rest and Relaxation. Crew rest and relaxation are essential to ensure that individuals are alert and prepared to perform their duties or to respond in an emergency. The use of any portable electronic device by one person shall never infringe upon the ability of others to rest and relax without distraction or annoyance.

Sample – Incorporation with Other Rules

- Cargo Loading:

In addition to tasks concerned with the cargo operations other responsibilities include:

> While on watch, cell phone and internet use for non-operational purposes, including texting, personal communications, or social media is prohibited. Operational calls shall be kept to an absolute minimum.

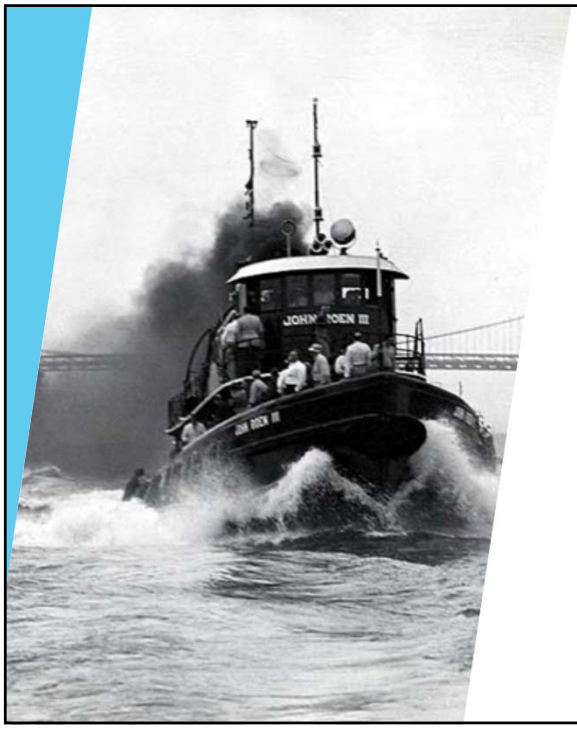
- Bunkering Pre-Transfer Conference:

A Declaration of Inspection Prior to Bulk Cargo Transfer shall be completed by the PIC and the bunker supplier's representative, which shall ensure, at a minimum, the following are addressed:

> Sufficient warning signs are displayed indicating transfer of bulk liquid, no smoking, no naked lights, and no mobile/cell phone use.

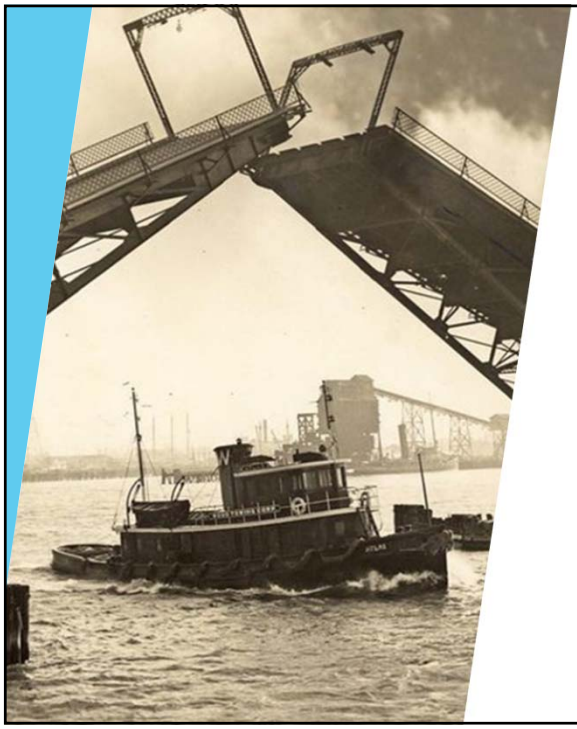
- Company Driver Requirements:

Drivers do not use a mobile phone or other two-way communication device while operating the vehicle except for answering operational urgent calls with the use of wireless hands free devices.



Takeaways – The Cell Phone Policy

- No policy is no good!
- An overly vague policy will not be sufficient (i.e., "minimize distractions" is not enough).
- Realistically, you cannot bar all cell phone usage.
- Any policy must be enforceable and enforced.
- Guidance to operators should include distinctions in types of cell phone use (personal v. work, on-duty v. off-duty).



Takeaways – Compliance

Questions to ask after an incident:

- How was policy enforced?
- Knowledge of cell phone usage?

How do tug operators ensure compliance?

What are insurers looking for in terms of the cell phone policy?

Discussion and Questions