



National Transportation Safety Board

Washington, DC 20594

Safety Recommendation

Date: August 26, 2011

In reply refer to: M-11-5

Mr. Chris Herschend
President
Ride The Ducks International, LLC
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The National Transportation Safety Board (NTSB) is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The NTSB is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation is derived from the NTSB's investigation of the July 7, 2010, collision of the tugboat/barge combination *Caribbean Sea/The Resource* with Ride The Ducks' amphibious passenger vehicle (APV) *DUKW 34*. The recommendation addresses the safety management program within Ride The Ducks International, LLC (Ride The Ducks), and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the NTSB has issued seven safety recommendations, one of which is addressed to Ride The Ducks. Information supporting this recommendation is discussed below. The NTSB would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

Background

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 APV *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.¹

¹ For more information, see *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: National Transportation Safety Board, 2011), available on the NTSB website at <http://www.nts.gov/doclib/reports/2011/MAR1102.pdf>.

The NTSB determined 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.

***DUKW 34* Maintenance and Inspections**

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.

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 accident tour. The deckhand did not inform the master of the high engine coolant temperature. During a test run that investigators conducted in Branson, Missouri, of an APV similar to *DUKW 34*, 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 concluded 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 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 concluded 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.

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 concluded 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, “immediately 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. (According to Coast Guard regulations and company policy, the manager-on-duty should also have notified the Coast Guard, but she did not do so.) 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 concluded 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 the deckhand sent was about 1 minute before he jumped into the water, just before the collision.

Talking on a cell phone has proven to be a distraction that can have serious consequences in safety-critical situations. Using a cell phone or other wireless device to send or read text messages is potentially even more distracting in that it requires attention to the display screen of the device. 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 concluded 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.

Ride The Ducks Safety Management

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 a safety management system (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 a 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 concluded 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.

Therefore, the National Transportation Safety Board makes the following safety recommendation 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)

The NTSB also issued four safety recommendations to the U.S. Coast Guard, one safety recommendation to K-Sea Transportation Partners L.P., and one safety recommendation to The American Waterways Operators.

In response to the recommendation in this letter, please refer to Safety Recommendation M-11-5. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox. To avoid confusion, please use only one method of

submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation.

[Original Signed]

By: Deborah A.P. Hersman
Chairman