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Testimony of the Honorable Mark R. Rosekind, Ph.D.
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National Transportation Safety Board
Before the
Subcommittee on Coast Guard and Maritime Transportation
Committee on Transportation and Infrastructure
U.S. House of Representatives
Hearing on
Coast Guard and Maritime Transportation Authorization Issues
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Good morning Chairman Hunter, Ranking Member Garamendi, and Members of the Subcommittee.

Thank you for the invitation to appear before you today to discuss important maritime transportation safety issues resulting from numerous investigations conducted by the National Transportation Safety Board (NTSB).

NTSB-USCG Cooperation

The USCG and NTSB work closely together to evaluate those accidents that meet the threshold of a major marine casualty, as set forth in joint NTSB-USCG regulations. Upon a determination that the NTSB will lead an investigation of a major marine casualty, it will establish the facts, circumstances, and probable cause of the event, consistent with its statutory mandate. Even where a determination is made that the USCG will lead an investigation, the NTSB frequently provides investigative support to the USCG, such as providing voyage data recorder information retrieval and materials properties analysis. The NTSB investigates all major marine casualties that occur each year – typically 30-35 per year.

Recent NTSB-USCG Activities

In June 2013 the Chairman of the NTSB hosted the Commandant of the Coast Guard for the annual Chairman–Commandant meeting. Several topics were discussed at this meeting including the ongoing good cooperation and constructive relationship between the agencies as well as the synergy in our investigative expertise and collaboration. Particularly noted in the meeting were concerns related to safety aspects of DUKW amphibious passenger tour vehicles and large passenger vessel safety. These discussions resulted in agreement that the USCG would lead efforts to improve amphibious passenger vehicle safety with NTSB support and the NTSB would lead a passenger vessel safety forum in partnership with the USCG with a focus on large foreign passenger vessels calling US ports.

Large foreign flagged passenger vessels have been increasingly in the spotlight since the grounding and capsizing of the *Costa Concordia* in January 2011. Since then there have been several accidents, including fires on board vessels resulting in the loss of power or significant damage to the vessel. Many of these accidents happened in close proximity to the US coast and affected thousands of US citizens sailing onboard. While some assume that the NTSB is investigating these incidents, under current regulations, investigations of these events involving foreign flagged vessels, occurring in international waters, although close to the US, are not led by the NTSB, but are conducted by the USCG, which is also the oversight agency for these operations.

The US Coast Guard is the official representative to the International Maritime Organization (IMO) and as such represents this country on maritime regulatory matters internationally. One important aspect of the IMO's work is to ensure maritime casualties are thoroughly investigated and that those countries directly involved or designated as "substantially interested states" to an accident consistent with the IMO Casualty Code work collaboratively to guarantee the most thorough, unbiased investigation. Many countries such as the UK, Sweden, Japan, Australia, Canada, Denmark, Finland and Ireland, among others also have their maritime regulatory agency as the primary representative to IMO. The independent safety agency in these countries, however, acts as the official representative when it comes to casualty investigations and representing the country as a substantially interested state. This distinction is important as it meets the intent of the IMO Code on Casualty Investigations in terms of an independent and unbiased investigative process that is not intended to apportion blame or determine liability but rather to understand the circumstances leading to the accident in order to determine measures to prevent recurrence and improve safety. Although the NTSB is the independent accident investigator, unlike the countries listed above, it does not serve as the official representative to IMO on casualty investigations.

Through cooperation and agreement provided by the memorandum of understanding (MOU) between the USCG and NTSB, both agencies have worked closely to review and provide feedback to accident reports from other countries where the US is a substantially interested state. The NTSB's Office of Marine Safety provides expert support from licensed, experienced merchant mariners and professional investigators on staff.

Out-of-Water Survival Craft and Small Passenger Vessel Safety

Throughout its history, the NTSB has investigated hundreds of marine accidents, identified a broad array of safety risks, and issued over 2400 recommendations to the USCG and other entities to improve marine safety. A longstanding issue of considerable interest to the NTSB is the importance of out-of-water survival craft, particularly for passengers and crewmembers on small passenger vessels.

NTSB Investigations and Recommendations Concerning Lifesaving Equipment

The NTSB first addressed this issue in determining the probable cause and making recommendations concerning the sinking of the *M/V Comet* off Point Judith, Rhode Island on May 19, 1973. Of the 25 fishing party passengers and 2 crewmembers, only 11 were rescued.

The NTSB determined the loss of life following the vessel's sinking, among other things, was due to "the lack of adequate equipment to protect the victims from prolonged exposure to cold water."¹

The NTSB also stated its concurrence with the recommendation of the USCG Marine Board convened to investigate the vessel's sinking to require "all primary lifesaving devices to keep persons out of the water when the prevailing water temperature is expected to be 60° F or less."² In responding to this Marine Board recommendation, the Commandant acknowledged, "should one of these small passenger vessels sink in an area where the sea water temperature is sufficiently cold, present equipment would offer little chance of survival." The Commandant also stated, "[t]he need for such equipment as an anticipatory measure will be given further consideration."³

In July 1986, the NTSB issued Safety Recommendation M-86-61 to the USCG to:

Require that all passenger vessels except for ferries on river routes on short runs of 30 minutes or less have primary lifesaving equipment that prevents immersion in the water for all passengers and crew.⁴

In its safety recommendation letter to the USCG, the NTSB again reiterated its concerns with the use of immersible lifesaving equipment on small passenger vessels:

The Safety Board is concerned about the use of buoyant apparatus and lifefloats aboard small passenger vessels in lieu of liferafts. Since neither buoyant apparatus nor lifefloats keep survivors from immersion in the water, potential hypothermal effects can result. Use of such buoyant apparatus or lifefloats is permitted between May 15 and October 15, north of the 33rd parallel on the U.S. east coast. However, National Oceanic and Atmospheric Administration (NOAA) data show that water temperatures can be quite low (below 50°) even during summer months along the east coast. In fact, the USCG requires most vessels that operate in waters where temperatures drop below 60° to carry exposure suits for all crewmembers in recognition of the potential for hypothermia.⁵

The NTSB's most recent recommendation on this topic is from our investigation of the *Queen of the West* engine room fire that occurred on the Columbia River in Oregon on April 8, 2008, and was issued to the USCG in 2009.

¹ Marine Casualty Report—*Foundering of the Motor Vessel COMET off Point Judith, Rhode Island, on May 19, 1973, with Loss of Life* (USCG/NTSB-MAR-75-4), at p. 8.

² *Id.*

³ *Id.*, at p. 12.

⁴ NTSB Safety Recommendation Letter to USCG Commandant, July 24, 1986, at p. 13.

⁵ *Id.*, at p. 9.

Require that out-of-water survival craft for all passengers and crew be provided on board small passenger vessels on all routes. (M-09-17)⁶

The *Queen of the West* was a passenger vessel with 177 persons onboard when fire broke out. The fire was detected and contained by the suppression systems and crew actions. However, had the fire grown to the extent that required the captain to order the evacuation of the vessel, 124 passengers, who were mostly senior citizens, and 53 crewmembers would have abandoned ship with only one six-person rescue boat available. Had the vessel fire spread more quickly, the passengers and crew would have evacuated into 44°F water wearing only lifejackets for flotation. The nearest assistance was about 2 hours away and the effects of hypothermia would have quickly set in, putting the passengers and crew at a high risk for injury and death.⁷

More recently, the need to implement the out-of-water survival craft requirement was justified again in the NTSB's investigation of the September 8, 2011, *Trinity II* liftboat accident in the Bay of Campeche, Gulf of Mexico.⁸ The crew was partially submerged in the warm water of the Gulf of Mexico after abandoning their ship in a storm. The length of their immersion slowly lowered the crew's body temperatures, and four died as a result of hypothermia, drowning or complications from prolonged exposure. Had the crew been able to remain out of the water all of them likely would have survived.

Legislation Related to Survival Craft

Following the *Queen of the West* engine room fire and the NTSB's investigation, Congress included a provision in the Coast Guard Authorization Act of 2010,⁹ prohibiting the USCG from approving a survival craft as a safety device unless the craft ensures that "no part of an individual is immersed in water." The provision further prohibited the USCG from approving a survival craft that does not meet the new standard subsequent to January 15, 2015. Section 303 of the Coast Guard and Maritime Transportation Act of 2012,¹⁰ directed the USCG to submit a Congressional report on a number of specific areas enumerated in the 2010 Act and delayed the January 15, 2015, implementation date for the out-of-water survival craft requirement. The 2012 Act specified the new implementation date as "the date that is 30 months after the date on which the [USCG] report ... is submitted." The USCG submitted its report, *Survival Craft Safety*, in August 2013; therefore, moving the implementation date to February 2016. Out-of-water survival craft can save lives and we urge Congress not to repeal or delay the requirement further.

⁶ NTSB Safety Recommendation Letter to USCG Commandant, July 24, 2009, at p. 4.

⁷ *Engineroom Fire on Board U.S. Small Passenger Vessel Queen of the West, Columbia River, Near Rufus, Oregon, April 8, 2008*, Marine Accident Report NTSB/MAR-09/04/SUM (Washington, DC: National Transportation Safety Board, 2009).

⁸ *Personnel Abandonment of Weather-Damaged US Liftboat Trinity II with Loss of Life, Bay of Campeche, Gulf of Mexico, September 8, 2011*, Marine Accident Report NTSB/MAR-13/01 (Washington, DC: National Transportation Safety Board, 2013).

⁹ Pub. L. 111-281, § 609, 124 Stat. 2905, 2968, October 15, 2010, *codified at* 46 U.S.C. § 3104.

¹⁰ Pub. L. 112-213, 126 Stat. 1540, 1563, December 20, 2012, amending 46 U.S.C. § 3104.

Hours of Service (HOS)

The NTSB supports a systematic approach to fatigue management that includes three fundamental elements: education; medical oversight, including diagnosis and treatment of sleep disorders; and proper scheduling and hours of service rules. In our investigation of the *Eagle Otome* accident,¹¹ we recommended that pilot oversight organizations implement fatigue mitigation and prevention programs that: (1) regularly inform mariners of the hazards of fatigue and effective strategies to prevent it; (2) promulgate HOS rules that prevent fatigue resulting from extended hours of service, insufficient rest within a 24-hour period, and disruption of circadian rhythms; and (3) HOS rules that ensure that mariners' work schedules do not cause fatigue. The USCG's voluntary crew endurance management system (CEMS) educates operators about the causes and effects of fatigue and ways to mitigate it. Similarly, the Coast Guard's revision of its medical oversight system provides critical oversight of the diagnosis and treatment of sleep disorders.¹²

In 2011, the USCG published a notice of proposed rulemaking (NPRM) regarding towing vessel safety.¹³ Although the USCG indicated it was not making any specific proposal at that time, it sought additional data, information and public comment on potential requirements for hours of service or crew endurance management for mariners aboard towing vessels. The USCG also pointed out that such rules should ensure that mariners could obtain a minimum of eight hours of uninterrupted sleep and prevent circadian rhythm disruptions from interfering with mariners' ability to maintain the regularity of a sleep-wake schedule needed for recuperative rest.¹⁴ The USCG cited the results of its application of the Fatigue Avoidance Scheduling Tool (FAST) to various watchkeeping schedules to examine their effects on circadian rhythms and uninterrupted sleep periods.¹⁵

Although recent literature on the application of biomathematical models to work settings has demonstrated shortcomings in such an approach,¹⁶ we agree with the USCG's conclusion that the 6-hours-on, 6-hours-off watch schedule widely used by inland waterway operators does not provide the uninterrupted sleep time or circadian rhythm regularity that mariners need to obtain sufficient recuperative sleep. Research cited in the NPRM clearly shows that a 4-hours-

¹¹ *Collision of Tankship Eagle Otome with Cargo Vessel Gull Arrow and Subsequent Collision with the Dixie Vengeance Tow, Sabine-Neches Canal, Port Arthur, Texas, January 23, 2010*, Marine Accident Report NTSB/MAR-11/04, (Washington, DC: National Transportation Safety Board, 2011).

¹² A more complete discussion of the NTSB's review of the Coast Guard's response to NTSB recommendations pertaining to medical oversight can be found in the *Eagle Otome* report, Id.

¹³ 76 *Fed. Reg.* 49976, August 11, 2011.

¹⁴ Id., at 49992.

¹⁵ Id., at 49996.

¹⁶ D. Dawson and others, "Modeling Fatigue and the Use of Fatigue Models in Work Settings," *Accident Analysis and Prevention*, vol. 43 (2011), pp. 549–564.

on, 8-hours-off watch schedule is better at reducing the effects of fatigue on mariner performance than a 6-hours-on, 6-hours-off watch schedule.¹⁷

The complex waterways on which towing vessels operate (near shallow water, often near obstructions such as major rail and highway bridge abutments, and near vessels carrying passengers or hazardous materials) require operators to continuously maintain the highest levels of alertness. Anything that reduces a mariner's cognitive performance—whether insufficient sleep, medication use, medical condition, extended duty, or disrupted circadian rhythms—can lead to potentially catastrophic accidents. Accordingly, the NTSB fully supports the establishment of effective science-based HOS rules for towing vessel operators, and we urge the Coast Guard to promulgate the necessary regulations at the earliest possible time. Such regulations, when implemented, should be consistent with NTSB Safety Recommendation M-99-1, which asked the Coast Guard to:

Establish within 2 years scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements.¹⁸

Proposed USCG HOS regulations should provide for at least eight hours of uninterrupted sleep, prevent extended periods of duty, and ensure that mariners' circadian rhythms are not disrupted. Recent rules promulgated by the Federal Aviation Administration, the Federal Motor Carrier Safety Administration, and the Federal Railroad Administration demonstrate that Federal transportation regulators can issue science-based HOS rules that would mitigate the effects of fatigue and help prevent fatigue-inducing work schedules.

Other NTSB Activities Related to Vessel Safety

At the same time the NTSB released the *Trinity II* accident report, the agency issued a Safety Alert entitled, *Mariners: Improve Your Chances of Survival When Abandoning Ship*. A copy of this *Safety Alert* is attached to this written hearing statement. The *Safety Alert* describes several problems leading up to the ten crewmembers abandonment of the water-damaged liftboat in near-hurricane-force conditions that negatively impacted their probability of survival once they were in the water. The crew's inflatable liferafts were blown away after crewmembers attempted to inflate them on deck rather than in the water, as they should have been. When they abandoned the liftboat, they were forced to cling to a lifefloat that did not offer out-of-water flotation. The *Safety Alert* also stresses the need for mariners to develop and execute a thorough weather preparedness plan; conduct realistic emergency drills that include the proper use of lifesaving equipment; and a step-by-step assessment of all such equipment, especially liferafts, that cannot actually be deployed during drills.

¹⁷ M. Harma and others, "Effects of 6/6 and 4/8 Watch Systems on Sleepiness Among Bridge Officers," *Chronobiology International*, vol. 25 (2008), pp. 413–423.

¹⁸ NTSB Safety Recommendation Letter to USCG Commandant, June 1, 1999.

Closing

I appreciate the opportunity to appear before you today to discuss maritime safety and I am prepared to answer your questions.



NTSB ***SAFETY ALERT***

National Transportation Safety Board

★ **Mariners: Improve Your Chances of Survival When Abandoning Ship** ★

Good preparation and proper use of safety equipment is key

The problem

The NTSB recently investigated an accident that required the crew to abandon a weather-damaged liftboat in near-hurricane-force conditions.¹ Several problems leading up to and during the vessel abandonment negatively impacted the 10 crewmembers' probability of survival once they were in the water, and four of them died as a result:

- The company hurricane plan did not account for rapidly and locally developing low pressure weather systems. This reduced the crewmembers' ability to properly plan for the developing storm and to make an early decision to leave the vessel through routine means before the onset of the storm.
- The vessel had recently been equipped with two new inflatable throw-over-type liferafts. However, the liferafts were inflated on deck instead of in the water when the crew prepared to abandon the vessel. This led to the liferafts blowing away from the vessel and vanishing in the high winds and seas. The crewmembers ended up clinging to a lifefloat, which, unlike the liferafts, did not provide out-of-water flotation, shelter from the elements, and nonperishable food and drinking water.
- Although the crewmembers had gathered additional food, drinking water, and other supplies while preparing to evacuate, they failed to take these with them.
- The vessel was equipped with an emergency position indicating radio beacon (EPIRB), which if activated would have quickly alerted authorities and narrowed the search area. However, the crewmembers did not take the EPIRB with them

¹ *Personnel Abandonment of Weather-Damaged US Liftboat Trinity II, with Loss of Life, Bay of Campeche, Gulf of Mexico, September 8, 2011.* The report is available at www.nts.gov, under report number NTSB/MAR-13/01.

when they abandoned the vessel. As a result, they spent 3 days in the water before search and rescue assets were able to locate them.

What can mariners do?

- **Develop and execute a thorough weather preparedness plan.** Ensure that your plan takes into account surface low pressure systems, nontropical storms, and other weather systems that may form rapidly and locally. (For example, not all hurricanes approach from the east.)
- **Ensure you know how to use safety equipment.** Don't wait until a real emergency to find out whether you know how to properly use lifesaving equipment. Instead, include in your regular weekly or monthly drills a thorough step-by-step assessment of all such equipment, especially liferafts, which can't actually be deployed during drills.
- **Plan before evacuating.** Before an emergency, ensure you know your assigned duties and responsibilities—such as who's bringing what supplies—and ensure the responsible person is aware of the location of those items.
- **Drill as if it is a real emergency.** Conducting realistic drills gets the attention of crewmembers, builds their confidence and proficiency in emergency response procedures, and reinforces a strong safety culture. Review drill performance with crew to identify areas for improvement.
- **Even in coastal waters, plan for the worst.** Despite being close to shore and/or in a normally high-traffic waterway, don't assume that others will be able to come to your immediate aid, especially if your location changes. Be physically and mentally prepared for the possibility of a prolonged exposure situation.
- **Follow your plan.** In emergency situations involving high stress and exhaustion, ensure all aspects are covered by running through step-by-step emergency procedures in accordance with established checklists. Use shoreside support resources to assist you with this.
- **Don't forget the EPIRB.** The EPIRB is a vital piece of equipment that can significantly shorten the time necessary to locate and rescue you. Take it with you! In addition, carry a personal locator beacon (PLB); it is an inexpensive and effective device.
- **Stay together in the water.** Search and rescue personnel will more easily spot a group of people in the water than dispersed swimmers.