



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



Fatigue in Marine Investigations

By Kathy Fox, TSB Chair

At the SCQFVS Conference 2019

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Canada

About the TSB

- Our **mandate** is to advance transportation safety in the marine, air, pipeline and rail modes by:
 - conducting **independent investigations**
 - identifying **safety deficiencies, contributing** and **risk factors**
 - making **recommendations** to address systemic issues
- The TSB is not a regulator.
- It is not the function of the Board to assign fault or determine civil or criminal liability.



Fatigue in investigations

- Was it present?
- Did it have an impact on performance?



How do we assess for the presence of fatigue?

We look at **six key risk factors**:

- Acute sleep disruption
- Chronic sleep disruption
- Continuous wakefulness
- Circadian rhythm effects
- Sleep disorders
- Medical and psychological conditions, illnesses, and drugs



Grounding and sinking, tug *Nathan E. Stewart*



Marine Investigation Report M16P0378



M16P0378: Findings

- The second mate fell asleep and did not make a planned course alteration.
- The navigational alarms were not used and a bridge navigational watch alarm system was not available.
- If a 6-on, 6-off shift schedule is used without fatigue-mitigating measures, there is a risk that crew members will be impaired by fatigue while on duty.
- If there is no requirement for crews to receive fatigue-related training, there is a continued risk that fatigue will not be identified, prevented, or mitigated.



Recommendations

- "... the Department of Transport require that watchkeepers whose work and rest periods are regulated by the Marine Personnel Regulations receive practical **fatigue education and awareness training** in order to help identify and prevent the risks of fatigue."

M18-01

- "...the Department of Transport require vessel owners whose watchkeepers' work and rest periods are regulated by the Marine Personnel Regulations to **implement a comprehensive fatigue management plan tailored specifically for their operation**, to reduce the risk of fatigue."

M18-02



Bottom contact, tug *Ocean Monarch*



Marine Investigation Report M17P0244



M17P0244: Findings

- The watchkeeper, who was alone on watch in the wheelhouse at night, fell asleep.
- It is likely that the acute fatigue, chronic sleep disruptions, circadian rhythm desynchronization, and nighttime working risk factors ... combined with the low and monotonous workload ... resulted in the mate falling asleep.
- There were no strategies in place to mitigate crew fatigue.
- Given the tug's 24/7 operations, a crew complement of 3 made it challenging and, at times, impossible to have 2 watchkeepers at night while also ensuring the crew was sufficiently rested.



M17P0244: Deficiencies in fatigue management

- The company had not provided the master and crew with fatigue-awareness training.
- The master had no guidance or tools to assist him in managing hours of work and rest.
- The company had no formal method to report fatigue.
- The crew's ability to recognize fatigue in themselves and others was limited.
- Crew may be less likely to report feeling tired in an environment in which some or most of their co-workers are also likely to be fatigued.
- **The company therefore had no system in place to manage fatigue.**



Fishing while fatigued

- *Safety Issues Investigation into Fishing Safety in Canada* (M09Z0001)
- The role of fatigue as an unsafe condition in the fishing community is generally not recognized and has not been well-documented.
- Fatigue-related outcomes of fisheries resource management measures are not identified or managed.
- There are no effective ways for fishermen to share and evaluate strategies for managing the risks of fatigue.
- TC training curricula that relate to small fishing vessels do not address fatigue management.
- There is a lack of training material and workshops that address fatigue management.
- There is limited guidance on practical, proven work practices for managing fatigue during fishing operations.



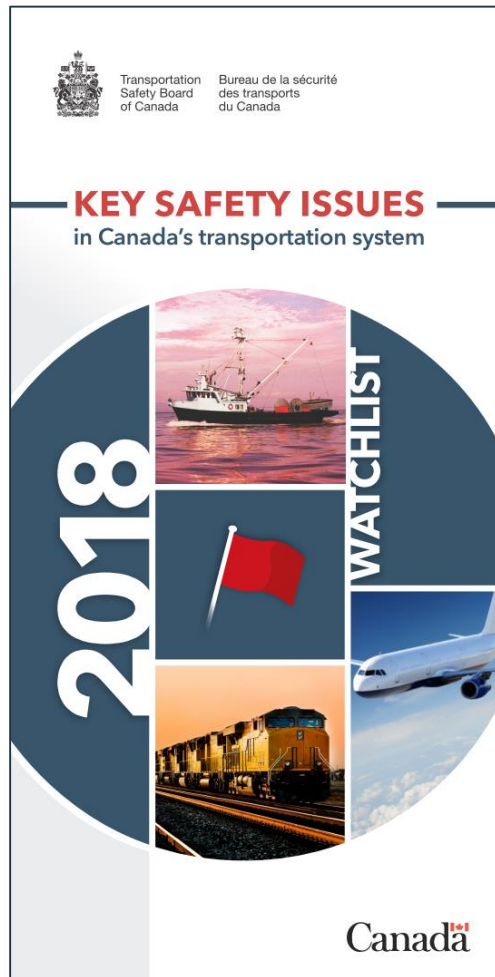
Capsizing and loss of life, Salmon Beach, N.-B.

- It was likely that the deckhand's ability to make a reasoned decision on the safe operation of the winch was adversely affected by fatigue caused by his work/rest schedule.
- The safety of fishermen will be compromised until the complex relationship and interdependency among safety issues are recognized and addressed by the fishing community.



Marine Investigation Report M16A0140

Watchlist 2018



Fatigue management

Safety management and oversight

Slow progress addressing TSB recommendations

Commercial fishing safety

Following railway signal indications

Runway overruns

Risk of collisions on runways



Fatigue management

Crews often work long and irregular schedules, sometimes crossing multiple time zones or in challenging conditions that are not always conducive to proper restorative sleep. Fatigue poses a risk to the safety of operations because of its potential to degrade several aspects of human performance.

Actions required

- TC must ensure watchkeepers receive practical fatigue education and awareness training.
- TC must update the hours of work and rest provisions in the *Marine Personnel Regulations*.

Vessel owners must be required to:

- Implement fatigue management plans;
- Provide support to mariners in reporting, managing and mitigating fatigue.



Slow progress on TSB recommendations

Actions taken to fix some long-standing, high-risk safety deficiencies have been too few and too slow.

Actions required

- TC must address recommendations that would bring Canada in line with international standards.
- TC must take action to reduce the remaining outstanding recommendations for which the regulator has indicated its agreement.
- Change agents must provide information to assess residual risk so that old recommendations can be closed.
- The government must review and improve interdepartmental processes for expedited implementation of safety recommendations.



Commercial fishing safety

Safety deficiencies onboard fishing vessels continue to put lives at risk. Various initiatives have sparked the development of a safety culture within the industry, but progress has been slow, sporadic, and localized.

Actions required

- Government authorities must coordinate regulatory oversight of commercial fisheries to eliminate any gaps.
- Transport Canada must publish and promote user-friendly guidelines on vessel stability.
- Fish harvesters must become familiar with the new stability guidelines and the 2017 Fishing Vessel Safety Regulations.
- There must be behavioural changes in the use of flotation devices, immersion suits, emergency signaling devices, and safe work practices.

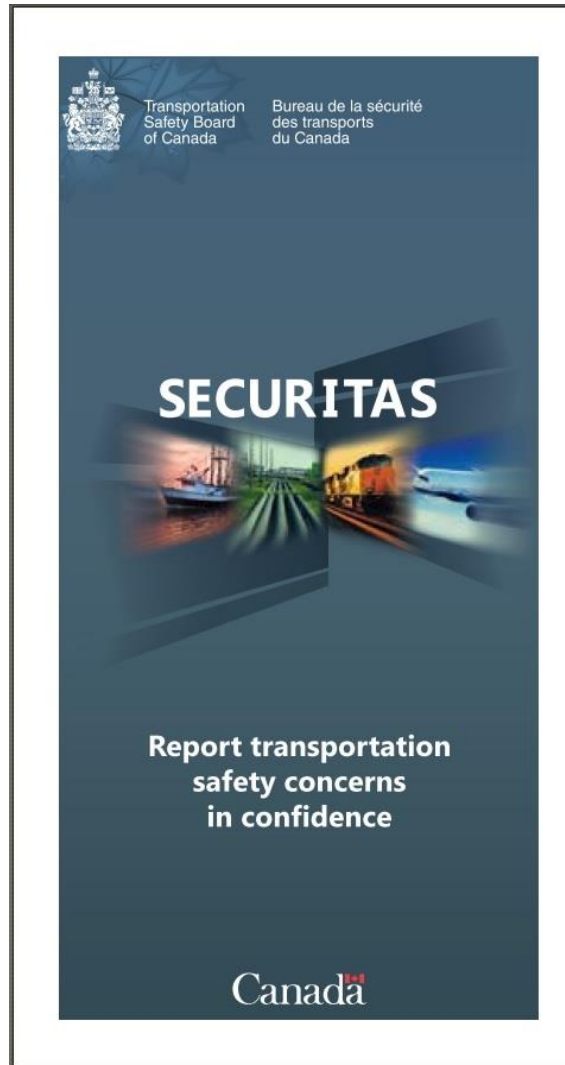


To operate safely...

- Fish harvesters should receive fatigue education and awareness training.
- Employers/operators need a fatigue-management plan specific to the individual risks within their operations.



To report safety concerns in confidence...



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