FATIGUE MANAGEMENT

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

The situation

Fatigue is pervasive in modern societies that rely heavily on 24/7 industries like transportation. A Statistics Canada study released in 2017[1] revealed that about a third of Canadian adults slept less than the recommended 7 to 9 hours per night.[2] Short sleep duration and poor sleep quality were also reported as relatively common.

Fatigue can impact human performance in ways that can lead to accidents. This is why the Transportation Safety Board of Canada (TSB) routinely investigates if fatigue was present in an occurrence, if it played a role, and if the operator had practices in place to manage the associated risks effectively.[3]

Transport Canada (TC), also aware that fatigue is an issue requiring attention, held an international multi-modal forum in June 2018, focusing on measures that can reinforce transportation safety through better recognition and management of fatigue.[4]

Number of occurrences in Canada

Since the early 1990s, the TSB has identified sleep-related fatigue as a contributing factor or a risk in at least 91 occurrences—34 in aviation, 28 in marine, and 29 in the rail sector.[5] A safety issue investigation conducted in 2012 highlighted the risks that fatigue poses in the fishing industry.[6]

The issue of fatigue management in freight train operations has been on the Watchlist since 2016 and was expanded in 2018 to include air and marine operations. There have been 2 additional reports with fatigue-related findings published since the 2018 Watchlist.[7]

To date, actions proposed or initiated by TC and the industries to address the risk of fatigue have not yet been fully implemented.

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1 J-P. Chaput, S. L. Wong, and I. Michaud, "Duration and quality of sleep among Canadians aged 18 to 79," at https://www150.statcan.gc.ca/n1/pub/82-003-x/2017009/article/54857-eng.htm

2 M. Hirshkowitz, K. Whiton, S. M. Albert et al. "National Sleep Foundation's updated sleep duration recommendations: Final report," *Sleep Health*, Issue 1 (2015): pp. 233–43.

3 Transportation Safety Board of Canada (TSB), Backgrounder – Fatigue in the transportation industry.

4 The program and presentations from the Fatigue in Transportation Forum 2018 can be found at https://aqtr.com/association/evenements/forum-fatigue-transports fatigue-transportationforum/programmation

5 TSB backgrounder, Fatigue-Related Findings, 1990–2018.

6 TSB Marine Investigation Report M09Z0001, *Safety Issues Investigation into Fishing Vessel Safety in Canada* (2012), at http://www.bst-tsb.gc.ca/eng/rapports-reports/marine/etudes-studies/m09z0001/m09z0001.html.

7 TSB transportation safety investigation reports R19D0123 and M17P0244.

The risks to people, property, and the environment

Despite the existence of work/rest provisions, work scheduling continues to be a challenge for employers and employees in all three transportation sectors. If regulations and procedures do not take into account all factors that can contribute to fatigue, there is a risk that employers will not mitigate those factors, leaving employees vulnerable to fatigue.

For example, if marine operators are not required to implement fatigue management plans, there is a risk that crews will work while fatigued, increasing the likelihood of operational errors. And if marine crews are not trained in fatigue awareness, there is a risk that they will be unable to prevent, or identify and mitigate, the risks or symptoms associated with fatigue.

Ultimately, if employees do not take responsibility for getting adequate rest, or are not provided with opportunities to remove themselves from work when fatigued, there is an increased risk of accidents that could potentially have adverse consequences for people, property, and the environment.

The call for change

Effective fatigue management and the reduction of associated risks require profound changes in attitudes and behaviours, both at the management and operational levels. This can only be accomplished through generalized and sustained awareness training, and implementation of fatigue management plans that encourage both employers and employees to take responsibility to ensure that no one becomes a casualty of fatigue.

To foster this paradigm shift, the issue of fatigue management in transportation will remain on the Watchlist until several actions are taken in each of the three modes.

Air sector: Implement flight and duty-time regulations

Flight operations take place around the clock, and sometimes over long distances, which involves crossing multiple time zones. Fatigue-related impairment has a detrimental effect on aviation safety.

Actions taken

In December 2018, TC published new requirements for managing flight crew fatigue in the *Canada Gazette*, Part II. The regulations have a staggered implementation period. Air operators subject to *Canadian Aviation Regulations* (CARs) subpart 705 have until December 2020, two years after the publication of the amendments, to comply with the new requirements. Air operators subject to CARs subparts 703 and 704 have four years–until December 2022–to comply with the new requirements. Air operators subject to CARs subpart 702 are not subject to the new flight crew fatigue management regulations (the older requirements still apply).

The new regulations also include an option for operators (including those subject to CARs subpart 702) to implement a Fatigue Risk Management System (FRMS) to identify and minimize the sources of fatigue and manage fatigue risk in an operation.[8]

Actions required

The issue of fatigue management in air transportation will remain on the Watchlist until the following actions are taken:

- Canadian air operators that operate under CARs subparts 703, 704 and 705 implement, and comply with, the new regulations on flight crew fatigue management.
- The impact of these new regulations on aviation operations in Canada is assessed by the TSB.

Marine sector: No fatigue awareness training or fatigue management plans

In the shipping industry, fatigue is linked to the intensive nature of the business: long and irregular hours of work over extended periods, brief or interrupted sleep, rapidly rotating shifts, high workload, and social isolation. Fatigue management currently relies on hours of work/rest regulations, and the master's responsibility to take into account the risks of fatigue when establishing work schedules. The approach to fatigue management also varies substantially from one owner and type of vessel to the next.

Enforcement of hours of work regulations on domestic vessels has been problematic. A strong work ethic, labour shortages and economic imperatives in the marine industry may encourage individuals to work while fatigued because of a real or perceived obligation to do so. This makes it more difficult for them to recognize fatigue as a problem and to take appropriate action. There is currently no mandatory requirement in the *Marine Personnel Regulations* for comprehensive fatigue awareness training or fatigue management plans.

In the fishing industry, approximately 95% of fishing vessels do not have any applicable work/rest provisions under the *Marine Personnel Regulations*. Given the long hours and high levels of physical and mental exertion involved in commercial fishing, fish harvesters need greater awareness of the risks associated with fatigue and effective strategies to mitigate its risks.

Actions taken

Between 2013 and 2020, the TSB issued two marine safety information letters regarding fatigue. Since 1999, it also issued six recommendations. The first four recommendations targeted pilotage services, and the other two recommendations (both issued in 2018) were intended for watchkeepers and vessel owners.

In the marine sector, TSB recommendations issued between 1996 and 1999[9] led TC to develop fatigue management and awareness training materials for marine pilots. In 2017, TC commissioned a comparative analysis of how other countries are addressing fatigue in the marine sector. The TSB issued two

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8 Government of Canada, *Canada Gazette*, Part 2, Volume 152, Number 25 (12 December 2018), Regulations Amending the *Canadian Aviation Regulations* (Parts I, VI and VII – Flight Crew Member Hours of Work and Rest Periods)

9 TSB Recommendations M96-17, M96-18, M99-03; and M99-04.

recommendations in 2018[10] regarding the need for fatigue education and awareness training for watchkeepers, and fatigue management plans for vessel owners. Since publication of the 2018 Watchlist, there have been developments domestically and internationally with regards to fatigue management in the marine industry. TC has worked with the TSB and several member countries of the International Maritime Organization's Sub-committee on Human Element, Training and Watchkeeping to revise the international guidelines on fatigue.

On 24 January 2019, the International Maritime Organization published its Guidelines on Fatigue (MSC .1/Circ 1598). These guidelines are to be used for raising awareness on fatigue and may be taken into consideration when determining safe manning levels.

TC is currently working to ensure that the course curriculum for all seafarer certification programs (including Certificates of Competency) includes mandatory training on fatigue. This new requirement will come into effect with the publication of the proposed amendments to the *Marine Personnel Regulations* (expected to advance to the *Canada Gazette*, Part I, in 2021).

There are no plans to address fatigue management for small vessel and fish harvesting operations.

Actions required

The issue of fatigue management in marine transportation will remain on the Watchlist until the following actions are taken:

- TC requires that watchkeepers whose work and rest periods are regulated by the *Marine Personnel Regulations* receive practical fatigue education and awareness training to help identify and prevent the risks of fatigue.
- Vessel owners are required to implement fatigue management plans, including education on the detrimental effects of fatigue and support to mariners in reporting, managing and mitigating fatigue.
- TC reviews the domestic hours of work and rest provisions in the *Marine Personnel Regulations* in light of the most recent knowledge from fatigue science and, at a minimum, ensures consistency with the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.*

Rail sector: Still awaiting a comprehensive approach based on fatigue science

Since the 1986 Foisy Inquiry,[11] there have been a number of government and industry initiatives to address fatigue in the rail sector, through rules and regulations, fatigue management plans and guidelines, even scheduling algorithms, among others. Yet the risks are still not adequately mitigated. Effective fatigue management has proved challenging, notably because of unpredictable start times in freight operations, long duty hours and rotating day and night shifts.

The current work/rest rules do not reflect the latest fatigue science on daily and cumulative work and rest periods, and only apply to operating crews. The regime relies on an individual's ability to judge their own fatigue instead of a shared employer–employee responsibility for proactively managing fatigue.

10 TSB Recommendations M18-01 and M18-02.

11 The Honourable Mr. Justice René P. Foisy, *Commission of Inquiry into the Hinton Train Collision* (December 1986), at http://publications.gc.ca/site/eng/9.818270/publication.html.

Actions taken

Since 2011, the TSB has directed 16 rail safety advisories and information letters to TC resulting from employee concerns about fatigue. The Board also issued a safety concern in 1999 regarding irregular work scheduling, extended duty times and rest requirements. These were identified during an investigation into an uncontrolled-movement occurrence that led to a main-track train collision and derailment in Alberta.[12]

In the rail sector, the Minister of Transport tasked an independent panel to review the rail safety regime, including practices for fatigue management.[13] The regulator has also announced its intent to amend the rail safety regulations to address fatigue.[14] In December 2018, the Minister of Transport ordered the railway operating companies to address fatigue among railway operating employees. The subsequent proposal brought forward by the industry was deemed inadequate. In July 2019, TC provided additional clarification to rail operators on specific areas to be addressed. The final proposal on the *Work/Rest Rules for Railway Operating Employees* was submitted by the industry to the Minister on 11 September 2020. The submission is currently undergoing analysis and a decision will be made within the 60-day timeframe described in the *Railway Safety Act*—i.e., by 10 November 2020—regarding its acceptability. In addition, TC is conducting safety management system audits, which include processes for scheduling of work. These audits are scheduled to be completed by March 2021.

In the meantime, railways in conjunction with unions are conducting various pilot projects, notably to improve scheduling of operating crews, and are exploring new solutions, such as in-cab fatigue monitoring technology.

Actions required

The issue of fatigue management in rail transportation will remain on the Watchlist until the following actions are taken:

- TC develops a policy framework for the management of fatigue based on its review of fatigue management systems, fatigue science and best practices.
- TC works with industry and employee representatives and fatigue science specialists to develop a comprehensive approach to fatigue management in the rail sector.
- TC completes amendments to the *Work/Rest Rules for Railway Operating Employees* (2011) based on fatigue science.

12 TSB Railway Investigation Report R99E0023.

13 Railway Safety Act Review Panel, Enhancing Rail Safety in Canada: Working Together for Safer Communities (May 2018).

14 Department of Transport, "Notice of intent to amend Canadian rail safety regulations", Government of Canada, Canada Gazette, Part I, Vol. 151, No. 45 (11 November 2017).