

# How shift scheduling practices contribute to fatigue amongst freight rail operating employees: Findings from accident investigations

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## Problem

Anonymous survey<sup>1</sup> of railway operating employees suggests that many do not get enough sleep because of their work schedules, and that fatigue may be affecting their performance at work. The Transportation Safety Board of Canada (TSB) is an independent agency that advances transportation safety by investigating occurrences in the rail, marine, pipeline, and air modes of transportation. The TSB is concerned that deficiencies in fatigue management of railway operating employees – especially those involved in freight train operations – are posing ongoing risk to Canada’s rail transportation system.

## Method

Besides general impairments in attention and cognitive functioning, fatigue in railway operating employees slows reaction time to safety alarms<sup>2</sup> and impairs conformance to train driving requirements<sup>3</sup>. Shift scheduling practices can contribute to sleep-related fatigue by:

1. restricting opportunities to obtain sufficient restorative sleep (acutely or chronically);
2. requiring extended periods of wakefulness; and/or
3. disrupting daily (circadian) rhythms.

One of the goals of accident investigation is to determine the causal and contributing factors that led to an accident. To assist its investigators, the TSB has published and updated a guide to investigating for fatigue since 1997. However, while there are typically between 1200 and 1400 rail occurrences reported to the TSB each year under mandatory reporting requirements, practical considerations dictate that only a portion (about 1%) are fully investigated by the TSB and result in a published TSB report. Therefore, it is challenging to estimate statistically the prevalence of fatigue-related accidents in the railway operating context. Nevertheless, review of those investigations where fatigue was concluded to have played a role can increase our understanding of the issue, especially when considered in light of recent advances in sleep science. To this end, rail investigation reports published in the 20-year period from 1995 to 2014 were searched for key words, and a list produced. Findings and recommendations relating to fatigue of railway operating employees were explored and grouped according to theme.

## Results

The database search identified 18 investigation reports that cited sleep-related fatigue of freight rail operating employees as a causal, contributing, or risk finding. This number represents about 20% of TSB rail investigations in which a human factors aspect of freight train crew activities was a primary cause. Themes comprised:

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<sup>1</sup> TCRC (Teamsters Canada Rail Conference) Fatigue Management Working Group (2014). Railway Operating Employees Fatigue Survey, October.

<sup>2</sup> Hildebrandt, G., Rohmert, W., & Rutenfranz, J. (1974). Twelve and twenty-four hour rhythms in error frequency of locomotive drivers and the influence of tiredness, *International Journal of Chronobiology*, 2, 97-110.

<sup>3</sup> Dorrian, J., Hussey, F., & Dawson, D. (2007). Train driving efficiency and safety: Examining the cost of fatigue, *Journal of Sleep Research*, 16(1), 1-11.

1. disruption of the normal sleep cycle;
2. insufficient rest periods between shifts;
3. extended periods of continued wakefulness due to shift length;
4. pressures on crews not to refuse shifts because of fatigue;
5. the varied and unpredictable nature of railway shift scheduling;
6. ineffective fatigue countermeasures; and
7. cumulative effects of working extended hours over the long term.

In addition to the investigation reports, eight TSB safety communication letters relating to fatigue management for rail operating employees, issued in response to anonymous reporting between 2011<sup>4</sup> and 2014, were also explored. Themes included:

1. excessive on-duty hours;
2. crews being called to duty, then cancelled and re-ordered;
3. fatigued supervisors;
4. crews reporting for duty in advance of call time when deadheading (travelling to a shift);
5. fear of discipline when reporting unfit for duty;
6. inadequate rest at away-from-home terminal; and
7. inaccurate time reporting among crews.

## Discussion

Eighteen occurrences that resulted in a TSB report identified fatigue of freight railway operating employees as a causal, contributing, or risk finding. Review of report themes, as well as of those from TSB safety communication letters, indicates that management of fatigue and shift scheduling in the freight rail industry is a complex issue that is often not conducive to the circadian rhythms and associated sleep requirements of employees. It further suggests that ongoing shift scheduling and fatigue management practices in the freight rail industry may be insufficient to mitigate the associated safety risk.

Transport Canada's (TC's) Railway Safety Management System (SMS) Regulations, published in 2015, include requirements for railway companies to develop and implement SMS that address risk from fatigue by applying certain principles of fatigue science to their shift scheduling practices. In April 2015, TC established a three-phase plan for the implementation of the new requirements, and stated that it will consider the results of audit activities and consultation with stakeholders before taking further measures to manage railway crew fatigue.

The TSB is concerned that fatigue management for freight railway operating employees is an issue posing ongoing risk to Canada's rail transportation system. Review of railway fatigue management systems required by the SMS Regulations needs to be expedited by TC, and further actions taken, to improve scheduling practices and mitigate the ongoing risk of fatigue amongst railway operating employees.

## Summary [150 words]

Eighteen TSB rail occurrence reports citing sleep-related fatigue of freight railway operating employees as a causal, contributing, or risk, factor, as well as 8 TSB safety communication letters issued in response to anonymous reporting, were reviewed, and themes identified. Fatigue-related issues included,

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<sup>4</sup> The last time the Canadian 'Work/Rest Rules for Operating Employees' (<https://www.tc.gc.ca/eng/railsafety/rules-tco140-364.htm>) were reviewed and modified.

amongst others: sleep disruption and unpredictability, excessive continued wakefulness due to shift length, pressures not to refuse shifts, and ineffective fatigue countermeasures.

The TSB is concerned that inadequate fatigue management for freight railway operating employees is posing ongoing risk to Canada's rail transportation system. Review of railway fatigue management systems required by the SMS Regulations needs to be expedited, and further actions taken, to improve scheduling practices and mitigate the ongoing risk of fatigue amongst freight railway operating employees.