



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



Presentation to Fatigue Forum 2018

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Canada 

About the TSB

Mandate: To advance transportation safety in the air, marine, pipeline and rail modes by:

- conducting **independent investigations**
 - identifying **safety deficiencies, causes, and contributing factors**
 - making **recommendations** to address systemic issues
- 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 analyze 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



TSB Marine investigation report M16P0378



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

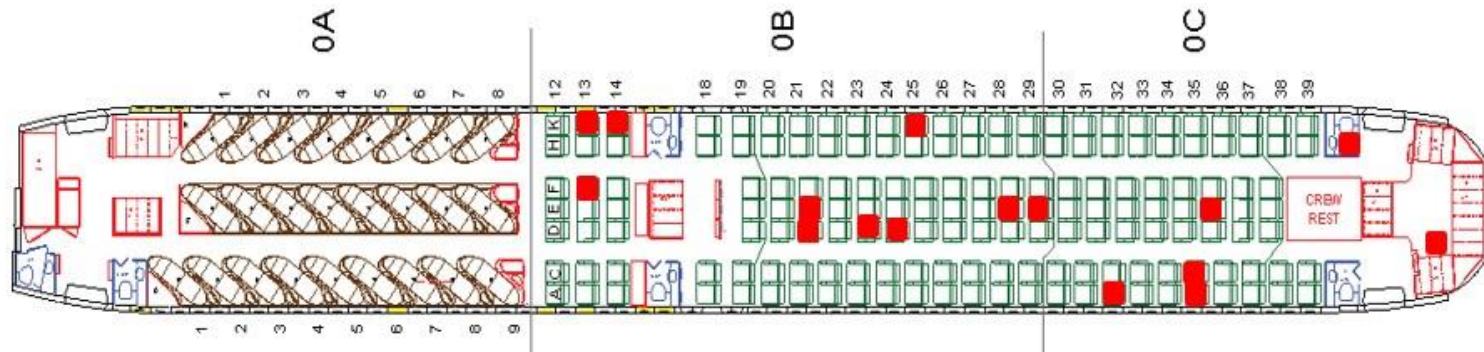
- "...the Department of Transport require vessel owners whose watchkeepers' work and rest periods are regulated by the Marine Personnel Regulations to **implement a comprehensive fatigue management plan tailored specifically for their operation**, to reduce the risk of fatigue."

M18-02



A11F0012: What *really* happened?

- At 0040, first officer (FO) commenced a “controlled rest”
- At 0155, captain made position report to control centre, which awakened FO → had slept for 75 minutes
- FO saw oncoming aircraft traffic, reacted to perceived imminent collision
- 14 passengers, 2 flight attendants injured



A11F0012: Findings as to cause

- FO had interrupted sleep night before flight which increased likelihood FO would feel fatigued and need rest during overnight eastbound flight.
- FO experienced circadian low due to time of day and fatigue due to interrupted sleep increasing propensity for sleep and worsened sleep inertia.
- FO slept for approx. 75 minutes which likely placed FO into slow-wave sleep and induced longer, more severe sleep inertia.
- By identifying the oncoming aircraft, the captain engaged the FO before the effects of sleep inertia had worn off.
- Under the effects of sleep inertia, the FO perceived the oncoming aircraft to be on a collision course and pushed forward on the control column.



Factors to consider

- North American pilots flying eastward at night across the Atlantic experience circadian lows that magnify performance decrements and increase desire to sleep
- Fatigue risk management
 - Education and awareness programs and strategies
 - Controlled rest policies and procedures
 - Use of relief pilot
- Sleep inertia

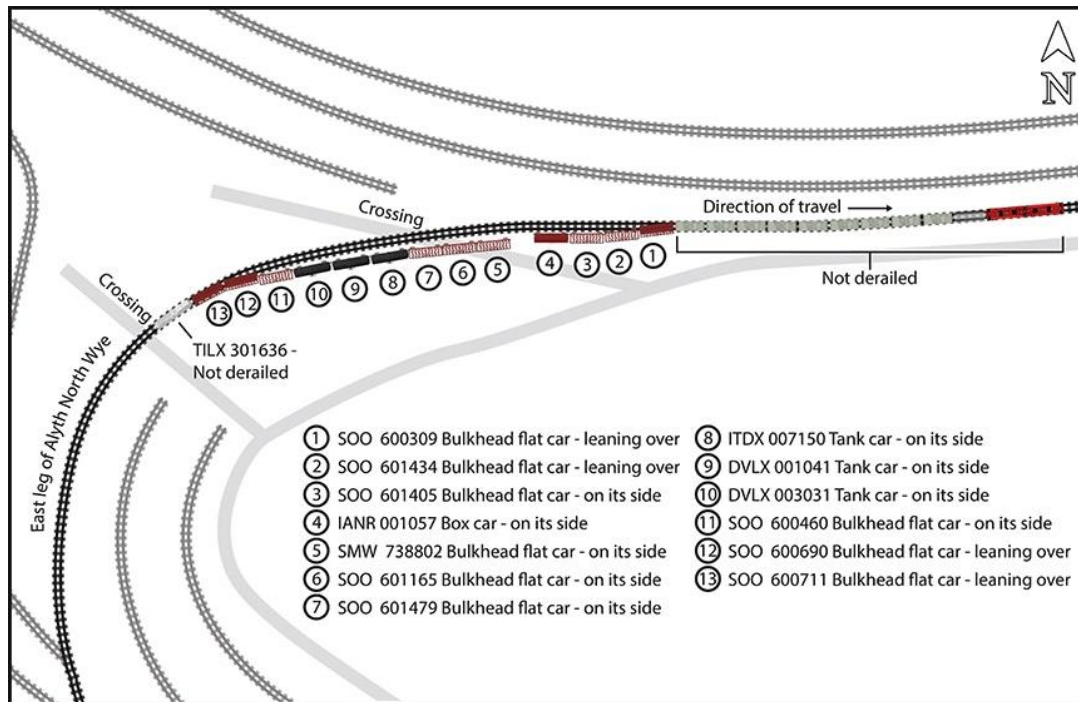


Controlled rest

- Strategic napping to improve crew alertness during critical phases of flight.
- Rest periods are 40 minutes (max) and must be completed 30 minutes before top of descent.
- In-charge flight attendant must be advised ... and instructed to call the flight deck at a specific time.
- Unless required due to an abnormal or emergency situation, the awakened pilot should be provided **at least 15 minutes without any flight duties to become fully awake** before resuming normal duties.



TSB Rail investigation report R16C0012



R16C0012: Lessons learned?

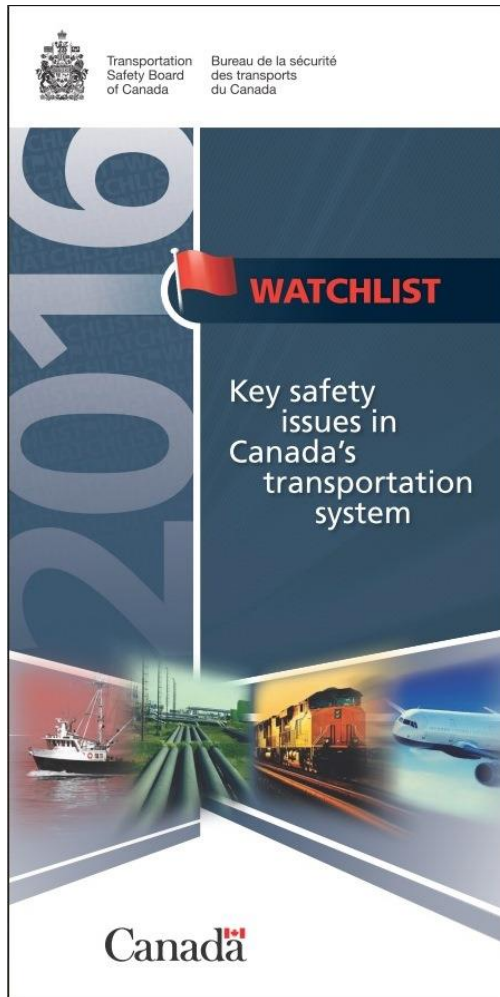
From CP's internal investigation:

- "the cause ... was improper use of locomotive throttle."
- The LE "was fit and well rested when he accepted the call ... He forgot about the above operating restriction and was remorseful for being responsible."

***** CP neither reviewed the LE's sleep history nor identified any systemic issues that may have contributed to the LE forgetting about the operating restrictions.**



Fatigue management: a Watchlist issue



Fatigue-management systems for train crews

Transportation of flammable liquids by rail

Following railway signal indications

On-board voice and video recorders

Unstable approaches

Runway overruns

Risk of collisions on runways

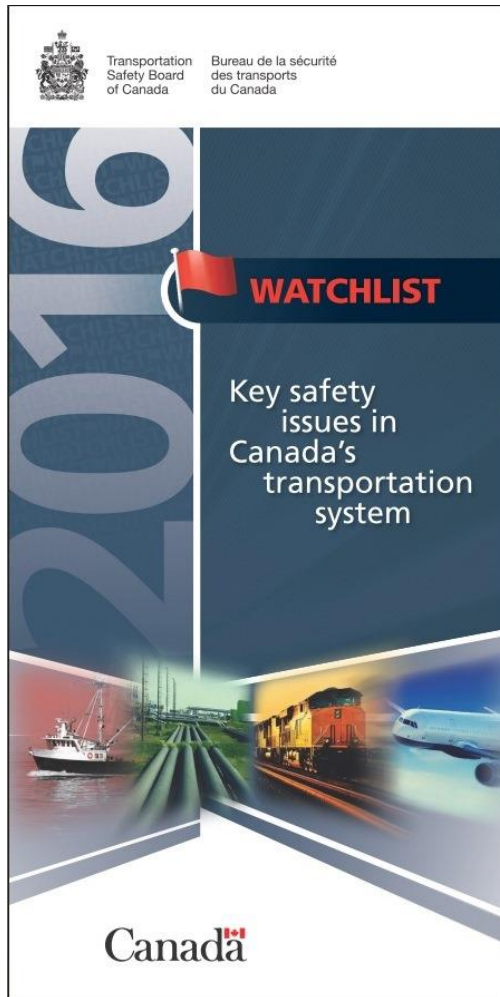
Safety management and oversight

Slow progress addressing TSB recommendations

Commercial fishing safety



Fatigue management: what's next?



This issue will remain on the Watchlist until:

- Transport Canada completes its review of railway fatigue management systems; and
- Transport Canada and the railways implement further actions to effectively mitigate the risk of fatigue for operating crew members on freight trains.



Not everybody is on the same page


- The TSB has made a number of findings about fatigue in aviation investigation reports over the years.
- When drawing up Watchlist 2016, we did not have sufficient data to support the inclusion of fatigue as a systemic problem in any mode beyond rail.
- Just because an issue is not on the Watchlist, doesn't mean it's not an issue that needs to be addressed, or that nothing more needs to be done.



Conclusions:

- Employees require education and awareness training
- Employers/ operators need a fatigue-management plan specific to the individual risks within their operations






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