



REASSESSMENT OF THE RESPONSES FROM TRANSPORT CANADA TO RAIL SAFETY RECOMMENDATION R00-05 – R98V0148

Locomotive environment

Background

On 11 August 1998, at approximately 1810 Pacific daylight time, Canadian Pacific Railway (CPR) train No. 463-11 (train 463) collided with the rear-end of CPR train No. 839-020 (train 839) at Mile 78.0 of CPR's Shuswap Subdivision, near Notch Hill, British Columbia. One car on train 463 and 2 cars on train 839 derailed. There were no injuries.

The Board identified two safety deficiencies related to: the backup safety defences for signal communication and the impact of noise on the communication of safety-critical information between crew members on locomotive cabs.

The Board concluded its investigation and released report R98V0148 on 01 February 2001.

Board Recommendation R00-05 (01 February 2001)

The Board recognizes the concerted effort by the railway company and the regulatory body to address the issue related to the communication of signals between crew members. Railway company programs such as the "Rule of the Week" are positive steps towards the reduction of risks associated with the communication of signals. The Board looks forward to the results of TC's review of the current state of compliance to Rule 34, and this program will likely heighten awareness of this issue amongst crews. However, the Board is concerned that the effectiveness of the program will likely be both temporary and incomplete. The current practice suggests that many crews do not consider compliance with Rule 34 to be necessary for safe operation. The widespread practice of not calling signals effectively removes the backup safety defence available from the second crew member in ensuring accurate signal interpretation, thus increasing the risk of accidents.

The effective and safe operation of a railway is largely dependent upon accurate and timely communications. Communication on railway locomotives is currently based on unaided voice communication. Noise in the locomotive cab, particularly in older locomotives, impedes the exchange of safety critical information through voice communications between the crew members. Therefore, the Board recommends that:

The Department of Transport assess the impact of noise on voice communication in locomotive cabs and ensure that crew members can effectively communicate safety-critical information.

TSB Recommendation R00-05

Response to R00-05 (23 April 2001)

Transport Canada (TC) accepted the recommendation. TC participated in an assessment of noise levels in locomotive cabs, in conjunction with Human Resources Development Canada (HRDC) in November 1999. Noise measurements in locomotive cabs were carried out from November 1999 to August 2000, and the results of these measurements were presented to CPR and Canadian National (CN) on 10 January 2001. The results indicated that noise levels in locomotive cabs meet the Canada Labour Code (CLC) requirements with respect to noise exposure levels.

Board assessment of the response to R00-05 (March 2002)

The study carried out by TC and HRDC determined that the noise levels in locomotive cabs meet the CLC requirements with respect to noise exposure levels. However, despite meeting CLC requirements, noise levels still have a strong negative impact on voice communications. Hearing protection is based upon an eight-hour exposure while voice communication is based upon real-time noise levels.

TC's compliance auditing did not directly address the identified safety deficiency, and the fact that TC continued to monitor and support studies of new technologies was not strictly a response to this recommendation. TC's response indicated that any direct initiatives towards improving the ability for crew members to effectively communicate safety-critical information are dependent on choices that the industry takes. As TC has completed an assessment of in-cab voice communication, and indicated participation and support for improvements, the response to the recommendation was assessed as **Satisfactory Intent**.

Additional response to R00-05 (11 June 2004)

TC provided no new information and indicated that they consider this recommendation closed.

Board reassessment of the response to R00-05 (September 2005)

No further action had been taken to assess the issue of effective in-cab communication. As in-cab noise levels have continued to prohibit effective communications, TC's response is reassessed as **Unsatisfactory**.

Additional response to R00-05 (28 July 2006)

TC had no update to provide at this time. However, TC indicated that it now considered this recommendation open.

Board reassessment of the response to R00-05 (25 August 2006)

As TC has decided to consider this recommendation open, the Board reassesses the response to Recommendation R00-05 as **Satisfactory in Part**.

Additional response to R00-05 (January 2010)

TC indicates that newer locomotives are much quieter and are being rolled out into service throughout the industry. TC believes that the problem has resolved itself over the past decade through the introduction of rebuilt and newer quieter locomotives.

Board reassessment of the response to R00-05 (16 September 2010)

In consideration that the deficiency has been partly addressed by the introduction of rebuilt and newer locomotives with quieter cabs, the Board reassesses the response to Recommendation R00-05 to remain **Satisfactory in Part**.

Additional information in response to R00-05 (August 2012)

Regulatory framework

Transport Canada enforces the On Board Trains Occupational Safety and Health Regulations of the Canada Labour Code.¹ Part IV, Levels of Sound, 4.2 prescribes that the level of sound in a workplace shall be less than 87dB. For situations where the level of sound exceeds 87dB, there is a table specifying the maximum exposure period for progressively increasing sound levels.

The United States Federal Railroad Administration (FRA) sponsored a research project which evaluated the effectiveness of various safety, ergonomic, and employee health-related upgrades to locomotive cabs. These upgrades included acoustic damping and absorption, vibration isolation, and active noise cancellation (ANC) technology. The FRA promulgated a rule in 2006 (i.e., Code of Federal Regulations, Section 49, Clause 229.121),² which specified performance standards for sound levels inside locomotive cabs. Specifically, all locomotives manufactured after October 2007 must have an average sound level less than or equal to 85dB(A), with an upper 99% confidence limit of 87dB(A).

Industry initiatives

Three major locomotive manufacturers have helped mitigate the sound issue by incorporating a number of design changes to their locomotive cabs. EMD has designed the Whisper Cab, where the locomotive cab is mounted on sound vibration isolators. This feature has helped improve noise readings from between 85 and 101 dB on older locomotives to between 72 and 78 dB in the Whisper Cab. The General Electric (GE) locomotive has the diesel engine mounted on sound vibration isolators. GE's Quiet Cab has noise-attenuating insulation and a modified air conditioning system. With these design changes the GE Quiet Cab noise levels are less than 76 dB. Motive Power Industries (MPI) builds and remanufactures locomotives with both the diesel engine and the cab mounted on rubber sound isolators. Along with the use of other sound-control methods, its locomotive cab noise levels are approximately 75dB.

¹ <http://laws-lois.justice.gc.ca/eng/regulations/SOR-87-184/index.html>, last accessed on 19 October 2012

² <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=57d8e84e70d71ccd61e0ca8626140925&rgn=div8&view=text&node=49:4.1.1.1.23.3.30.44&idno=49>, last accessed on 19 October 2012

Canadian locomotive fleet

Locomotives manufactured for the major Canadian railways are used in cross-border service and must meet the FRA standards. Canadian Pacific (CP) has approximately 763 locomotives which meet the FRA 229.121 rule. Of these locomotives, 579 are equipped with air conditioning, which allows the crew to close doors and windows of the locomotive cab to seal out exterior noise. CP will be remanufacturing an additional 50 locomotives in 2012, which will receive new cabs with air conditioning. Canadian National (CN) has 751 locomotives (i.e., 60% of its road fleet) equipped with air conditioning; 240 of them were manufactured using isolated cab design.

Board reassessment of the response to R00-05 (17 October 2012)

To ensure that crew members can effectively communicate safety-critical information, the locomotives being built or remanufactured today have significantly quieter cab environments. With reductions at the origin of the noise, additional sound dampening systems, and modified air conditioning systems, the sound level in the cabs of recently manufactured locomotives is more conducive to the effective exchange of safety-critical information through voice communication. In consideration of the fact that the majority of trains will have newer locomotives placed in the leading position, the risk of safety-critical information not being communicated effectively due to noise levels in the cab is significantly reduced. The Board reassesses the response to Recommendation R00-05 as being **Fully Satisfactory**.

This file is **Closed**.