



REASSESSMENT OF THE RESPONSES FROM TRANSPORT CANADA TO RAIL SAFETY RECOMMENDATION R02-04 – R99H0010

SURVIVABILITY OF ACCIDENT DATA

Background

On 30 December 1999, at approximately 1900 eastern standard time, Canadian National (CN) train No. U-783-21-30 was travelling westward from Saint-Romuald, Quebec, on the north track of the Saint-Hyacinthe Subdivision. At Mile 50.84, near Mont-Saint-Hilaire, Quebec, cars from train No. U-783-21-30 derailed, fouling the adjacent south track. CN train No. M-306-31-30, which was travelling eastward on the south track at the time, collided with the cars of train No. U-783-21-30 as they derailed. The two crew members on train No. M-306-31-30 were fatally injured in the accident. Approximately 350 families living within a two-kilometre radius of the accident site had to be temporarily evacuated. Two locomotives and 61 cars were damaged in the accident. Approximately 2.7 million litres of hydrocarbons spilled and caught fire, damaging private property, public property and the environment.

The TSB has succeeded in recovering event recorder data for the vast majority of investigated railway accidents; however, in the case of catastrophic accidents, where locomotives were subject to high impact, fire or water, the data could not be retrieved. For instance, in this accident, the behaviour and response of the crew on train 306 could not be determined because the event recorders on both locomotives were damaged. The data on the recorder on the second locomotive would have been saved had that recorder been designed and manufactured according to crashworthiness standards similar to those on the air and marine modes of transportation.

The ability to understand the nature of rail-related accidents and to analyze trends in railway safety is a key element to the success of safety initiatives. By providing a historical record of both the situation (speed, throttle position, etc.) and the actions (brake applications, acceleration, etc.) just before an accident, event recorders play a paramount role in the advancement of safety.

Board Recommendation R02-04 (24 September 2002)

Locomotives crossing the United States-Canadian border will be subjected to the new Federal Railroad Administration (FRA) rule; however, locomotives dedicated solely to Canadian trackage will not be affected, as the existing Canadian regulations or industry standards do not contain any provisions for the design and construction of locomotive event recorders. This lack of design and construction standards impedes the efforts to understand rail accidents and advance the safety of rail transportation in Canada. Therefore, the Board recommended that:

Transport Canada ensure that the design specifications for locomotive event recorders include provisions regarding the survivability of data.

R02-04

Response to R02-04 (24 December 2002)

Transport Canada (TC) supports this recommendation and recognizes the need to extend the existing design and construction standards for locomotive event recorders to address data survivability or “crashworthiness” which is not addressed at this time. The FRA in the United States is presently developing a rule on the crashworthiness of locomotive event recorders that would be similar to the standards for aeronautical and marine event recorders.

TC is a member of the Railroad Safety Advisory Committee (RSAC), which is chaired by the FRA and comprises the North American railways, unions and other stakeholders. The RSAC is a collaborative effort that provides advice and recommendations from industry on a range of regulatory issues. In 1997, the RSAC initiated a Working Group (WG) to address the issue of what data elements should be recorded, inspected, tested and maintained, physical location, as well as survivability of the event recorder.

TC is closely following the development of the proposed United States rule. It is anticipated that the United States rule will be finalized in fall of 2004, at which time TC will review the United States rule and initiate a similar rule-making process in Canada.

Board Assessment of Response to R02-04 (15 April 2004)

TC supports this recommendation and, as a member of the RSAC, is closely following the development of the proposed United States rule to address the issues of what data elements should be recorded, inspected, tested and maintained, the physical location of the recorder, and the survivability of the event recorder. TC will review the United States rule and initiate a similar rule-making process in Canada. However, for the present, the action has not been sufficiently advanced to mitigate the deficiency.

In consideration that TC supports this recommendation and has described action that, if implemented in full, will substantially reduce or eliminate the deficiency, the response to Recommendation R02-04 is assessed as **Satisfactory Intent**.

Additional Response to R02-04 (July 2004)

As of July 2004, TC has developed Terms of Reference for the purposes of creating a project team on the development of national standards for addressing the survivability of locomotive event recorders. The team will consist of representatives from TC, the Canadian rail industry and the United States FRA.

The scope of the project will be to identify options and provide advice on the potential

establishment of comprehensive national standards and may include:

- Identification of present regulatory requirements for locomotive event recorders (LERs), including survivability and specifications for the type of data recorded both in Canada and in the United States;
- Identification of present and future regulatory requirements for event recorders, including audio capabilities, both in Canada and in the United States;
- Identification of present and future technologies available to the industry with regards to LERs, including survivability, type of data that can be recorded, audio capabilities and interface with on-board communications systems;
- Drafting of a final report identifying options and providing advice to TC and the rail industry on the potential establishment of comprehensive national standards for LERs; and
- Development of national safety standards on LERs by the industry.

The project was expected to commence in January 2004; however, due to operational urgencies at TC, it is expected that the project will now commence in the fall of 2004. A draft report will be prepared by April 2005 by the project team with an anticipated completion date of December 2005.

Board Reassessment of Response to R02-04 (December 2004)

TC has developed Terms of Reference for the purposes of creating a project team on the development of national standards for addressing the survivability of LERs. In consideration that TC has described action which, if implemented in full, will substantially reduce or eliminate the deficiency, the response to Recommendation R02-04 is maintained as **Satisfactory Intent**.

Additional Response to R02-04 (12 December 2005)

TC has provided the following update. On 30 June 2005, the United States Department of Transport (DOT) FRA published the Locomotive Event Recorders Final Rule, 49 CFR, Part 229, which came into effect on 01 October 2005. TC has been in discussion with the Railway Association of Canada (RAC) and has been informed that the RAC will be reviewing the FRA's rule in order to make modifications to the existing *Railway Locomotive Inspection and Safety Rules* which contain certain requirements in regards to LERs. TC anticipates that revisions to the rules, which will include new design specifications and provisions regarding the survivability of data, will be harmonized with the United States rule and will be submitted within a year. TC will keep the TSB informed on the progress of this issue.

Board Reassessment of Response to R02-04 (21 November 2006)

As the United States rule is finalized and the Canadian working group has commenced, but the outcome is not known, the Board reassesses the response to this recommendation as **Satisfactory in Part**.

Additional Response to R02-04 (February 2008)

TC indicates that the RAC submitted its revised *Railway Locomotive Inspection and Safety Rules* to TC. The revision was approved on 18 September 2007. This revision contains design specifications for LERs, which include provisions for survivability of data which state in part:

- (a) the Event Recorder module (ERMM) shall meet the survivability criteria established in the crashworthiness standards of the institute of Electrical and Electronics Engineers, Inc., modified for the locomotive environment;

Board Reassessment of Response to R02-04 (06 March 2008)

The new recorders are a definite improvement in terms of crash survivability. However, only time will tell if they can survive a collision/derailment with a subsequent long duration fire, as happened in Mont-Saint-Hilaire, McBride and Lillooet, for example. Both CN and Canadian Pacific Railway (CPR) are equipping new locomotives with the recorder, but they are not retrofitting existing locomotives. As old event recorders fail, the intention is for railways to install event recorders with the new standard. However, there is no “grandfather clause” requiring a date by which all main line (road) locomotives will be equipped with the new recorders. To date, CN and CPR have 145 and 40 locomotives respectively equipped with the new recorders, out of a total of around 2250 road locomotives in those companies. The typical lifetime of locomotives is around 20 to 30 years.

The revised *Railway Locomotive Inspection and Safety Rules* approved by TC contain design specifications for survivability of data. However, it will be a significant period of time before all road locomotives are equipped with these new recorders. Therefore, the Board reassesses the response to this recommendation as **Satisfactory in Part**.

Additional Response to R02-04 (January 2010)

All new locomotives built after 01 January 2007 and delivered after 01 January 2008 shall be equipped with an event recorder designed with a “Certified Crashworthy” ERMM (event recorder memory module). Effective 01 January 2010, should an event recorder be replaced on a locomotive built prior to 01 January 2008, the event recorder shall be replaced by an event recorder with a hardened memory module or by an event recorder with a certified crashworthy ERMM.

Board Reassessment of Response to R02-04 (16 September 2010)

The Class 1 railways in Canada have been renewing their locomotive fleets, taking advantage of technological advancements. With the move to longer, heavier trains, high horsepower locomotives are generally used to pull these trains and the newest locomotives are most often

put in the leading position. These locomotives (delivered after January 2008) are equipped with event recorders that meet the new design and crashworthiness criteria. In consideration that TC has met the intent of the recommendation by modifying the design specifications for locomotive event recorders, the Board reassesses this response as **Fully Satisfactory**.