



TSB Recommendation R15-03

Vehicle event data recorders

The Transportation Safety Board of Canada recommends that the Department of Transport require commercial passenger buses to be equipped with dedicated, crashworthy, event data recorders.

Rail transportation safety investigation report	R13T0192
Date the recommendation was issued	02 December 2015
Date of the latest response	December 2024
Date of the latest assessment	January 2025
Rating of the latest response	Satisfactory Intent
File status	Dormant

Summary of the occurrence

On 18 September 2013, at about 0832 Eastern Daylight Time, westward VIA Rail Canada Inc. (VIA) passenger train No. 51 departed from the VIA station in Ottawa, Ontario, on time and proceeded en route to Toronto, Ontario. At 0847:27, OC Transpo double-decker bus No. 8017 departed from the Fallowfield Station on the OC Transpo bus Transitway. At 0848:06, while proceeding at about 43 mph, the train entered the OC Transpo Transitway crossing, located at Mile 3.30 of VIA's Smiths Falls Subdivision. At the time, the crossing lights, bells and gates were activated. The northbound bus was travelling at about 5 mph with the brakes applied when it struck the train. As a result of the collision, the front of the bus was torn off. The train, comprising 1 locomotive and 4 passenger cars, derailed but remained upright. Among the bus occupants, there were 6 fatalities and 9 serious injuries, and about 25 minor injuries were reported. No VIA crew members or VIA passengers were injured.

The Board concluded its investigation and released report R13T0192 on 02 December 2015.

Rationale for the recommendation

The Alexander Dennis Limited (ADL) double-decker buses were equipped with a video monitor that provides the driver with interior views and exterior views of the bus. However, the system

monitoring the video cameras installed on the bus did not have recording enabled, and no video information was recovered from the system.

Each of the rail, air and marine modes of transportation require locomotives and many commercial aircraft and vessels to be equipped with event data recorders (EDRs) that record a number of specified elements. In contrast, the *Canada Motor Vehicle Safety Standards* (CMVSS) contain no requirements for buses (including school, transit and inter-city) to be equipped with an on-board crashworthy EDR. While nothing precludes an operator from installing such technology on its fleet, OC Transpo had no such requirement. As a result, the occurrence bus was not equipped with a crashworthy EDR (i.e., black box) to record and store vehicle operation data that occurred prior to and during the accident sequence. Consequently, 8 electronic units that contained non-volatile memory (NVM) were recovered and analysed.

Of the 8 units recovered, only the engine control module (ECM) retained useful data. The ECM is programmed to automatically record a sudden deceleration event when the bus decelerates at greater than 9.0 mph/s (14.5 km/h/s). Had the bus decelerated at less than 9.0 mph/s (14.5 km/h/s), the ECM would have contained no data at all. While, in this case, the recovered ECM data were useful, when compared to locomotive event recorder (LER) data, the ECM data lacked sufficient detail to conduct a meaningful analysis. Specifically,

- there was no meaningful time stamp;
- no distance travelled was recorded;
- the recorded time interval of 1 second was not sufficient for detailed analysis;
- the operation of the anti-lock brake system and emergency brake was not identified;
- the ECM data indicated that the brakes had been applied, but no other meaningful braking information was recorded; and
- there was no brake line air pressure recorded to determine the amount of force applied to the brakes.

Consequently, a detailed braking analysis had to be performed to determine event timing, braking distance and amount of braking force applied by the bus during the accident. The complexity of this work added a number of months to the investigation process. In comparison, comprehensive data from the LER were available for review the next day. The LER data clearly identified the operating parameters of the train and actions of the train crew, which permitted investigators to make informed decisions as to the direction of the investigation and turn their attention to the condition and operation of the bus.

In the United States, the National Transportation Safety Board (NTSB) has recommended EDRs for buses since 1999. While progress has been made, the use of EDRs remains voluntary for roadway vehicles, and the NTSB has classified the related safety recommendations as “Open—Unacceptable Response” because the United States National Highway Traffic Safety Administration (NHTSA) has not required the use of EDRs on buses.

Through years of experience with EDRs in the air, rail and marine modes of transportation, the TSB, the NTSB and the transportation industry have learned a great deal about the effective use

of recording technology. Establishing industry standards for recording in these modes has been critical to effective implementation of EDRs by ensuring consistency in the recorded data in standardized formats.

Railway companies routinely use LER data in conjunction with operator (driver) proficiency testing to identify potential areas of improvement within the context of a railway company's safety management system (SMS).

EDRs have been commonly used by over 100 United States jurisdictions to manage school bus fleets. Studies have determined that, when integrated into a company's safety program, the review of EDR data has led to operational safety improvements for vehicle fleets. A sampling and review of EDR data can identify emerging driver trends, and modifications to company training and/or employee mentoring can be made to improve safety accordingly. Such reviews can also be used to identify and reinforce positive and safe driver behaviour. This demonstrates that EDR information can be used in a non-punitive way as a tool for monitoring driver behaviour and performance in conjunction with a transportation company's safety program that can further reduce risk and improve safety before an accident occurs.

Although accidents involving transit buses at level crossings are rare, they are considered to be high-risk events due to the number of passengers transported in each bus and the potential for injury to the travelling public. When these accidents occur, it is imperative that all investigators have access to real-time recorded data that are consistent and meaningful to quickly identify safety deficiencies and prevent recurrence. Understanding driver behaviour and identifying the related human factors are critical to understanding why accidents happen.

All safety, regulatory, law enforcement and company accident investigations benefit from the efficient, timely and accurate collection, assimilation and analysis of available information. In many cases, EDRs provide and validate much of this valuable information. Early recovery of the information can also result in more timely communication of safety deficiencies and accident reports to industry, regulators and the public, which in turn can result in the implementation of measures to prevent a recurrence. Considering that today's vehicles are capable of supporting crashworthy technology that has the capacity to record safety-critical information that enables safety improvements as well as comprehensive and timely accident investigation, the Board recommended that

the Department of Transport require commercial passenger buses to be equipped with dedicated, crashworthy, event data recorders.

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Previous responses and assessments

February 2016: response from Transport Canada

Transport Canada acknowledges the recommendation.

There are no United States or United Nations safety regulations requiring EDRs on large commercial vehicles of any type. At the same time, Transport Canada will commit to scan current EDR technologies available for commercial passenger buses. This research will look at vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers. TC will review available international commercial vehicle EDR standards and recommended practices. Transport Canada will also evaluate the feasibility of developing a commercial passenger bus EDR standard by undertaking a review of technical and scientific reports/papers and validation studies on the accuracy, reliability and limitations of commercial vehicle EDRs. The results of this work would help to determine the need for standards and guide TC on how to proceed. Such work could produce useful guidelines for the installation of such equipment.

March 2016: TSB assessment of the response (Satisfactory in Part)

Transport Canada (TC) has acknowledged this recommendation.

TC will initiate research on EDR technologies, including vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers. After reviewing the results of the research, TC will evaluate the feasibility of developing an EDR standard for commercial passenger buses. This work will help determine the need for standards and could lead to guidelines for the installation of such equipment.

The Board is encouraged that TC will initiate research to help determine the need for standards and/or guidelines for the installation of EDRs for commercial passenger buses. However, this work will take time, and no specific timeline has been provided. In addition, beyond this commitment, there are no explicit plans for the development of EDR standards for commercial passenger buses.

Therefore, the Board considers the response to Recommendation R15-03 to be **Satisfactory in Part**.

February 2017: response from Transport Canada

TC will research current EDR technologies available for heavy commercial vehicles, document current EDR standards and recommended practices, undertake a thorough literature review of commercial vehicle EDRs, review any existing national or international standards and evaluate the feasibility of developing a commercial passenger bus EDR standard.

TC has posted the Request for Proposal (RFP) to hire a consultant to do the research. The bid period has closed and a contract has been awarded.

In addition, recognizing that it is important to develop expertise and operational procedures within TC for commercial vehicle EDRs, TC staff (a collision investigator and a defect investigator) have recently taken further training in "Accessing and Interpreting Heavy Vehicle Event Data Recorders".

March 2017: TSB assessment of the response (Satisfactory in Part)

TC recently hired a consultant to conduct research on EDR technologies. This work will include researching current EDR technologies for heavy commercial vehicles; documenting current EDR standards and recommended practices; undertaking a literature review of existing commercial vehicle EDRs; reviewing any existing national or international standards; and evaluating the feasibility of developing a commercial passenger bus EDR standard.

The Board is encouraged that TC has initiated research to help determine the need for standards and/or guidelines for the installation of EDRs for commercial passenger buses. TC has also invested in the development of in-house expertise by providing selected staff with specialized training. However, no explicit plans have yet been established for follow-up work, including the development of EDR standards for commercial passenger buses.

Therefore, the Board considers the response to Recommendation R15-03 to be **Satisfactory in Part**.

February 2018: response from Transport Canada

There are two components to the work that will be conducted as part of this recommendation:

- Transport Canada's (TC) Motor Vehicle Safety (MVS) Directorate will research current EDR technologies available for heavy commercial vehicles, document current EDR standards and recommended practices, undertake a thorough literature review of commercial vehicle EDRs, review any existing national or international standards and evaluate the feasibility of developing a commercial passenger bus EDR standard.

Status: TC has posted the RFP to hire a consultant to do the research. The bid period has closed and 3 responses were received. The contract has been awarded. The end date of the contract is March 31, 2018.

- Recognizing that it is important to develop expertise and operational procedures within TC for commercial vehicle EDRs, TC MVS has sent one collision investigator and one defect investigator to the training course "Accessing and Interpreting Heavy Vehicle Event Data Recorders" offered by the Society of Automotive Engineers (SAE).

Status: The SAE course has been completed by both investigators.

An environmental scan of technical and scientific reports/papers and validation studies on the accuracy, reliability and limitations of commercial vehicle EDRs has been completed and submitted to Transport Canada. Many publications from the environmental scan were subject to Copyright Protection Laws; as such, the Department undertook to purchase the documents of interest. There are only a few outstanding items that need to be purchased.

A report with the highlights (observations and conclusion) compiled from the environmental scan of technical and scientific reports/papers and validation studies identified has been submitted to TC. The report is undergoing final review and formatting.

A three-day face-to-face meeting with Mecanica Scientific Services (the contractor) was held the first week of December. The summary report of the facts, based on analysis of the scientific reports/papers and validation studies was reviewed and final editing is being done.

A DRAFT summary report of all commercial vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers is currently being developed. This includes equipment requirements, operational requirements and technical specifications.

Interviews with key government and industry stakeholders are currently being formalized in terms of questionnaires and protocols. It is anticipated that some of these discussions will take place in Washington in late January during the SAE Government/Industry meetings.

Also it is worthy of noting that the SAE Truck and Bus Event Data Recorder Committee, which has been inactive since June of 2010, has been re-activated to review SAE J2728 (Heavy Vehicle Event Data Recorder [HVEDR] Standard - Tier 1), as well as further development of standards on Truck and Bus EDR. The re-activation of the committee is in large part due to a feasibility study that was launched by Transport Canada. Transport Canada is an active member of the committee.

March 2018: TSB assessment of the response (Satisfactory in Part)

TC will research current EDR technologies available for heavy commercial vehicles, document current EDR standards and recommended practices, undertake a thorough literature review of commercial vehicle EDRs, review any existing national or international standards and evaluate the feasibility of developing a commercial passenger bus EDR standard. The status of the work (to date) is as follows:

- An environmental scan of technical and scientific reports/papers and validation studies on the accuracy, reliability and limitations of commercial vehicle EDRs has been completed.
- A report with the highlights (observations and conclusion) compiled from the environmental scan of technical and scientific reports/papers and validation studies identified has been completed.
- A 3-day meeting with Mecanica Scientific Services (the contractor) was held in December 2017 to discuss the results of the research.
- A DRAFT report is being prepared to summarize the commercial vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers.
- Interviews with key government and industry stakeholders are being formalized in terms of questionnaires and protocols. Some of these discussions were completed in January 2018.

The Truck and Bus Event Data Recorder Committee (Society of Automotive Engineers [SAE]) was re-activated to review the SAE J2728 standard (Heavy Vehicle Event Data Recorder

[HVEDR] Standard - Tier 1), and to further develop standards for truck and bus EDRs. The re-activation of the committee was in large part due to TC initiating the feasibility study to develop a commercial passenger bus EDR standard. TC is an active member of the committee.

The Board is encouraged that the environmental scan of technical and scientific reports/papers and validation studies identified has been completed and that the Truck and Bus Event Data Recorder Committee (SAE) has been re-activated to assist with this work. However, no explicit commitments or timelines have been established for the development of EDR standards for commercial passenger buses.

Therefore, the Board considers the response to Recommendation R15-03 to be **Satisfactory in Part**.

February 2019: response from Transport Canada

Transport Canada continues to research current event data recorder (EDR) technologies available for heavy commercial vehicles, document current EDR standards and recommended practices, undertake a thorough literature review of commercial vehicle EDRs, review any existing national or international standards, and evaluate the feasibility of developing a commercial passenger bus EDR standard. The Department has advanced these efforts as follows:

- An environmental scan of technical and scientific reports/papers and validation studies on the accuracy, reliability and limitations of commercial vehicle EDRs was completed in early 2018.
- A report with the highlights (observations and conclusion) compiled from the environmental scan of technical and scientific reports/papers and validation studies identified was completed in March 2018.
- A three-day meeting with Mecanica Scientific Services (the contractor) was held in December 2017 to discuss the results of the research.
- A report has been prepared to summarize the commercial vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers.
- The Truck and Bus Event Data Recorder Committee (Society of Automotive Engineers) was re-activated in early 2017 to review the SAE J2728 standard (Heavy Vehicle Event Data Recorder [HVEDR] Standard - Tier 1), and to further develop standards for Truck and Bus EDRs. The re-activation of the committee was in large part due to Transport Canada's initiation of a feasibility study to develop a commercial passenger bus EDR standard. Transport Canada is an active member of the Committee.
- For additional context, four types of data recorders were presented in the study: recording capabilities added to existing electronic control units; electronic logging devices; video data recorders; and stand-alone add-on recorders. Overall, the report findings indicate that over 99% of heavy vehicles currently have some degree of HVEDR functionality added to existing engine control units, and most Canadian vehicles are

being designed according to the Society of Automotive Engineers (SAE) J2728 “Heavy Vehicle Event Data Recorders” recommended practice.

- While HVEDRs have also been studied in Europe and in North America, there are currently no regulations mandating their use. Due to the existence and adoption of SAE J2728 by industry, a review and update of this standard is considered the most effective course of action at this time. The SAE J2728 committee met on January 22, 2019 to continue reviewing the existing standard, standardizing data elements for crash reconstruction and adding additional features to monitor automated driving systems. Transport Canada will continue to be an active member of this committee.

March 2019: TSB assessment of the response (Satisfactory Intent)

In 2018, TC continued its work on EDR technologies for heavy commercial vehicles. This work included documenting EDR standards and recommended practices, conducting a literature review of commercial vehicle EDRs, reviewing national and international standards, and evaluating the feasibility of developing a commercial passenger bus EDR standard.

Specific progress and observations on HVEDRs were made in the following areas:

- In early 2018, an environmental scan of technical and scientific reports/papers and validation studies on the accuracy, reliability and limitations of commercial vehicle EDRs was completed.
- In March 2018, a report that summarized the observations and conclusions from the environmental scan of technical and scientific reports/papers and validation studies identified was completed.
- A report was prepared to summarize the commercial vehicle-based systems, engine-based systems as well as global positioning systems developed both by original equipment manufacturers and after-market suppliers.
- While HVEDRs have been studied in Europe and in North America, there are currently no regulations mandating their use. However, it was determined that over 99% of heavy vehicles have some degree of HVEDR functionality added to existing engine control units and that most Canadian heavy vehicles are being designed to the SAE J2728 “Heavy Vehicle Event Data Recorders” recommended practice.

Due to the adoption of SAE J2728 by industry, TC considers that a review and update of this standard will be the most effective course of action. In January 2019, the SAE J2728 committee met to continue its review of the existing standard, with consideration to standardize certain data elements to assist with crash reconstruction and to add additional features to monitor the automated driving systems. TC participated in the meeting and will continue to be an active member of this committee.

The Board is encouraged that a course of action has been identified and that the SAE committee (which includes TC participation) is actively reviewing the standard, with the intent to standardize and update certain areas of the standard. However, the timeline for completing the

next steps has not yet been established. The Board considers the response to Recommendation R15-03 to show **Satisfactory Intent**.

December 2019: response from Transport Canada

Transport Canada continues its work on heavy vehicle event data recorder (HVEDR) standards development. Specifically:

The Truck and Bus Event Data Recorder Committee (Society of Automotive Engineers) was re-activated in early 2017 to review the SAE J2728 standard (HVEDR] Standard - Tier 1), and to further develop standards for Truck and Bus EDRs. The re-activation of the committee was in large part due to Transport Canada's initiation of a feasibility study to develop a commercial passenger bus EDR standard. Transport Canada is a member of this Committee.

Since Transport Canada's last progress update, a proposed standard has been developed. On November 20, 2019, the SAE J2728 committee tabled a standard, which sets out data elements and event triggers for recording of event data relevant to collision investigations for heavy vehicles, and provides design and performance recommendations needed to develop baseline HVEDR capabilities. This standard is currently in "ballot status", awaiting approvals. The next meeting of the SAE J2728 committee is scheduled to take place in early 2020.

Looking ahead, Transport Canada will seek international consensus of a baseline HVEDR standard at the April 2020 session of the United Nations' Working party on General Safety Provisions.

February 2020: TSB assessment of the response (Satisfactory Intent)

On 20 November 2019, the SAE J2728 committee (of which TC is a member) tabled a proposed standard for HVEDRs. This standard sets out the data elements and the event triggers for the recording of data relevant for collision investigations involving heavy vehicles. This standard is in "ballot status," awaiting approval by the SAE J2728 committee. The next committee meeting is scheduled in early 2020.

At the April 2020 session of the United Nations' Working party on General Safety Provisions, TC will seek international consensus of a baseline HVEDR standard.

The Board is encouraged that a proposed standard has been developed and tabled at the SAE committee and that TC is seeking international consensus for a baseline HVEDR standard. The Board considers the response to Recommendation R15-03 to show **Satisfactory Intent**.

January 2021: response from Transport Canada

Transport Canada has been working with the Society of Automotive Engineers Truck and Bus Event Data Recorder Committee to advance the adoption of the standard for Event Data Recorders (EDR) on commercial passenger buses. The standard was published on June 9, 2020 and includes data elements and event triggers for the recording of event data relevant to crash

investigations. Looking ahead, Transport Canada is supporting the review and update of data extraction and hardware requirements.

In addition, Transport Canada has identified the United Nations' Working Party on General Safety Provisions to collaborate on its proposal to establish international consensus on a baseline standard for Heavy Duty Vehicle EDRs. The next meeting is scheduled for April 12-16, 2021, at which time Transport Canada intends to provide the group with an overview of its progress on fleet adoption for heavy duty commercial vehicle EDR standards and encourage continued discussion and harmonization at the international level.

March 2021: TSB assessment of the response (Unable to assess)

The Truck and Bus Event Data Recorder Committee (SAE) published standard J2728 (Heavy Vehicle Event Data Recorder [HVEDR] Standard – Tier 1) on 09 June 2020, which includes data elements and event triggers for the recording of event data relevant to crash investigations. TC is supporting the review and update of data extraction and hardware requirements.

TC is now working toward an international consensus on a baseline standard for heavy-duty vehicle EDRs. At the next meeting of the United Nations' Working Party on General Safety Provisions in April 2021, TC will be presenting an overview of its progress on fleet adoption of HVEDR standards.

The Board is encouraged by the publication of the SAE standard on HVEDR. However, the timeline for the completion of next steps to introduce HVEDR to Canadian commercial passenger vehicles has not yet been established and there is no clear workplan for the roll-out of planned changes to the *Canada Motor Vehicle Safety Standards* (CMVSS) indicated in the response.

The Board considers the response to Recommendation R15-03 as being **Unable to Assess**.

November 2021: response from Transport Canada

Transport Canada continues to play a leadership role in encouraging international consensus on a baseline standard for Heavy Duty Vehicle Event Data Recorders (EDRs). In keeping with this objective, Transport Canada presented a report on the feasibility of equipping Heavy Duty Vehicle EDRs in commercial passenger buses at the April 12-16, 2021 meeting of the United Nations' Working Party on General Safety Provisions (UNECE WP.29 GRSG-EDR Committee).¹ In particular, the report summarized Canadian research of Heavy Duty Vehicle EDR and international development of EDR technology and standards, and concluded that a Heavy Duty Vehicle EDR regulation can and should be developed.

Transport Canada has also shared its report and detailed research findings at the September 22, 2021 meeting of the Society of Automotive Engineers (SAE)'s J2728 Truck and Bus Event Data

¹ <https://unece.org/sites/default/files/2021-04/GRSG-121-28e.pdf> (last accessed 04 January 2023).

Recorder (EDR) Committee² where Canada is strongly advocating for the development and adoption of the standard for EDRs on commercial passenger buses, building on the current edition of the SAE J2728 standard which was published on November 1st, 2020.

Looking ahead, Transport Canada is developing industry best practices for Heavy Duty Vehicle EDRs as a path towards standardization, with guidelines to be published by fall 2022. These guidelines will form the basis of ongoing discussions with key stakeholders to encourage harmonization at the international level, including the U.S. National Highway Traffic Safety Administration, SAE's J2728 Truck and Bus EDR Committee, and the UNECE WP.29 GRSG-EDR Committee.

March 2022: TSB assessment of the response (Satisfactory in Part)

TC presented a report on the feasibility of equipping heavy-duty vehicle EDRs in commercial passenger buses at the 12-16 April 2021 meeting of the United Nations' Working Party on General Safety Provisions and at the 22 September 2021 meeting of the SAE J2728 Truck and Bus Event Data Recorder Committee.

While the report findings conclude that HVEDR regulations can and should be developed, it does not provide an update on the progress about the adoption of HVEDR standards in Canada.

As a path towards standardization, TC is developing industry best practices for HVEDRs, with guidelines to be published by fall 2022. However, no timeline has been provided for any planned changes to the CMVSS.

The Board considers the response to Recommendation R15-03 to be **Satisfactory in Part**.

December 2022: response from Transport Canada

Transport Canada is continuing its work on Heavy Vehicle Event Data Recorders (HVEDR) with the development of the research report entitled, "HVEDRs Best Practices Guide". This guidance document is currently undergoing a consultation review process with Original Equipment Manufacturers (OEMs) and stakeholders, with an expected publication date in Winter 2023. The purpose of this guideline is to provide best practices and lessons learned for the construction and installation of HVEDRs to truck and bus OEMs, tier suppliers, fleet managers and drivers. The guide identifies the main technical issues for HVEDRs, including, but not limited to, element types to be captured, trigger mechanisms and algorithms to capture data elements during a particular event, storage issues, survivability characteristics and data extraction tools. An additional focus of the guide will be placed on existing HVEDR functions available within the North American commercial truck or bus's OEM, Electronic Control Units (ECU) and/or installed aftermarket devices that include Global Positioning System (GPS) based telematics,

² <https://tc.canada.ca/en/road-transportation/motor-vehicle-safety/motor-carriers-commercial-vehicles-drivers/transport-canada-commercial-bus-hvedr-feasibility-study-file-no-t8080-160062-deliverable-no-7> (last accessed 04 January 2023).

dashcam data, and Electronic Logging Devices (ELD). The guide also provides research references to assist police, fleet managers, collision reconstructionists and government regulators with a better understanding of the value that HVEDRs provide.³

It is also important to note that on September 21, 2022, the United States (U.S.) Department of Transportation's National Highway Traffic Safety Administration (NHTSA) posted the document, "Considerations for Regulating Installation and Performance of HVEDRs", (Document ID: NHTSA-2007-28793-0031, <https://www.regulations.gov/document/NHTSA-2007-28793-0031>). The main technical issues under consideration in the NHTSA document included data elements to be captured, trigger mechanisms, storage issues, survivability characteristics and data extraction. As significant informational gaps still exist in the areas of operator privacy, system costs and data elements required for crash analysis and because of the difficulty in estimating the benefits of HVEDRs, NHTSA concluded that developing regulations for the HVEDRs is still not feasible at this time. The NHTSA study further concludes that as heavy vehicles adopt new crash avoidance technologies and advanced driver assistance systems, the data availability and system cost considerations may change. NHTSA will continue to research, monitor, and engage in international activities regarding the issues surrounding HVEDRs, related data standards, and emerging technologies and revisit the possibility of developing a regulatory proposal at a future date. These findings are aligned with Transport Canada's previously explained position.

In addition, Transport Canada also continues to actively contribute to and support the United Nations Working Party on General Safety Provisions (UNECE WP.29 GRSG-EDR Committee, or "UNECE Committee"). On May 19, 2022, the UNECE Committee tasked the Society of Automotive Engineers (SAE) J2728 Truck and Bus Event Data Recorder Committee (or "SAE Committee") to generate more detailed information providing supporting technical detail for their triggering specifications. On September 15, 2022, a draft document was updated to clarify the scope of HVEDRs noting that the EDR data is valuable for effective crash investigations and for analysis of safety equipment performance. On December 1, 2022, technical documentation was also updated regarding event triggers and data elements for heavy duty vehicles.

Transport Canada also continues to actively contribute to and support the SAE Committee. On May 19, 2022, the SAE Committee reviewed the technical details regarding the UNECE Committee's heavy duty vehicle acceleration triggers. On September 22, 2022, the SAE Committee came to a consensus to support the reference of triggers/data elements in the new regulation.

As Canada and the U.S. share fleets of heavy vehicles operating in the trans-border movement of goods and passengers, the development of HVEDR regulation requires harmonization with our American partners (and international partners). Transport Canada will continue to play an

³ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors in the material it reproduces without indication but uses brackets [] to show other changes or to show that part of the response was omitted because it was not pertinent.

active role in encouraging international consensus regarding the harmonization of data elements, trigger mechanisms, report format and the establishment of a common data retrieval tool for HVEDRs.

March 2023: TSB assessment of the response (Unable to assess)

Since the TSB first issued the recommendation in December 2015, Transport Canada (TC) has taken several steps toward the eventual implementation of dedicated, crashworthy event data recorders (EDRs) on commercial passenger buses.

In particular, TC, which is an active member of the Truck and Bus Event Data Recorder Committee (a committee of the Society of Automotive Engineers [SAE]), participated in the development and publication of the SAE J2728 standard (Heavy Vehicle Event Data Recorder [HVEDR] Standard - Tier 1). The standard was published on 09 June 2020.

Since then, TC has been advocating for the development and adoption of the standard for EDRs on commercial passenger buses, building on the current edition of the SAE J2728. TC is also working to establish international consensus on a baseline standard for HVEDRs to ensure harmonization with the United States.

In April 2021, TC presented a report on the feasibility of equipping HVEDRs in commercial passenger buses at a meeting of the United Nations' Working Party on General Safety Provisions (UNECE WP.29 GRSG-EDR committee, or "UNECE committee"). Since then, the UNECE committee has tasked the SAE J2728 committee to generate more detailed information providing supporting technical detail for their proposal regarding event triggers and data elements for heavy duty vehicles. On 01 December 2022, the technical documentation for the proposal was updated.

In 2022, the United States (U.S.) Department of Transportation's National Highway Traffic Safety Administration (NHTSA) posted the document "Considerations for Regulating Installation and Performance of HVEDRs." The NHTSA concluded that developing regulations for the HVEDRs was not feasible at this time because of the significant informational gaps that still exist in the areas of operator privacy, system costs, and because of the difficulty in estimating the benefits of HVEDRs. NHTSA will revisit the possibility of developing a regulatory proposal at a future date.

Meanwhile, in Canada, TC has been developing a guidance document on HVEDRs, with an expected publication date in Winter 2023. The purpose of this document is to provide best practices and lessons learned for the construction and installation of HVEDRs to truck and bus manufacturers, tier suppliers, fleet managers, and drivers.

The Board recognizes TC's efforts toward the development and adoption of the SAE J2728 standard. However, the Board is concerned that no timelines for the completion of next steps to introduce HVEDRs to Canadian commercial passenger vehicles have yet been established, and there is no clear workplan for the roll-out of planned changes to the *Canada Motor Vehicle*

Safety Standards. Therefore, the Board is **unable to assess** the response to Recommendation R15-03.

January 2024: response from Transport Canada

In response to Transportation Safety Board's Recommendation R15-03, Transport Canada has taken several initiatives to explore the feasibility of equipping commercial passenger buses with dedicated, crashworthy event data recorders.

In 2018, Transport Canada completed a comprehensive study titled "Feasibility Study of Event Data Recorders for Commercial Buses". This work involved an extensive literature review and the development of five technical reports on Heavy Vehicle Event Data Recorders (HVEDRs). These reports, along with a list of technical and scientific papers and validation studies, are available at the following dedicated website: <https://transcanadahvedr.ca/>.

Building on this foundational work, in 2021, Transport Canada initiated the development of an industry best practices document for HVEDRs. Titled "Heavy Vehicle Event Data Recorders: Best Practices", this document provides structured insights and incorporates historical context, background information, and an extensive compilation of research on HVEDRs. It offers recommendations and guidance for key stakeholders.

Currently, the HVEDR Best Practices document is undergoing a thorough consultation review process. It is being shared with subject matter experts for their feedback, with a final version anticipated to be published in spring 2024.

The HVEDR Best Practices recognize inherent complexities with current HVEDRs. These include challenges in accessing HVEDR data, the dispersion of functionality across multiple Electronic Control Units, potential data loss due to fire or power loss, and the absence of a synchronized common time clock across all recorded data sources. These concerns align with those stated in the (U.S.) Department of Transportation's National Highway Traffic Safety Administration (NHTSA) document, "Considerations for Regulating Installation and Performance of HVEDRs".⁴ Recognizing the interconnected nature of North American roadway infrastructure and trade corridors, the harmonization of HVEDR regulations between Canada and the U.S. (and with international partners) is important because it ensures that data from these devices is consistent and can be effortlessly compared across different jurisdictions, making it easier to investigate crashes and incidents involving heavy vehicles.

EDRs offer the advantage of providing data that may not be accessible through traditional collision investigation methods. This additional information can facilitate a more comprehensive determination of the factors contributing to an incident. However, practical challenges in implementing HVEDRs include issues related to the standardization of data elements required for crash analysis, the installation of additional sensors to collect data,

⁴ <https://www.regulations.gov/document/NHTSA-2007-28793-0031> (last accessed 20 February 2024).

compatibility across different vehicle types, and ensuring that the technology is reliable and durable in real-world heavy vehicle operations.

Addressing the challenges outlined in the HVEDR Best Practices is not only a crucial prerequisite for developing HVEDR regulations, but also ensures a solid foundation for effective implementation and compliance. In line with this, Transport Canada is emphasizing the need for a complete understanding of these factors as a necessary step before progressing with the establishment of such regulations.

Transport Canada is actively participating and lending support to the United Nations' Working Party on General Safety Provisions, as well as the Society of Automotive Engineers (SAE) J2728 Truck and Bus Event Data Recorder Committee. This collaboration aims to achieve international consensus on the establishment of baseline standards; at present there is no fixed timeline in which this work will be completed. Once such a standard is developed, Transport Canada will consider moving forward with regulations for HVEDRs while taking into account harmonization with international counterparts, particularly the U.S.

In conclusion, the feasibility of HVEDRs in commercial vehicles does not lie in the concept of recording event-based data but in the implementation of the technology. Transport Canada is actively working towards addressing the Transportation Safety Board's recommendation through comprehensive research, development of best practices, and participation in international fora. The goal is to ensure effective, practical implementation of HVEDRs in commercial passenger buses, contributing to the overall safety of passengers and the public.

February 2024: TSB assessment of the response (Satisfactory Intent)

Since the TSB first issued the recommendation in December 2015, Transport Canada (TC) has taken several initiatives to explore the feasibility of equipping commercial passenger buses with dedicated, crashworthy event data recorders.

In 2021, TC started developing an industry best practices document for Heavy Vehicle Event Data Recorders (HVEDRs) entitled "Heavy Vehicle Event Data Recorders: Best Practices," which is undergoing a thorough consultation review process. It is being shared with subject-matter experts for their feedback, with a final version anticipated to be published in spring 2024.

TC indicated that the challenges outlined in the HVEDR Best Practices document need to be addressed for developing HVEDR regulations and for ensuring a solid foundation for effective implementation and compliance. TC is therefore emphasizing the need for a complete understanding of these factors as a necessary step before progressing with the establishment of such regulations.

Furthermore, TC is actively participating and lending support to the United Nations' Working Party on General Safety Provisions, as well as the Society of Automotive Engineers (SAE) J2728 Truck and Bus Event Data Recorder Committee in order to achieve international consensus on the establishment of baseline standards. Once a baseline standard is developed, TC indicated

that it will consider moving forward with HVEDR regulations while taking into account harmonization with international counterparts, particularly the United States.

The Board recognizes TC's efforts to address Recommendation R15-03 and looks forward to the development of a baseline HVEDR standard and for the establishment of a fixed timeline for the implementation of HVEDR regulations for commercial passenger buses. The Board considers the response to Recommendation R15-03 to show **Satisfactory Intent**.

Latest response and assessment

December 2024: response from Transport Canada

Transport Canada acknowledges the Transportation Safety Board of Canada's (TSB) ongoing interest in the implementation of Heavy Vehicle Event Data Recorders (HVEDRs) in commercial passenger buses and appreciates the request for a timeline for mandating these devices in Canada.

Since the initial issuance of Recommendation R15-03, Transport Canada has made significant strides towards advancing the understanding of HVEDRs, aligning with international standards, and addressing the TSB's concerns.

Key Achievements and Actions to Date

1. Feasibility Assessment

In 2018, Transport Canada completed a comprehensive assessment of the feasibility of equipping commercial passenger buses with HVEDRs. This assessment considered various factors, such as technological advancements, industry readiness, and regulatory implications. The findings have informed our approach to developing an effective and practical path forward for industry implementation. The final report, along with a list of technical and scientific papers and validation studies, are available at the following dedicated website:

<https://tc.canada.ca/en/road-transportation/motor-vehicle-safety/motor-carriers-commercial-vehicles-drivers/transport-canada-commercial-bus-hvedr-feasibility-study-file-no-t8080-160062-deliverable-no-7>.

2. Development and Publication of Best Practices

On October 25, 2024, Transport Canada published a comprehensive best practices document for HVEDRs, providing valuable guidance to industry stakeholders. This document serves as a resource to promote the voluntary adoption of HVEDRs and to standardize their implementation across the industry. These best practices and guidelines primarily target Original Equipment Manufacturer (OEM) HVEDRs that are commonly found in vehicles categorized as Class 3 through 8, which weigh over 4536 kg (10 000 pounds) and are equipped with either the SAE J1708/J1587 serial communications bus or the J1939 CAN communications bus. Furthermore, they provide valuable information to potential end-users who may need to access HVEDR data in the event of a highway crash or any other unusual vehicle incident.

requiring investigation. This is an important milestone, which will lay the foundation for the development of a Canadian regulatory initiative on HVEDRs. The document is available at <https://tc.canada.ca/en/road-transportation/motor-carriers-commercial-vehicles-drivers/heavy-vehicle-event-data-recorders-best-practices>.

3. Active Participation in International Standard Development

Transport Canada continues to participate in and lend support to both the United Nations' Working Party on General Safety Provisions (UN GRSG) and the Society of Automotive Engineers (SAE) J2728 Truck and Bus Event Data Recorder Committee. Both groups are working to achieve international consensus on establishing baseline standards for HVEDRs.

At the 127th GRSG session in April 2024, a draft regulatory text was presented and agreed upon by contracting parties of the United Nations 1958 Agreement, which governs the development of United Nations vehicle regulations. Canada, the United States, and industry stakeholders expressed that the draft was incomplete and required significant work before adoption. Although Canada and the United States are not signatories to the 1958 Agreement and are not permitted to vote on its adoption, it was agreed that the group will continue developing the regulations to address all outstanding issues, including those raised by Canada. A new terms of reference governing the technical development was adopted with a mandate to complete the work by October 2026. Final adoption into UN Regulation No. 169 is anticipated in the spring of 2027.

Importance of Harmonization

The harmonization of HVEDR regulations between Canada, the United States, and international partners is crucial. It ensures that data from these devices is consistent and can be effortlessly compared across different jurisdictions, facilitating effective investigations of crashes and incidents involving heavy vehicles. Both Transport Canada and the U.S. National Highway Transportation Safety Administration (NHTSA) are directly involved in this ongoing regulatory development. There is no intent to propose HVEDR requirements into our Canada Motor Vehicle Safety Standards (CMVSS) until this international work is complete. There is also no indication that NHTSA is taking steps toward regulations at this time.

Potential Timeline for Mandating HVEDRs in Canada

Transport Canada plans to initiate the formal regulatory process once we are confident that both the regulatory requirements and technology are sufficiently mature. In keeping with the current timelines established by UN GRSG for UN Regulation No. 169, the department anticipates conducting informal and formal consultations with the public and stakeholders to evaluate the requirements of UN Regulation No. 169 for the Canadian context. A full evaluation of all potential impacts, including a Cost-Benefit Analysis (CBA), is required by the Treasury Board Secretariat (TBS), and all other non-regulatory options need to be explored before a proposal can be submitted for publication in the *Canada Gazette*, Part I.

Considering the regulatory development timeline defined under UN GRSG and following the Government of Canada Cabinet directive on Regulatory development (<https://www.canada.ca/en/government/system/laws/developing-improving-federal-regulations/requirements-developing-managing-reviewing-regulations/guidelines-tools.html>), Transport Canada anticipates potential adoption of HVEDR requirements into Canadian regulations in 7-9 years. This timeline accounts for the multiyear process of regulatory development, which can be significantly affected by stakeholder feedback, TBS priorities, and the overall complexity of the file.

Conclusion

Transport Canada's ongoing efforts in response to TSB Recommendation R15-03 have involved extensive research, stakeholder engagement, and international collaboration to develop and refine standards for the deployment of Event Data Recorders in commercial passenger buses.

Transport Canada completed an important milestone with the publication of the "Heavy Vehicle Event Data Recorders: Best Practices" guide in 2024, laying the groundwork for the development of potential Canadian regulations. The proposed timeline for publication of HVEDR standards in Canada will follow a structured path from consultations to the publication of regulations, in keeping with Government of Canada Cabinet directive on Regulatory development, with a clear emphasis on stakeholder feedback and international alignment.

Our goal is to ensure the effective and practical implementation of HVEDRs in commercial passenger buses, thereby enhancing the overall safety of passengers and the public. Transport Canada remains committed to addressing the TSB's recommendation and will continue to engage with stakeholders and international partners to achieve harmonized and effective HVEDR regulations.

January 2025: TSB assessment of the response (Satisfactory Intent)

Since the TSB first issued the recommendation in December 2015, Transport Canada (TC) took several initiatives to explore the feasibility of equipping commercial passenger buses with dedicated, crashworthy heavy vehicle event data recorders (HVEDRs).

On 25 October 2024, TC published a comprehensive best practices document for HVEDRs, which will be used to promote the voluntary adoption of HVEDRs and standardize their implementation. The document lays out the foundation for the development of a Canadian regulatory initiative on HVEDRs.

TC believes that the harmonization of HVEDR regulations between Canada, the United States, and international partners is crucial. It continues to participate in the United Nations' Working Party on General Safety Provisions (UN GRSG) and the Society of Automotive Engineers (SAE) J2728 Truck and Bus Event Data Recorder Committee to achieve international consensus on establishing baseline standards for HVEDRs. In April 2024, at the 127th session of the UN GRSG, a draft regulatory text was presented. Canada, the United States, and industry stakeholders expressed concern that the draft required significant work before adoption. A new terms of

reference governing the technical development was adopted with a mandate to complete the work by October 2026. Final adoption into UN Regulation No. 169 is anticipated in the spring of 2027.

TC does not intend to propose HVEDR requirements into its Canada Motor Vehicle Safety Standards until this international work is complete. Considering the regulatory development timeline, TC anticipates potential adoption of HVEDR requirements into Canadian regulations in seven to nine years, up to 19 years after the TSB first made this recommendation.

The Board recognizes TC's efforts to address Recommendation R15-03 and looks forward to the establishment of a fixed timeline for the implementation of HVEDR regulations for commercial passenger buses. The Board considers the response to Recommendation R15-03 to show **Satisfactory Intent**.

File status

Given the timelines associated with achieving harmonized HVEDR requirements amongst stakeholders and international partners and the implementation of these requirements into Canadian regulations, the Board will periodically review TC's progress in the future.

This deficiency file is **Dormant**.