



TSB Recommendation R22-03

Risk management through hazard identification, data trend analysis, and risk assessments

The Transportation Safety Board of Canada recommends that the Department of Transport require Canadian Pacific Railway Company to demonstrate that its safety management system can effectively identify hazards arising from operations using all available information, including employee hazard reports and data trends; assess the associated risks; and implement mitigation measures and validate that they are effective.

Rail transportation safety investigation report	R19C0015
Date the recommendation was issued	31 March 2022
Date of the latest response	December 2023
Date of the latest assessment	February 2024
Rating of the latest response	Satisfactory Intent
File status	Active

Summary of the occurrence

On 04 February 2019, the Canadian Pacific Railway Company (CP) freight train 301-349 being operated by a relief crew derailed on Field Hill near Field, British Columbia, on a 13.5-mile section of track with a steep descending grade (average 2.2%) and several sharp curves. The 3 crew members—a locomotive engineer, a conductor, and a conductor trainee—were fatally injured in the derailment.

Rationale for the recommendation

A safety management system (SMS) is an internationally recognized framework that allows companies to effectively manage risk and make operations safer. Risk assessments are a cornerstone of a fully functioning and effective SMS, and are essential for safe operations. The *Railway Safety Management System Regulations, 2015* (the SMS Regulations) require railway companies to conduct risk assessments, including when a safety concern is identified. However, what constitutes a safety concern is not defined in the regulatory provisions, leaving it to interpretation.

To identify safety concerns, railway companies are required to conduct, on an ongoing basis, an analysis of their operations, current or emerging trends, or any recurring situations. These analyses are based on information such as reports of safety hazards submitted by employees and data from safety monitoring technologies.

CP's *Reporting Contraventions, Safety Hazards and Identifying Safety Concerns Procedure* defines safety concern as follows:

Safety Concern-is a hazard or condition which could result in an undesired event that constitutes:

- a threat to safe railway operations or could reduce the safety of railway operations; and
- presents a direct safety risk to employees; railway property; property transported by the railway; the public or property adjacent to the railway.¹

At the time of the occurrence, CP's procedure outlined the situations in which a safety hazard report should be made and an analysis conducted to identify safety concerns, emerging trends or recurring situations. It also identified the steps to be followed to progressively escalate a safety issue until it was resolved. However, the investigation revealed that the process was not always being followed, that hazard reports were not always rated or assessed, and that some reports were closed out without any clear indication of the corrective action undertaken or any indication of verification that the action had been completed or was effective.

Prior to this occurrence, safety hazard reports involving poorly braking unit grain trains descending Field Hill in cold winter weather had been submitted by train crews for a number of years in January and February. Although CP's procedure for safety hazard reporting was actively followed at the Calgary terminal, the follow-up process was not effective at analyzing trends. CP did not consider that the trend in safety hazard reports represented a "safety concern," as per the SMS Regulations, or by CP's own *Reporting Contraventions, Safety Hazards and Identifying Safety Concerns Procedure*.

The individual notifications of this hazard were closed, yet new similar reports continued to be recorded through the reporting system. Still, year after year, the reports on the poor braking of unit grain trains on Field Hill were closed, no risk assessment was conducted, and insufficient corrective action was taken. Since braking performance degradation occurred seasonally on CP unit grain trains in extreme cold temperature, this condition had become normalized such that it was expected that close to maximum available braking would be required while descending Field Hill.

Furthermore, Transport Canada's oversight of the occupational health and safety committee in Calgary did not identify the lack of corrective action on the reported substandard braking performance of unit grain trains descending Field Hill.

¹ Canadian Pacific, *Reporting Contraventions, Safety Hazards and Identifying Safety Concerns 2.0*, (last revised 19 December 2018), section 3.1, p. 10.

CP collects data from the wheel temperature detectors (WTD) on its network. These detectors facilitate the identification of cars with cold wheels, which is an indicator of poor braking performance. The data collected in winter allow the railway to monitor the temperature sensitivity and performance of the car air brakes when they are most susceptible to leakage. WTDs are a safety monitoring technology and, as such, data collected from these systems must be analyzed to identify safety concerns, trends or emerging trends, or recurring situations. However, at the time of the occurrence, this available data was not actively analyzed by CP and an opportunity was missed to identify the hazard and mitigate any risks related to the braking performance of grain trains in extreme cold temperatures.

Risk assessments must be conducted prior to implementing operational changes which have the potential to introduce new hazards or increase the level of severity of existing hazards. In the years preceding the occurrence, CP made several modifications to the operating procedures for Field Hill, such as changes to the speed threshold at which trains are permitted to descend Field Hill, and changes to the requirements for retainers and hand brakes after an emergency brake application. CP did not conduct a risk analysis to assess how these changes would impact safety.

The SMS Regulations require that railway companies ensure that employees performing duties essential to safe railway operations (such as conductors) have the skills and qualifications required to perform their duties safely. However, when CP changed its training program for conductors on the Laggan Subdivision, it did not conduct a risk assessment of this change.

Since the new SMS Regulations came into effect in 2015, the TSB has investigated 11 occurrences, including this one, in which shortcomings in hazard identification, analysis of relevant railway safety data, or risk assessments were identified as a risk factor. Of these, 7 occurred in CP operations.

The Board issued a recommendation to the Department of Transport related to the effectiveness of railways' SMS in 2014, following its investigation into the July 2013 accident at Lac-Mégantic, Quebec. In its investigation report, the Board indicated that, until Canada's railways make the cultural shift to SMS, and TC makes sure that they have effectively implemented SMS, the safety benefits from SMS will not be realized.

The Board recommended that the Department of Transport audit the safety management systems of railways in sufficient depth and frequency to confirm that the required processes are effective and that corrective actions are implemented to improve safety. (TSB Recommendation R14-05)

Since then, TC has completed its initial comprehensive audit of all federally regulated railways. As a result of these audits, TC requested corrective action plans where necessary, and stated that it continues to follow up to ensure that all railways have taken corrective action to address the findings. In its March 2021 assessment of TC's response, the Board stated that it was encouraged by TC's progress and looked forward to receiving information on the findings.

The effectiveness of railway SMS remains a concern and is included in the TSB's Watchlist 2020, a list of issues that need to be addressed to make Canada's transportation system even safer. As stated in the Watchlist, federally regulated railways have been required to have an SMS since 2001, and regulatory requirements were significantly enhanced in 2015. However, since then, companies' SMS have not produced the expected safety improvements associated with mature safety management and safety culture, as the rate of main-track train accidents has not improved. The TSB believes that railway companies' SMS are not yet effectively identifying hazards and mitigating risks in rail transportation. Safety management will remain on the Watchlist for the rail transportation sector until safety data is collected and analyzed to reliably determine risk assessment and risk mitigation, leading to measurable safety improvement.

An effective safety culture includes proactive actions to identify and manage operational risk. The identification of hazards within a risk assessment is critical to identifying the required mitigation measures needed, and is the foundation of an effective SMS.

When hazards are not identified, either through reporting, data trend analysis, or by evaluating the impact of operational changes, and when the risks that they present are not rigorously assessed, gaps in the safety defences can remain unmitigated, increasing the risk of accidents. Ultimately, it is the railway companies themselves which must ensure that they have the culture, structures, and processes in place to allow for proactive identification of hazards, assessment of risks, and implementation of mitigation strategies. However, Transport Canada also has a responsibility to ensure that railway companies not only comply with the SMS regulations, but are also managing the risks in their operations effectively.

Until CP's overall corporate safety culture and SMS framework incorporate a means to comprehensively identify hazards, including the review of safety reports and data trend analysis, and assess risks before making operational changes, the effectiveness of CP's SMS will not be fully realized.

Therefore, the Board recommended that the Department of Transport require Canadian Pacific Railway Company to demonstrate that its safety management system can effectively identify hazards arising from operations using all available information, including employee hazard reports and data trends; assess the associated risks; and implement mitigation measures and validate that they are effective.

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Previous responses and assessments

June 2022: response from Transport Canada

Transport Canada (TC) agrees with recommendation R22-03 and will implement a mix of oversight and regulatory measures to improve safety of railway employees:

- Taking immediate action, the department will begin targeted audits of CP by August 2022, assessing the effectiveness of their safety management systems and

training regime. This work will build on progress that the department has recently achieved with respect to addressing findings from the Auditor General's follow-up audit on rail safety, including building a framework to support effectiveness audits and performance indicators to assess effectiveness over time.

- Complementing these audits, TC will immediately require CP to provide the department with quarterly reports of its hazard-reporting activities, data analysis and follow-up measures, including corrective actions taken in response to the targeted audits. This quarterly reporting requirement will support improved tracking and oversight of the company's safety management system.
- In parallel, TC will strengthen its oversight of CP's occupational health and safety committees. This measure will enable the department to better monitor whether the company is effectively identifying and addressing hazards.
- Building on this progress, by August 2022, the department will launch consultations on potential amendments to the *Railway Safety Management System Regulations, 2015*. This important step will ensure that lessons-learned from targeted audits of safety management systems will contribute toward the development of robust, modernized requirements to ensure that safety management systems are effective and support an improved railway safety culture.
- In Fall 2022, the department will pre-publish in Canada Gazette, Part I, proposed amendments to the *Railway Employee Qualification Standards Regulations*. These amendments will address findings in the Transportation Safety Board's report by establishing modernized crew and supervisor training requirements.

July 2022: response from Canadian Pacific Railway Company

Canadian Pacific Railway Company (CP) is confident that its safety management system is effective in identifying hazards by using all available information, as confirmed by TC's past and current audits and monitoring efforts. CP is not opposed to increased transparency, but does take exception to any suggestion that there have been deficiencies that call for additional oversight.

August 2022: TSB assessment of the response (Satisfactory Intent)

Transport Canada (TC) agrees with the recommendation. TC will implement a combination of oversight and regulatory measures aimed at improving the overall safety of railway employees. TC will begin in August 2022 with a targeted audit of CP, assessing the effectiveness of its safety management system and training regime. TC will immediately require CP to provide the Department with quarterly reports of its hazard-reporting activities, data analysis, and follow-up measures, including corrective actions taken. In addition, TC plans to strengthen its oversight of CP's occupational health and safety committees to enable the Department to better monitor whether the company is effectively identifying and addressing hazards.

By August 2022, TC will launch consultations on potential amendments to the *Railway Safety Management System Regulations, 2015*. Although details have not been provided, TC indicated

that lessons-learned from targeted audits of safety management systems will contribute toward the development of robust, modernized requirements to ensure that safety management systems are effective and support an improved railway safety culture. Finally, TC advised that, in the fall of 2022, the Department will pre-publish in the *Canada Gazette*, Part I proposed amendments to the *Railway Employee Qualification Standards Regulations* that will establish modernized crew and supervisor training requirements.

The Board is encouraged that TC agrees with this recommendation and has developed a plan to assess the effectiveness of CP's safety management system and strengthen its oversight of CP's occupational health and safety committees. Therefore, the Board considers TC's response to Recommendation R22-03 to show **Satisfactory Intent**.

Latest response and assessment

December 2023: response from Transport Canada

Over the last 16 months, Transport Canada (TC) has completed significant actions toward assessing the effectiveness of Canadian Pacific's (CP) safety management system (SMS).²

On July 12, 2022, TC issued a letter to CP, requiring periodic filings containing information to support TC in assessing the efficacy of the process for identifying safety concerns and the risk assessment process. TC continues to evaluate CP's filings to ensure marked improvements are occurring at the railway.

Further, TC conducted two targeted audits of CP's SMS. These audits focused on the company's processes for hazard identification, identifying safety concerns, and risk assessment. All audits have been concluded. As a result of these audits, TC has clearly communicated with CP expectations relating to the implementation of their corrective action plan, which included the amendment of their process for identifying safety concerns. CP's amended process is due on December 31, 2023. Once received, the department will assess its completeness and verify its implementation.

December 2023: response from Canadian Pacific Railway Company

CP continues to be confident that its safety management system ("**SMS**") is effective in identifying hazards by using all available information, as confirmed by Transport Canada's ("**TC**") past and current audits and monitoring efforts. CP is not opposed to increased transparency, but still takes exception to the suggestion that there have been deficiencies that call for additional oversight. As committed to in that letter, CP has engaged with TC to demonstrate the effectiveness of CP's SMS during TC SMS Audits and through quarterly reports filed with TC.

² 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.

CP has also engaged with TC in the following activities that they are also progressing from a general SMS perspective and/or identified in their initial response to the TSB:

- Development of SMS Audit Effectiveness Criteria
- Proposed amendments to the *Railway Employee Qualification Standards Regulations* and the *Railway Safety Management System Regulations, 2015*.

Additionally, through its own continuous improvement process, CP is continuing to monitor, evaluate and audit its SMS, identifying and making changes, as needed.

In summary, CP remains confident that its safety management system (“**SMS**”) is effective in identifying hazards and takes exception to the suggestion that there have been deficiencies that call for additional oversight. CP believes that recommendation R22-03 should be closed.

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

Transport Canada (TC) completed numerous activities over the past 16 months toward assessing the effectiveness of Canadian Pacific Railway’s (CP)³ safety management system (SMS).

In July 2022, TC required periodic SMS filings from CP in order to help assess the efficacy of CP’s processes for hazard identification, identifying safety concerns, and risk assessment.

TC conducted 2 targeted audits of CP’s SMS. As a result of these audits, TC informed CP of its expectations, including the amendment of its process for identifying safety concerns. CP’s amended process was received, and TC is in the process of reviewing and assessing it.

In addition, TC increased its inspection frequency of CP’s occupational health and safety committees by 7 inspections between fiscal years 2020-2021 and 2021-2022. Going forward, TC will continue to use a risk-based approach for committee monitoring.

CP engaged with TC in the development of SMS audit effectiveness criteria and the proposed amendments to the *Railway Employee Qualification Standards Regulations* and the *Railway Safety Management System Regulations, 2015*.

The Board is encouraged that TC conducted targeted audits of CP’s SMS and increased its inspection frequency for occupational health and safety committee monitoring. The Board is also encouraged that CP is continuing to monitor, evaluate, and audit its SMS through its own continuous improvement process to identify and make changes, as needed. The Board looks forward to receiving the results of TC’s review and assessment of CP’s amended SMS processes. Therefore, the Board considers TC’s response to Recommendation R22-03 to show **Satisfactory Intent**.

³ On 14 April 2023, Canadian Pacific Railway Company (CP) and Kansas City Southern (KCS) combined into a single railway company doing business as CPKC. As the occurrence took place before the transition date, the acronym CP will be used throughout this document.

File status

The TSB will continue to monitor TC's progress on its planned actions.

This deficiency file is **Active**.