



TSB Recommendation R20-01

Reducing the frequency and associated risks of uncontrolled movements while switching without air

The Transportation Safety Board of Canada recommends that the Department of Transport work with the railway industry and its labour representatives to identify the underlying causes of uncontrolled movements that occur while switching without air, and develop and implement strategies and/or regulatory requirements to reduce their frequency.

Rail transportation safety investigation report	R17W0267
Date the recommendation was issued	10 June 2020
Date of the latest response	January 2024
Date of the latest assessment	March 2024
Rating of the latest response	Satisfactory Intent
File status	Active

Summary of the occurrence

On 22 December 2017, at about 1800 Central Standard Time during hours of darkness, a Canadian National Railway Company (CN) foreman and a helper were performing switching operations at CN's Melville Yard in Melville, Saskatchewan. The foreman was operating extra yard assignment Y1XS-01 using a remote control locomotive system (RCLS) when the foreman became pinned between the assignment and the lead car of an uncontrolled movement while applying a hand brake. The foreman received fatal injuries. There was no derailment and no dangerous goods were involved.

The Board concluded its investigation and released the report R17W0267 on 10 June 2020.

Rationale for the recommendation

In this occurrence, a foreman was controlling a yard assignment using an RCLS while switching without air in Melville Yard. During switching operations, the foreman became pinned between the assignment and the lead car of an uncontrolled movement while attempting to stop the movement by applying a hand brake. As a result, the foreman received fatal injuries.

Uncontrolled movements generally fall into 1 of 3 broad causal categories: loss of control, switching without air, and securement. Since 2016, the TSB has completed 3 investigations,¹ including this one, involving switching without air. This category of uncontrolled movement uses the locomotive independent brakes only, with no air brakes available on the cars being switched or kicked. The vast majority of these occur in yards.

Similar to this occurrence, TSB occurrence R16W0074 involved relatively inexperienced operators who were conducting switching operations without air in Canadian Pacific Railway Company (CP)'s Sutherland Yard in Saskatoon, Saskatchewan. The investigation determined that, despite Transport Canada (TC) and industry initiatives, the desired outcome of significantly reducing the number of uncontrolled movements had not yet been achieved. Consequently, the Board was concerned that the current defences were not sufficient to reduce the number of uncontrolled movements and improve safety.

Between 2010 and 2019, 589 unplanned/uncontrolled movements occurred. There has been an upward trend during this 10-year period. The average increase per year for all categories was 2.33 occurrences, with 71% of the overall increase associated with switching without air. Of the 202 occurrences involving switching without air, 74 (37%) occurred as a result of rollbacks and 60 (30%) involved dangerous goods. The major outcomes of these occurrences were collisions (137, or 68%) and derailments (85, or 42%). Two of the occurrences (1%), including this occurrence, involved an employee fatality.

While switching without air is routine and occurs every day in the railway industry, the practice has some inherent risks that can result in serious consequences. If effective strategies are not taken to improve safety while switching without air, uncontrolled movements will continue to occur, increasing the risk and severity of adverse outcomes.

The railway industry is responsible for having rules, instructions, procedures, and processes in place to safely manage operations. Railway employees who are directly involved in these operations have the greatest knowledge of how the work actually gets done and are the most affected when accidents occur. However, the regulator also has a responsibility to have adequate regulations, rules, and enforcement in place in order to provide effective regulatory oversight to ensure safe operations.

Safety action taken by TC and the railway industry to date has focused on securement practices. However, the desired outcome of significantly reducing the number of uncontrolled movements has not yet been achieved.

The underlying causes of uncontrolled movements that occur while switching without air can vary greatly. Consequently, developing a comprehensive strategy to deal effectively with all of the underlying factors and associated risks in order to reduce the number of such uncontrolled movements is proving to be difficult. Therefore, the Board recommended that

¹ TSB railway investigation reports R16W0074, R16T0111, and R17W0267.

the Department of Transport work with the railway industry and its labour representatives to identify the underlying causes of uncontrolled movements that occur while switching without air, and develop and implement strategies and/or regulatory requirements to reduce their frequency.

TSB Recommendation R20-01

Previous responses and assessments

September 2020: response from Transport Canada

Transport Canada agrees with Recommendation R20-01, and is taking immediate steps to address identified and future gaps in the rail safety regulatory regime by the following actions:

Action #1

- Transport Canada is preparing a Ministerial Order, anticipated in September 2020, requiring industry to create a new Rule that provides additional requirements when conducting switching operations. The Rule will require that once switching is complete, it must be left properly secured.

Action #2

- Transport Canada continues to revise the *Railway Employee Qualification Standards Regulations* to strengthen oversight requirements and address gaps related to training and experience of employees to ensure that they can safely conduct their duties. In fall 2020, the Department will launch stakeholder consultations on key aspects of the regulations. Publication of the regulatory proposal in *Canada Gazette*, Part I, is planned for spring 2021.

The initiatives will provide opportunities for further engagement and discussions, including the requirements under *Railway Safety Act* for the industry to consult with labour organizations when drafting a new rule. Ultimately, this is to better understand the underlying causes of uncontrolled movements and provide nationally consistent standards to mitigate the risks of uncontrolled movements that occur during switching activities, and reduce their frequency.

December 2020: TSB assessment of the response (Satisfactory in Part)

Transport Canada (TC) agrees with the recommendation and has proposed a 2-step action plan. The first step, to issue a Ministerial Order (MO), was completed on 29 September 2020 – MO 20-09. It directed the railway industry to revise the *Canadian Rail Operating Rules* to address 3 key risks during switching operations as follows:

1. Requirements for location of switching operations
2. Requirements when performing switching operations
3. Requirements for switching with remote control locomotives

The MO requires industry to meet and discuss the proposed rules with affected associations and organizations and to file the proposed rules with the Minister of Transport by 01 June 2021.

While switching without air is routine and occurs every day in the railway industry, the practice has some inherent risks that can result in serious consequences. TC has recognized that these risks and their potential for severe outcomes need to be addressed as quickly as possible. The rapid issuance of the MO brings needed attention to this matter and clearly demonstrates TC's interest in reducing the safety deficiency highlighted under Recommendation R20-01.

Although TC's past regulatory focus for reducing unplanned/uncontrolled movements has been largely directed at the securement of equipment, it is encouraging that the MO may improve the likelihood of solutions being put in place for increasing the lines of defence against hazards inherent with switching operations. The effectiveness of TC's response, however, cannot yet be fully ascertained until the consultations with the railway industry and its labour representatives have occurred, the underlying causes of uncontrolled movements that occur while switching without air are better understood, and strategies have been developed and implemented to reduce their frequency. Therefore, until the consultations are complete and strategies to reduce the frequency of uncontrolled movements that result from switching without air have been identified and implemented, the Board considers the response to Recommendation R20-01 to be **Satisfactory in Part**.

The second step in TC's response makes reference to future stakeholder consultations on key aspects of the *Railway Employee Qualification Standards Regulations*. These are planned for fall 2020; however, they have not yet been initiated. The goal is to strengthen oversight requirements and address gaps related to training and experience of employees in the regulations to ensure that they can conduct their duties safely. This should address the Board safety concern issued at the same time as Recommendation R20-01.

The Board is encouraged that TC acknowledges the existence of gaps in the training and qualification for employees in safety-critical positions and that it is actively working in a number of areas to address these gaps, including amendments to the regulatory framework.

November 2021: response from the Railway Association of Canada

In September 2020, TC issued MO20-09 requiring railway companies and local railway companies to revise the *Canadian Rail Operating Rules* (CROR) to incorporate provisions governing switching operations. CROR were revised and filed with the Minister on June 1, 2021. These rules were approved by the Minister on July 29, 2021 and came into effect on October 28, 2021.

December 2021: response from Transport Canada

Transport Canada reaffirms its agreement with this important recommendation. Taking action in this area, the department has implemented several measures to mitigate the risk of uncontrolled movements that occur while switching without air. Following the September 29, 2020 Ministerial Order (MO) 20-09 on this topic, Transport Canada approved changes to the *Canadian Rail Operating Rules* (CROR) to improve safety and prevent uncontrolled movements while conducting switching operations, and to ensure that equipment

is properly secured while switching. These changes came into force on October 28, 2021. The amended CROR now prescribes:

- when air brakes must be used during switching operations to ensure a consistent approach across the railway system (Rule 113.3);
- measures to ensure that stationary equipment is secured during switching operations to prevent uncontrolled movements (Rules 113.1 and 113.2); and
- speed restrictions when switching is conducted with a remotely controlled locomotive (Rule 70).

In addition, Transport Canada held a workshop with industry and labour representatives on May 17, 2021 concerning uncontrolled movements. Participants reviewed analyses of the uncontrolled movement data, underlying causes, risks, and measures taken to date. Building on the outcomes of the workshop, the department will publish a call for proposals to research potential mitigation measures applicable to uncontrolled railway equipment movements. That research will look into:

- integration of new and existing technologies with modern railway switching operations;
- analysis of human factors contributing to this issue; and
- best practices from other transportation modes and sectors.

In parallel, Transport Canada continues to move forward with updating the regulatory regime for railway employee training and qualification. Progress in this area has accounted for landmark reports on rail safety in Canada, such as the February 2021 Auditor General's follow-up audit on rail safety oversight, extensive review of observations and findings from TSB investigation reports, as well as from Transport Canada inspections and audits. Drawing on these findings, the department has prepared proposed regulatory changes aligned with the TSB's recommendations and findings, including with respect to training programs, crew resource management, on-the-job training, and re-certification. To support a consultative approach in this area, on November 16, 2021, Transport Canada published a discussion paper² that outlines key policy considerations (e.g. scope of application, training requirements, examinations and evaluations) for updating the *Railway Employee Qualification Standards Regulations*. The discussion paper has been posted on TC's website for a 60-day consultation period and during this period, the department will also engage in targeted consultations with stakeholders. Pending the results of these consultations, publication of the regulatory proposal in Canada Gazette, Part I, is planned for spring 2022.

Building on this progress, Transport Canada will undertake the following actions to further mitigate the risks of uncontrolled movements:

- Host a second workshop with industry and labour representatives, scheduled for January 24, 2022, to further assess the effectiveness of measures taken to date, and to explore next steps;

² <https://letstalktransportation.ca/reqsr> (last accessed 04 January 2023).

- Conduct a review of international train securement practices, with an emphasis on safety measures on mountainous terrain (2022); and
- Develop a discussion paper on potential solutions for integrating crew resource management practices into the Safety Management Systems Regulations (2022).

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

This recommendation is related to the TSB Watchlist 2020 key safety issue of “Unplanned/uncontrolled movements of rail equipment” that create high-risk situations that may have catastrophic consequences. It is also linked to Recommendation R14-04, in which the Board recommended that “the Department of Transport require Canadian railways to put in place additional physical defenses to prevent runaway equipment.”

In December 2021, TC reaffirmed its agreement with the recommendation. On 28 October 2021, following MO 20-09, the CROR were amended and now prescribe:

- when air brakes must be used during switching operations to ensure a consistent approach across the railway system (Rule 113.3);
- measures to ensure that stationary equipment is secured during switching operations to prevent uncontrolled movements (rules 113.1 and 113.2); and
- speed restrictions when switching is conducted with a remotely controlled locomotive (Rule 70).

In spring 2021, TC held a workshop with industry and labour representatives on the subject of uncontrolled movements and published a call for proposals to research potential mitigation measures. The Board looks forward to the results of these research initiatives.

TC also continues to move forward with updating the regulatory regime for railway employee training and qualification. To support a consultative approach in the area of training programs, crew resource management, on-the-job training, and recertification, on 16 November 2021, TC published a discussion paper that outlines key policy considerations for updating the *Railway Employee Qualification Standards Regulations* and has identified that it intends to conduct industry consultations.

The Board notes that, pending these consultations, publication of the regulatory proposal in the *Canada Gazette*, Part I, is planned for spring 2022.

The Board further notes that, in 2022, TC

- hosted a second workshop with industry and labour representatives;
- plans to conduct a review of international train securement practices; and
- plans to develop a discussion paper on potential solutions for integrating crew resource management practices into the Safety Management Systems Regulations.

The publication of the regulatory proposal and additional strategies to reduce the frequency of uncontrolled movements that result from switching without air are imminent. However, until

the details of the proposals are clear, the Board considers the response to Recommendation R20-01 to be **Satisfactory in Part**.

December 2022: response from Transport Canada

The prevention of uncontrolled movements continues to be a top priority for Transport Canada's rail safety program, and the department is committed to full implementation of this recommendation.³

To address this serious issue, Transport Canada has taken considerable action in several key areas:

Transport Canada approved changes to the *Canadian Rail Operating Rules* (CROR) to improve safety while employees are carrying out switching activities and to prevent uncontrolled movements. In developing these rule changes, labour was consulted by the Railway Association of Canada.

- In October 2021, Rules 113-113.7 of the CROR were updated and added to establish procedures and criteria to reduce the safety risks when conducting switching operations and reduce the incidence of uncontrolled movements during switching activities. Rule 70 implemented speed restrictions when switching is conducted with a remotely controlled locomotive. These rule changes are currently in force.
- In May 2022 the Department approved additional changes to the CROR with the addition of Rule 109 which establishes the duties required of the locomotive engineer when temporarily exiting the controlling locomotive cab on a standing movement. Rule 112 was also amended to clarify when equipment is considered unattended. This rule change is currently in force.
- In May 2022, the *Railway Locomotive Inspection and Safety Rules* were revised to strengthen requirements that must be met for a controlling locomotive equipped with a safety control system with roll-away protection, including how and when the system must activate. The revisions also provide for a comprehensive testing scheme to ensure the rollaway system is functioning as intended. This rule change is currently in force; however, some elements which required changes to equipment have a later coming into force date.

On January 24, 2022, using the Advisory Council on Rail Safety (ACRS) as a venue, TC hosted a second workshop with industry and labour representatives to further assess the effectiveness of measures taken to date, and to explore next steps, which include:

- Continued work by the TSB/Industry Rail Data Working Group on the issue of uncontrolled movements classification,

³ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues 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.

- Retention of uncontrolled movements as an area of focus for ACRS, regularly seeking updates from the work of the Rail Data Working Group.

Transport Canada also completed in January 2022 a 60-day online consultation on a proposal document to modernize the *Railway Employee Qualification Standards Regulations* (REQSR). A second round of consultations will occur once the updated regulations are pre-published in the Canada Gazette Part I in the fall of 2023. Changes proposed to the REQSR will address minimum requirements for various types of training and include requirements for Crew Resource Management (CRM). In the interim, until the updated regulation is in force, TC will develop a best-practices for CRM document incorporating learnings from aviation, other jurisdictions and academia by May 2023. Improvements in CRM, which includes improved communication between employees, will reduce the risk of incidents.

In 2022, TC also advanced research on human factors and new technologies for which preliminary findings were received in November 2022. Building on these findings, further research will be advanced in 2023 (research contract planned to begin in new fiscal).

Substantial changes have been made to the regulatory regime to reduce the risk of uncontrolled movements while employees are undertaking switching operations. The preliminary data from the TSB for 2022 (43 occurrences as of Nov 11) shows the number of uncontrolled movements for 2022 is on track to be the lowest number of occurrences since 2010 and is showing a continued downward trend since 2020. The department is encouraged by these improvements and is continuing to analyze the occurrence data to understand how the measures taken have impacted the number of occurrences.

January 2023: response from the Railway Association of Canada

In addition to the update provided in November, 2021, in January, 2022, the RAC and Transport Canada co-hosted a Rail Safety Workshop for discussing uncontrolled movements.

The industry through the Rail Data Working Group has proposed to the TSB changes to the occurrence categories of uncontrolled movements that, if implemented, would allow for better trend analyses of the underlying causes of uncontrolled movements. The industry and TSB have agreed to a trial period until the year end of 2022 in which Industry provides examples of reports which should reside within the new proposed categories.

March 2023: TSB assessment of the responses (Satisfactory Intent)

This recommendation is related to the TSB Watchlist 2022 key safety issue of “Unplanned/uncontrolled movements of rail equipment” that create high-risk situations that may have catastrophic consequences. It is also linked to Recommendation R14-04, in which the Board recommended that “the Department of Transport require Canadian railways to put in place additional physical defences to prevent runaway equipment.”

Despite the actions taken to improve safety and prevent uncontrolled movements, the trend of uncontrolled movements between 2010 and 2019 was on an upward trajectory, with a peak of

78 occurrences in 2019. Although the 2020 to 2022 data indicate a reduction in the number of such occurrences as compared to previous years, there is no statistically significant trend. Furthermore, this decrease may be due in part to the impact of COVID-19 on the rail industry as well as other disruptions to service in 2020 and 2021. In 2022, there were 52 uncontrolled movements; this number is slightly below the average for 2010 to 2022 (57) and similar to the number of occurrences in 2020 and 2021 (51 and 50, respectively).

In 2022, there were 23 uncontrolled movements related to switching without air; this number was slightly greater than the average for 2010 to 2022 (20) and greater than the number of occurrences in 2020 and 2021 (19 and 16, respectively).

In its response, Transport Canada (TC) indicated that it is committed to full implementation of this recommendation. In the 2021-2022 timeframe, TC approved several changes to the *Canadian Rail Operating Rules* to improve safety while employees are carrying out switching activities and to prevent uncontrolled movements, including new Rule 109, and updated Rule 112, and rules 113 to 113.7.

In May 2022, the *Railway Locomotive Inspection and Safety Rules* were revised to strengthen the requirements for a controlling locomotive equipped with a safety control system with roll-away protection, including how and when the system must activate.

On 24 January 2022, during the Advisory Council on Rail Safety, TC and the Railway Association of Canada co-hosted a second workshop with industry and labour representatives to further assess the effectiveness of measures taken to date and to explore next steps.

TC also completed a 60-day online consultation in January 2022, on a proposal to modernize the *Railway Employee Qualification Standards Regulations*. A second round of consultations will occur once the updated regulations are pre-published in the *Canada Gazette*, Part I in the fall of 2023.

In 2022, TC also advanced research on human factors and new technologies for which preliminary findings were received in November 2022.

The Board appreciates TC's and industry's efforts and acknowledges the significant safety action taken to date. However, the desired outcome of significantly reducing the frequency and associated risks of uncontrolled movements while switching without air has not yet been achieved. Therefore, the Board considers the response to Recommendation R20-01 to show **Satisfactory Intent**.

Latest response and assessment

December 2023: response from Transport Canada

Transport Canada (TC) is actively addressing the safety concern of uncontrolled movements during switching without air, dedicating efforts to identifying underlying causes.

TC heightened its oversight inspections within railyards, specially focusing on switching activities. As of November 11, 2023, 42 out of the 60 planned inspections on switching and securement activities across the nation have been concluded. Notably, zero instances of non-compliance related to switching have been observed in the 42 completed inspections.

TC continues to advance its research efforts on human factors and new technologies. TC has initiated a research contract that will assess human factors related to uncontrolled movement incidents in the rail industry. Furthermore, the initiative will study safety protocols from other safety-critical sectors to gain best practices for human factors related to dangerous operations. This TC-guided study will thoroughly explore human factors, technological solutions, and operational behaviors. The project aims to develop a guidance document for Canadian railway operators, highlighting best practices to mitigate the risk of uncontrolled movements.

Additionally, in anticipation of regulatory changes to the *Railway Employee Qualification [Standards] Regulations* that will encompass provisions addressing crew supervision, crew resource management, and oversight of less-experienced employees, TC has taken interim measures by developing and publishing a Crew Resources Management training best practice document on its website.⁴ Transport Canada is targeting publication of a new and strengthened training and qualification regulation for railway safety-critical positions in the *Canada Gazette*, Part I in 2024.

January 2024: response from the Railway Association of Canada

As stated in the comments relating to R14-04, much of the data referenced by the TSB does not relate to occurrences that create “high-risk situations that may have catastrophic consequences.” Moreover, relying on total numbers of uncontrolled movement occurrences to determine trends in risk mitigation is overly simplistic and inaccurate, because these numbers do not account for main track versus non-main track occurrences, level of potential consequence, or normalization of data using gross ton miles.

The Rail Data Working Group determined shortfalls with categorizing switching occurrences in terms of whether or not air was involved. It subsequently updated the categories of uncontrolled movements. The new categories are: Securement, Switching, Loss of Control, and Vandalism. Sub-categories for environmental effects, third party handling, and equipment failure would be considered uncontrolled movements, though under an “other” category. The RDWG also agreed to identify occurrences that were successfully mitigated with a derail.

Based on an Excel sheet that TSB shared with the RDWG in September 2023, the trend in switching uncontrolled movements (UMs) was as follows:

- **2020: 9** switching UMs (12 total minus 3 equipment failures)
- **2021: 8** switching UMs (16 total minus 7 equipment failures and 1 third-party handling)

⁴ Transport Canada, Best practices for crew resource management training, May 2023.

- **2022: 11** switching UMs of which 2 were successfully mitigated with a derail (22 total minus 7 equipment failures, 1 third-party handling, and 3 environmental effects)
- **2023 (Jan-Aug YTD): 3** switching UMs (8 total minus 5 equipment failures)

Because the TSB no longer categorizes switching occurrences based on whether air was involved, and more useful categories have been implemented, R20-01 should be closed.

March 2024: TSB assessment of the responses (Satisfactory Intent)

This recommendation is related to the TSB Watchlist 2022 key safety issue of “Unplanned/uncontrolled movements of rail equipment” that create high-risk situations that may have catastrophic consequences. It is also linked to Recommendation R14-04, in which the Board recommended that “the Department of Transport require Canadian railways to put in place additional physical defences to prevent runaway equipment.”

In its response, Transport Canada (TC) indicated that it is actively addressing the safety concern of uncontrolled movements during switching without air.

TC increased its oversight inspections in yards, focusing on switching activities. As of 11 November 2023, TC completed 42 planned yard inspections on switching and securement activities across Canada and found no instances of non-compliance.

In 2023, TC continued to advance its research on human factors and new technologies. TC initiated a research study aimed at assessing human factors related to uncontrolled movements within the rail industry and at studying safety protocols from other safety-critical sectors to gain best practices for human factors related to dangerous operations. At the end of this study, a guidance document will be published for Canadian railway operators; it will highlight best practices to mitigate the risk of uncontrolled movements.

Furthermore, TC developed and published a document on best practices for crew resource management (CRM) training, which was posted on its website in June 2023. The publication of this best practices document is an interim measure in anticipation of the regulatory changes to the *Railway Employee Qualification Standards Regulations* (REQSR). In 2023, TC held targeted consultations with the railway industry and unions to ensure the feasibility of the proposed new requirements in the updated REQSR. TC intends to pre-publish the proposed REQSR in the *Canada Gazette*, Part I, in 2024. The revised REQSR will include provisions addressing CRM and oversight of less experienced employees. In the meantime, TC has published its CRM training best practices document, which will ensure that railway employees have a comprehensive resource until the updated REQSR are in effect.

The Board is encouraged by the initiatives taken to date by TC to identify the underlying causes of uncontrolled movements that occur while switching without air, which include increasing its oversight inspections in yards, and advancing its research aimed at assessing human factors related to uncontrolled movements within the rail industry.

The trend of uncontrolled movements between 2010 and 2019 was on an upward trajectory, with a peak of 78 occurrences in 2019. The 2020 to 2023 data show a reduction in the number of occurrences as compared to previous years (43 in 2020, 49 in 2021, 49 in 2022, and 33 in 2023). The number of occurrences in 2023 is the lowest reported over the last 10 years and is below the 10-year average of 58 reported between 2013 and 2022.

The trend for uncontrolled movements categorized as switching was also on an upward trajectory between 2010 and 2019, with a peak of 35 occurrences in 2019. The data show a decrease in 2020 (12) followed by an increase in 2021 (16) and 2022 (22). However, the number of occurrences reported in 2023 (14) is the lowest since 2020 and 2012 (12) and is below the the 10-year average of 22 reported between 2013 to 2022. While the number of switching type uncontrolled movements has decreased since 2019, the decrease in occurrences in 2020 and 2021 may be due in part to the impact of COVID-19 on the rail industry as well as other disruptions to service. Despite this recent decrease in occurrences, additional data are required to determine whether this is a statistically significant trend and whether the defences that are in place are, in fact, achieving the desired outcome. Therefore, the Board considers the response to Recommendation R20-01 to show **Satisfactory Intent**.

File status

The TSB is monitoring TC's and the railway industry's progress on their planned actions.

This deficiency file is **Active**.