



## REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION R17-02

### Rail surface condition data for risk-based planning

#### Background

On 7 March 2015, at 0242 Eastern Standard Time, Canadian National Railway Company (CN) crude oil unit train U70451-02 was proceeding eastward at about 43 mph on CN's Ruel Subdivision when it experienced a train-initiated emergency brake application at Mile 88.70, near Gogama, Ontario. A subsequent inspection determined that the 6th to the 44th cars (39 cars in total) had derailed. As a result of the derailment, about 2.6 million litres of petroleum crude oil (UN1267) was released to atmosphere, water, or surface. The released product ignited and caused explosions, and some product entered the nearby Makami River. A CN bridge over the Makami River (at Mile 88.70) and about 1000 feet of track were destroyed. There was no evacuation, and there were no injuries.

#### TSB Recommendation R17-02 (August 2017)

Railway companies are responsible for the safety of their operations and for being in compliance with all regulatory requirements. In many cases, with regard to track inspection, railways have additional standards that supplement or exceed the Transport Canada (TC)-approved *Rules Respecting Track Safety* (TSR). TC is responsible for ensuring regulatory compliance through compliance monitoring, inspections and audits.

Individual railway subdivisions are not necessarily subject to a regular schedule of TC inspections. Instead, TC uses a risk-based approach that considers various factors to identify specific subdivisions or areas of subdivisions that require targeted inspection. TC prioritizes inspections by considering different operational factors including rail and geometry defects, passenger trains and high operating speeds, and tonnage. There are 3 components to TC's risk-based approach:

- TC Headquarters develops a national inspection plan for the next year using a statistical model, identifies the number of inspections, and targets companies that are to receive these inspections.
- TC regions focus on specific recurring issues requiring closer monitoring using a risk-based business planning process to identify the companies that are to receive these inspections.
- TC performs unplanned inspections that respond to emerging issues such as rail accidents.

For the national inspection plan, regional functional groups rank the subdivisions, yards, and maintenance facilities according to risk. Factors considered include accident history, compliance with standards and regulations, changes in operations, amount and type of traffic, hours of work, type of work performed, previous TC and railway inspections, and maintenance history. While a significant increase in overall freight or DG traffic or other indicators may be considered, they do not necessarily influence which subdivisions are planned for inspection. However, despite the planning process, there appears to be gaps in the type of data used for planning the targeted regulatory track inspections.

Since May 2014, there were 5 other TSB investigations where either a track joint or rail failure occurred in the immediate vicinity of pre-existing localized surface collapse (LSC) or rail end batter (REB) conditions and/or a regulatory track inspection had not been conducted in over 2 years. Specifically:

- In 3 of the 5 occurrences, track joint or rail failure occurred in the immediate vicinity of pre-existing LSC or REB rail surface conditions which, although not condemnable, were being monitored by the railway at the time.
- In 4 of the 5 occurrences, the most recent TC regulatory inspections conducted prior to the accident were in 2012, after which TC planning for regulatory track inspections did not identify the subdivisions for planned track inspections. In each of these occurrences, railway track maintenance practices were not adequate and had placed the track infrastructure at risk. The regulatory oversight did not identify the ineffective railway track maintenance and the track further deteriorated until a derailment occurred.

Rail flaw technology to detect LSC, REB, and crushed head (CH) rail surface conditions is relatively new. To detect and record these conditions, some railways have developed comparable, but not harmonized, thresholds. Before this technology was implemented, these conditions were usually detected by visual inspection, but relatively few were identified. After the technology was implemented, the number of identified rail surface conditions increased significantly. On the Ruel Subdivision, between January 2014 and March 2015, LSC, REB, and CH rail surface conditions accounted for about 76% of the 570 rail defects and conditions identified by rail flaw testing. These conditions also represented a significant increase in workload as they required additional monitoring and/or repair by the railway.

LSC, REB, or CH rail surface conditions are leading indicators of deteriorating rail but the TSR contains no guidance or condemning criteria for them. If not properly addressed in the field, REBs can result in joint failure and derailment. LSCs, REBs, and CHs can result in high contact stresses and can lead to or accelerate the development of other rail defects such as a transverse detail defect (TDD) or a vertical split head (VSH) which can fail rapidly and result in a derailment.

However, information for these emerging rail surface conditions is not generally provided to TC, specifically considered as part of TC's risk-based approach, or reviewed by TC for any increase in the number of these conditions.

With more complete LSC, REB, and CH data, TC's risk-based approach for planning targeted regulatory track inspections can be augmented using this valuable information relating to leading indicators of degrading track conditions. The absence of this information represents a gap in TC's planning process, which can result in targeted inspections that are not well focused. Therefore, the Board recommends that:

The Department of Transport acquire rail surface condition data, including information on localized surface collapse, rail end batter and crushed heads, and incorporate it into its risk-based planning approach for targeted regulatory track inspections.

#### **TSB Recommendation R17-02**

#### **Transport Canada's response to Recommendation R17-02 (November 2017)**

Transport Canada (TC) supports this recommendation. The department has requested data on rail surface condition including localized surface collapse, rail end batter and crushed heads from the Canadian National Railway (CN) and from the Canadian Pacific Railway (CP). Both CN and CP have agreed to provide the information to TC going forward. The information will be used to inform the department's risk-based track inspections on an ongoing basis starting in 2018-19.

TC has decided to put the focus on CN and CP at this time. CN and CP own more than 80% of the rail network in Canada. TC will determine on a case by case basis what additional information is required from the remaining companies that fall under the federal regime.

#### **TSB assessment of Transport Canada's response to Recommendation R17-02 (January 2018)**

Transport Canada has acknowledged and supports this recommendation. TC has requested data on rail surface condition, including localized surface collapse, rail end batter and crushed heads, from both CN and CP. Both companies have agreed to provide this information to TC going forward. TC plans to use this information in its risk-based planning approach for targeted regulatory track inspections on an ongoing basis starting in 2018-19. With respect to other federally-regulated railway companies, TC will determine on a case by case basis what additional information is required.

The Board is very encouraged that TC has rapidly taken action to implement the recommendation. Until the proposed action for 2018-19 has taken place, the Board assesses the response to Recommendation R17-02 as having **Satisfactory Intent**.

#### **Transport Canada's response to Recommendation R17-02 (February 2019)**

Transport Canada (TC) supports this recommendation. The department is receiving data on rail surface condition including localized surface collapse, rail end batter and crushed heads from the Canadian National Railway (CN) and from the Canadian Pacific Railway (CP), as an additional component of their annual submissions of information related to railway safety as per the *Transportation Information Regulations (TIRS)*.

The rail surface condition data provides indication of rail deterioration. Commencing in FY 2017-18, Transport Canada (TC) incorporated the rail surface conditions provided from CN and CP, to its risk based inspection program as a quantitative support to prioritize track inspections in FY 2018-19. For 2019-20, the department will initiate a review of the variation of rail surface conditions on a year by year basis to further support the track oversight program and will provide the inspectors with locations where rail deterioration could be occurring, based on the data analyzed. Going forward, the department expects to further refine its data analysis tools in order to continuously improve the prioritization and accuracy of inspections based on risk.

While Transport Canada will continue to focus on rail surface condition data from CN and CP given that they own the vast majority of the rail network in Canada, this work is one component of a much broader oversight program which includes the inspection of track for all regulated companies including shortlines.

### Risk-based Business Planning Methodology

To evaluate risk and to appropriately monitor railway operations, TC plans and carries out oversight using the Rail Safety risk-based business planning (RBBP) methodology. This methodology is designed to identify issues for which a possible intervention may be required as well as to aid in the prioritization of the department's inspection regime. Oversight activities the department conducts can take different forms, such as, on-site inspections, audits, reviews and data collection and analysis.

The RBBP methodology consists of randomly selected oversight activities (Component A) which verify the regulatory compliance within the railway industry and may detect emerging safety issues and immediate safety threats. Planned risk-based oversight activities, referred to as Component B, address risks identified and prioritized from an analysis of data from a number of sources. Reactive oversight activities, referred to as Component C, address emerging issues and follow up to verify appropriate corrective actions have been taken.

### Track Inspection

Component A track inspection locations are randomly selected from both Class 1 railways and federally regulated shortlines. Component B track inspection, also conducted on both Class 1 railways and federally regulated shortlines are informed by data sources such as past inspection results, audit reports, enforcement actions, as well as external data including commodities information, occurrences reported to the TSB and TIRS data. Component C inspection are also conducted on Class 1 and shortline railways as required.

### **Railway Association of Canada's response to Recommendation R17-02 (February 2019)**

The required information (i.e., rail surface condition data) is provided to TC by CN and CP.

### **TSB reassessment of Transport Canada's response to Recommendation R17-02 (March 2019)**

In 2018, Transport Canada (TC) received data on rail surface conditions including localized surface collapse, rail end batter and crushed heads from Canadian National Railway (CN) and from Canadian Pacific Railway (CP). The rail surface condition data provided information on the general level of rail deterioration. TC incorporated the rail surface condition information into its risk based inspection program to help prioritize its track inspections in fiscal year 2018-19.

For fiscal year 2019-20, TC will initiate a review of the variation of rail surface conditions on a year by year basis to further support the track oversight program. With the on-going use of this information in future years, TC will refine its data analysis tools to continuously improve the prioritization and accuracy of inspections based on risk.

TC carries out oversight at all federally-regulated railways using its risk-based business planning (RBBP) methodology. This methodology is based on 3 components:

- Component A - Randomly selected oversight activities will help verify regulatory compliance and monitor for emerging safety issues and immediate safety threats.
- Component B - Planned risk-based oversight activities will help address the identified risks.
- Component C - Reactive oversight activities will help address emerging issues and will include follow-up to verify that appropriate corrective actions have been taken.

For railways that do not have automated rail surface condition information (e.g., shortline railways), TC will continue to apply its RBBP methodology, including conducting targeted regulatory track inspections (Component B) based on data sources such as past inspection results, audit reports, and enforcement actions.

As the use of rail surface condition information for CN and CP is now fully integrated into TC's risk-based planning approach for targeted regulatory track inspections, the Board considers the response to Recommendation R17-02 as **Fully Satisfactory**.

This deficiency file is **Closed**.