Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

RAILWAY INVESTIGATION REPORT

R00D0026

DERAILMENT

CANADIAN NATIONAL
FREIGHT TRAIN NO. L-525-21-10
MILE 83.70, MASSENA SPUR
BROSSARD, QUEBEC
10 MARCH 2000

Canada

Railway Investigation Report

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Summary

On 10 March 2000, at about 1924 eastern standard time, Canadian National (CN) westward freight train No. L-525-21-10, destined for Saint-Isidore, Quebec, derailed five cars at Mile 83.70 on the Massena Spur of the Rouses Point Subdivision at Brossard, Quebec. The derailment occurred after the train went through a public crossing. Four cars came to rest on their side in the ditch; three of these contained dangerous goods, but no product was lost. Twenty people were evacuated as a precautionary measure.

Ce rapport est également disponible en français.

Other Factual Information

On 10 March 2000, the train left Saint-Lambert, Quebec, at about 1734 eastern standard time (EST)[1], and proceeded west on the Massena Spur (the spur) of the Rouses Point Subdivision, destined for Saint-Isidore, Quebec.

The train consisted of 2 locomotives and 11 cars (8 loaded and 3 empty cars), was about 730 feet long and weighed some 1 330 tons. Freight train No. L-525-21-10 is the only one that uses the spur and makes return trips from Saint-Lambert to Saint-Isidore five days a week. In the first six months of 2000, a total of 3 231 cars (1 856 loaded and 1 375 empty cars) travelled on the spur, carrying all categories of goods (including dangerous goods). In the three years before the accident, i.e., 1997-1999, the total numbers of dangerous goods cars travelling on the spur were 2 499, 4 411 and 2 818, respectively. The spur starts at Mile 84 (Mile 36.30 of the Rouses Point Subdivision) and ends at Mile 72.5 at Saint-Isidore. The track of the spur is a Class 2 track, which means that the maximum allowable speed for freight trains is 25 mph. The maximum speed on the spur is 25 mph, and there is a permanent speed restriction of 20 mph between Mile 83.3 and Mile 83.9 due to the condition of the track.

Movements on the Massena Spur are governed by the Occupancy Control System (OCS) of the Canadian Rail Operating Rules (CROR) and supervised by a rail traffic controller (RTC) located in Montréal, Quebec.

The train departed from the beginning of the spur (Mile 84), accelerated to 23 mph, and was travelling at a constant speed when it went through the public crossing at Mile 83.70 at 1924:36. The train crew noticed nothing unusual when the lead locomotive went through the crossing. The train was stopped by a heavy application of the air brakes from the brake pipe. The crew inspected the train and noticed that the air brake hose on car CGTX 20577 was disconnected and bent; as a result, the air in the brake pipe could not escape rapidly. The crew also observed that five cars were derailed—four had rolled onto their side in the ditch and the fifth was still upright on the railway right-of-way. The crew contacted the RTC and notified him of the situation. Three of the derailed cars were tank cars containing dangerous goods: car PROX 73132 and car CITX 76201 were carrying molten naphthalene (UN 2304), a Class 4.1 flammable solid, and car CGTX 20689 was carrying creosote (UN 3082), a Class 9.2 dangerous good. No product was released as a result of the derailment. The other two derailed cars were hopper cars. As a precautionary measure, the Brossard fire department ordered the evacuation of about 20 people in the area.

The three tank cars and two hopper cars were damaged but the tanks remained intact. The track was heavily damaged over a length of about 170 feet.

Wheel marks were observed on the running surface of the head of the south rail 15 feet west of the crossing, but no marks were found on the crossing or on the rail anchors and tie plates before that location. The gauge at the west end of the crossing was 57 1/2 inches (measured

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[1] All times are EST (Coordinated Universal Time (UTC) minus five hours) unless otherwise stated.

when unloaded). The south rail was lower than the north rail due to the left-hand curve when travelling west. Transport Canada (TC) standards for the gauge of this class of track are 56 inches to 57 3/4 inches. Evidently, the gauge is greater when there is a load on the track. Normal gauge, when ties are in good condition, vary between 4 feet 8 inches and 4 feet 9 3/4 inches.[2] TC standards for verifying track geometry of an unloaded track state that:

> When unloaded track is measured to determine compliance with requirements of this part, the amount of rail movement, if any, that occurs while the track is loaded must be added to the measurements of the unloaded track.[3]

Five gauge rods were installed over a distance of about 79 feet on the east side of the crossing, and 12 gauge rods were installed over a distance of some 150 feet on the west side. The gauge rods were installed after the last inspection by the track geometry test car on 28 June 1999. The condition of the ties before the derailment is unknown. On annual inspections, foremen are required to examine the ties by walking along the track. During the 2000 annual inspection, CN identified this portion of the subdivision as requiring replacement of the ties and was planning to replace some 2 200 ties over the course of 2000.

The track foreman had performed nine inspections since the beginning of the year and found no deficiencies other than bolts that needed tightening or replacement. Although he knew that the track was not in perfect condition, the track foreman felt it was safe because the maximum speed had been reduced from 40 mph to 25 mph when the track was redesignated from main track to spur. The foreman's inspections consist of riding the track in a maintenance vehicle and verifying the track to detect areas that do not comply with the standards. The foreman does not use instruments to measure track gauge or wear unless he detects obvious defects. It is important to note that it is difficult to visually check track gauge at a crossing because the track structure is covered. The track was also inspected by a track geometry test car on 28 June 1999. That car takes measurements to verify track geometry. The results of that inspection reveal that no measurements were taken between Mile 83.91 and Mile 84 because the track geometry test car was moving too slow. The data recorded after Mile 83.91 indicate numerous deficiencies, some requiring immediate corrective action. CN practices require that the foreman look for and correct defects in areas where the track geometry test car does not take readings.

Analysis

The train brakes were applied when five cars derailed immediately to the west of the crossing. All indications are that the wheels dropped inside the rails where the distance between the rails was too great to support the weight of the cars.

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[2] Given that the wheel on the low side of the curve dropped inside the rails, the gauge under load would have exceeded 59.72 inches (distance between the wheels: 53 1/16 inches, wheel width (including the flange): 5 16/32 inches, and flange width: 1 5/32 inches).

[3] Transport Canada, *Railway Track Safety Rules* (1998), page 5.

The analysis will focus on the track gauge and the inspections performed by the track foreman and the track geometry test car.

Traffic volume on the spur is low. Since it is only a spur track with a relatively low maximum speed, the track is classified as Class 2, which means that the applicable structure standards are slightly less stringent than for Class 3, 4, 5 or 6 tracks. The higher the track class, the more stringent the structure standards and the higher the train speed limit will be.

Several gauge rods were installed on either side of the crossing, indicating that CN had detected track gauge problems and decided to use gauge rods to keep the gauge within the required standards. Installing gauge rods is considered a temporary corrective measure and requires that closer attention be paid to the condition of the track. The use of several gauge rods on both sides of the crossing was an ineffective means of maintaining track gauge over the long term.

The gauge rods and the planned tie replacement work indicate that the ties were deteriorated. In fact, the gauge exceeded the allowable range of 57 3/4 inches, resulting in the derailment of car CGTX 20689.

The inspections performed by the track foreman in a track unit revealed only defects that were easily visible, like missing bolts. Since the visual inspections seldom include gauge measurements, they cannot always detect incorrect track gauge. The *Railway Track Safety Rules* state that track inspections must reveal any deviation from the requirements; however, since track foremen conduct these inspections by track unit and they do not always measure track gauge, they find it very difficult to determine tie condition and gauge.

In addition to the track foreman's inspections, a track geometry test car is used to perform annual inspections. CN relies on the accuracy of the measurements taken by the track geometry test car to quickly verify track geometry, which is not easy to do visually. The last time the track geometry test car was used to take track measurements, it took no readings between the beginning of the spur and Mile 83.48; as a result, the defects in this area were not detected.

The use of the track geometry test car by CN is recognized as a means of collecting a lot of information on track condition. The data collected by the car for the beginning of the spur indicate that no readings were taken because the car was moving too slow at the start of the inspection run. Given the importance placed on the readings taken by the track geometry test car, if readings are unavailable for certain sections of track, the information required to ensure track safety is not available and risks associated with the structure may not be detected.

The use of gauge rods indicates that there were problems relating to the ability of the ties to maintain the required gauge. The presence of a large number of gauge rods and the fact that CN had planned to replace the ties indicate that CN was aware of track structure problems at this location.

Findings

Findings as to Causes and Contributing Factors

1. When the train went through the crossing, its weight caused the track gauge to exceed standards and the wheels of car CGTX 20689 dropped inside the south rail (the lower rail) 15 feet west of the crossing.

Other Findings

1. The use of several gauge rods on both sides of the crossing was an ineffective means of maintaining track gauge over the long term.

2. The *Railway Track Safety Rules* state that track inspections must reveal any deviation from the requirements; however, since track foremen conduct these inspections by track unit and they do not always measure track gauge, they find it very difficult to determine tie condition and gauge.

3. Given the importance placed on the readings taken by the track geometry test car, if readings are unavailable for certain sections of track, the information required to ensure track safety is not available and risks associated with the structure may not be detected.

4. The presence of a large number of gauge rods and the fact that CN had planned to replace the ties indicate that CN was aware of track structure problems at this location.

Safety Action

Action Taken

On 23 March 2000, CN permanently reduced the speed limit between Mile 83.30 and Mile 83.90 from 20 mph to 10 mph.

Beginning in April 2000, CN replaced 260 hardwood ties between Mile 84 and Mile 83 and a total of 2 275 ties on the whole spur.

The crossing was completely rebuilt in May 2000.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 10 July 2001.