



**AMENDED**

**RAILWAY OCCURRENCE REPORT**

**COLLISION**

**CN NORTH AMERICA  
MILE 124.21, THREE HILLS SUBDIVISION  
CALGARY, ALBERTA  
24 JANUARY 1994**

**REPORT NUMBER R94C0010**

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**Canada**

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## **MANDATE OF THE TSB**

The Canadian Transportation Accident Investigation and Safety Board Act provides the legal framework governing the TSB's activities. Basically, the TSB has a mandate to advance safety in the marine, pipeline, rail, and aviation modes of transportation by:

- conducting independent investigations and, if necessary, public inquiries into transportation occurrences in order to make findings as to their causes and contributing factors;
- reporting publicly on its investigations and public inquiries and on the related findings;
- identifying safety deficiencies as evidenced by transportation occurrences;
- making recommendations designed to eliminate or reduce any such safety deficiencies; and
- conducting special studies and special investigations on transportation safety matters.

It is not the function of the Board to assign fault or determine civil or criminal liability. However, the Board must not refrain from fully reporting on the causes and contributing factors merely because fault or liability might be inferred from the Board's findings.

## **INDEPENDENCE**

To enable the public to have confidence in the transportation accident investigation process, it is essential that the investigating agency be, and be seen to be, independent and free from any conflicts of interest when it investigates accidents, identifies safety deficiencies, and makes safety recommendations. Independence is a key feature of the TSB. The Board reports to Parliament through the President of the Queen's Privy Council for Canada and is separate from other government agencies and departments. Its independence enables it to be fully objective in arriving at its conclusions and recommendations.



The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

## Railway Occurrence Report

### Collision

CN North America  
Mile 124.21, Three Hills Subdivision  
Calgary, Alberta  
24 January 1994

Report Number R94C0010

### *Synopsis*

During a running switch, a rail car rolled out of control on a descending grade striking the warehouse door of Federated Cooperatives Limited. Two workmen inside the warehouse were injured.

The Board determined that the operating crew did not apply the prescribed operating procedure.

Ce rapport est également disponible en français.

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## *1.0 Factual Information*

### *1.1 The Accident*

At 0820 mountain standard time (MST) on 24 January 1994, CN North America (CN) 0800 yard assignment (the yard assignment), consisting of two locomotives and one car, departed from Sarcee Yard northward on the Three Hills Subdivision for the Federated Cooperatives Limited spur at Mile 124.21. At the spur switch, the crew performed a running switch with a loaded refrigerator car, FGMR12042. While performing the running switch, the foreman realized that the car was beginning to accelerate down the grade towards the Federated Cooperatives Limited warehouse door. The foreman's attempts to stop the car on the spur by applying the hand brake were unsuccessful. The car gained speed on the descending grade and the foreman detrained before the car struck the Federated Cooperatives Limited warehouse door. Two employees of a firm contracted by Federated Cooperatives Limited, who were working inside the building on the opposite side of the warehouse door, were struck by portions of the broken door.

### *1.2 Injuries*

One employee of the contracted firm sustained a minor injury and the other sustained a serious head injury.

### *1.3 Damage to Rolling Stock*

There was no damage to railway equipment.

### *1.4 Other Damage*

The Federated Cooperatives Limited warehouse door was destroyed, the warehouse siding sustained minor damage, and a compressor was slightly damaged.

### *1.5 Personnel Information*

The crew of the yard assignment included a yard foreman, a locomotive engineer and a yardman. All crew members were familiar with the Three Hills Subdivision, were qualified to the requirements of their respective positions and met fitness and rest standards established to ensure the safe operation of trains.

### *1.6 Train Information*

The yard assignment comprised two locomotives and one car. It departed Sarcee Yard following brake tests and inspection with no irregularities noted.

### *1.7 Method of Train Control*

Traffic in the area is governed by Rule 105 of the Canadian Rail Operating Rules (CROW) which requires equipment to operate at reduced speed and be prepared to stop short of a displayed red flag, by railway timetable footnotes, and by CN System Special Instructions.

### *1.8 Weather*

The temperature was minus seven degrees Celsius and visibility was good.

### *1.9 Occurrence Site Information*

The Federated Cooperatives Limited spur at Mile 124.21 extends for 1,521 feet from the spur switch to the warehouse door east from the main track. It has a 14-degree right-hand curve and a maximum descending grade of 1.54 per cent. The track extends 350 feet inside the warehouse.

### *1.10 Tests and Research*

#### *1.10.1 Tests on Car FGMR12042 Air Brake System*

An inspection and air brake test on rail car FGMR12042 determined that the air brakes were functioning properly and that all components were within specification.

#### *1.10.2 Tests on Car FGMR12042 Hand Brake System*

An examination of the hand brake and its related components revealed that the connection pin holes in both the fulcrum brackets and levers were badly worn. In addition, the No. 1 fulcrum bracket was not standard to the car and the bell crank was improperly positioned. Therefore, the hand brake was ineffective.

#### *1.10.3 TSB Engineering Laboratory Report (LP 033/94)*

The TSB Engineering Laboratory conducted a test to calculate the approximate speed at which the car was travelling at the time it struck the warehouse door. The report contends that a rail car rolling free down a maximum 1.5 per cent grade for 1,521 feet would reach a speed of between 17 and 18 mph.

## 1.11 *Other Information*

### 1.11.1 *The Switching Activities of CN 0800 Yard Assignment Crew*

At the commencement of the yard assignment crew shift, the yardmaster instructed the crew to "spot" loaded car FGMR12042 inside the Federated Cooperatives Limited warehouse. The crew intended to allow the uncoupled car to run free down the spur and control its speed to the warehouse door with the hand brake. The yard assignment crew switched the car from track No. 13 and left Sarcee Yard northward on the Three Hills Subdivision. The foreman asked the yardmaster by radio to have Federated Cooperatives Limited personnel open the warehouse door. The foreman then discussed with the yardman and the locomotive engineer how the running switch would be performed.

The foreman detrained from the lead locomotive and entrained on the north end of the car approximately 7 to 10 car lengths from the Federated Cooperatives Limited spur switch. He applied the hand brake as the locomotives were coming to a stop. The foreman did not fully apply the hand brake. Rather, he applied it only enough to ensure that the chain was tight. He stated that he did not hear the squeal of the brake shoes against the wheel or feel the retardation of the movement of the car. He believed that, if the chain was tight, the hand brake worked. He then released the hand brake and instructed the locomotive engineer to advance seven car lengths.

The yardman detrained from the lead locomotive at the spur switch, unlocked and lined the switch back and forth to ensure proper operation before returning it to the normal position.

The foreman detrained from the car and, as the movement proceeded southward, he entrained on the south end of the trailing locomotive so he could easily uncouple the car from the locomotive during the running switch. The first attempt was unsuccessful but, during the second attempt, the foreman waited to ensure that the uncoupling was completed before he detrained from the accelerating locomotive and entrained onto the leading end of the car.

The locomotives proceeded northward on the main track clear of the spur switch and the yardman lined the switch for the spur. The foreman told the locomotive engineer by radio that the locomotives were clear of the switch and he applied the hand brake as the car travelled northward onto the switch. The car slowed and, not wanting to stall on the switch, the foreman released the hand brake. A car length past the switch, the car gained speed so the foreman applied the hand brake again but the car continued to gain speed. The foreman called on the radio to inform his fellow crew members that the hand brake was not responding.

As the locomotive engineer moved the locomotive consist onto the spur, the speed of the uncoupled car was rapidly increasing. The foreman continued to attempt to apply the hand brake several times as the car gained speed on the grade. By the time the locomotives were on the curve, the car passed a switch located 240 feet from the warehouse door. The foreman detrained just before the car struck the warehouse door.

### 1.11.2 *Running Switch*

A running switch is a procedure generally designed to reverse the positions of a locomotive(s) and a car. The car is pulled by the locomotive in a facing point movement toward a switch and cut off in motion. The locomotive is accelerated ahead over the switch, the switch is turned, and the car is allowed to proceed under its own momentum to a different track. The locomotive can then move around the car.



Typically, the speed of the uncoupled car can be controlled by the application and release of the hand brake.

Ideally, the procedure should be carried out by a crew of four: one person who would be positioned at the switch to be turned, one who would be at the controls of the locomotive, one who would pull the operating lever on the locomotive, and one who would ride and control the uncoupled car. In addition, the CROR contains a discussion on the performance of a running switch which states that:

Before making a running switch, crew members affected must understand the movement to be made. It must be known that the switch and hand brakes are in working order before the movement is commenced.

#### *1.11.3 Switching Instructions for Industrial Tracks*

The CN General Operating Instructions contain a section on switching restrictions where spurs are involved which states that:

Air brakes must be in service on all cars when switching industrial tracks where there are gates or doors to be opened and on any other tracks with a descending grade towards gates or doors.

In this case, to apply this operating procedure and ensure that the air brakes were working, the crew members would have had to marshall their train such that, when they were ready to switch the car to the warehouse, the car would have been positioned ahead of the locomotives. According to government safety standards, a crew member would have been required to ride on the car from the yard to the warehouse spur. In this instance, the foreman or the yardman would have had to travel on the leading car for a distance of approximately two miles to protect the movement over crossings. Alternatively, the crew members would have had to perform the running switch, couple to the car in the lead position, and then connect and charge the air brakes on the car before moving down the spur.

#### *1.11.4 Training of Employees Involved in Switching Activities*

Crew members involved in this occurrence stated that it was the standard procedure to perform a running switch when moving cars to the Federated Cooperatives Limited warehouse door. When questioned regarding their responsibility to comply with the relevant operating procedures for industrial tracks which descend towards a door, the crew members stated that they could not recall being trained to be aware of this operating procedure.

CN was questioned regarding the content and format of training that employees involved in switching activities receive. It was indicated that training for employees is divided into two areas: the first is theoretical as it pertains to the rules and operating procedures for switching; the second is the practical application of the aforementioned rules and procedures. CN stated that there is no specific reference in the lesson plans to the requirements of rule 6.8(1)(c) of the CN General Operating Instructions; however, they are confident that the gist of the rule is made in class.

#### *1.11.5 Verification Procedure for Hand Brake Integrity*

In order to verify that a hand brake is in proper working order, an employee must observe physical and visible indicators. The employee must visually check all the hand brake components, including the brake wheel, lever, pawl, ratchet and chain. The employee must turn the brake wheel enough so that the retarding force is physically sensed and the employee can safely assume that the hand brake is in proper working order.

#### *1.11.6 The Federated Cooperatives Limited Warehouse*

Because of previous incidents where railway cars had gone through warehouse doors, a Federated Cooperatives Limited supervisor complained to CN crews about the running switch method of service to the warehouse; however, he was told that a running switch was the established practice for this location and that the switching crews were well aware of the procedure. He did not pursue the issue with CN supervisors.



## 2.0 *Analysis*

### 2.1 *Introduction*

The analysis will focus on the following areas: the condition of the hand brake on car FGMR12042 and the running switch performed by the operating crew of CN 0800 yard assignment.

### 2.2 *Consideration of the Facts*

#### 2.2.1 *The Condition of the Hand Brake on Car FGMR12042*

The hand brake was not in proper working condition because of worn parts, a non-standard replacement part and improper assembly. The foreman would have realized that the hand brake was not in proper condition if he had performed the complete test on the integrity of the hand brake before entering the spur. The foreman only turned the wheel until he was satisfied that the chain was tight. The brakes should be tightened until the squeal of the brake shoes against the wheel is heard and the retardation of the car is felt. Such action would have confirmed that the hand brake was functioning as intended.

#### 2.2.2 *Running Switch*

A running switch was the normal procedure used to provide railway cars to the Federated Cooperatives Limited warehouse. This move saved time and avoided having the crew ride in cold weather on the leading end of the car for two miles to protect the movement over crossings. This method of delivering cars was an established practice and would normally have succeeded if the hand brake had been in proper operating condition, although it is in contravention of the company general operating instructions.



### 3.0 *Conclusions*

#### 3.1 *Findings*

1. Before performing the running switch, it was not determined that the hand brake was operating properly.
2. The hand brake on car FGMR12042 was out of adjustment, was not effective, and was comprised of badly worn and non-standard parts which contributed to the problem.
3. Allowing the uncoupled car to roll down the grade under the control of the hand brake after a running switch was the normal procedure for switching cars onto the Federated Cooperatives Limited spur.
4. The crew did not comply with the CN operating instruction that requires cars which are to be switched to this type of location to be coupled to the locomotive with the air brakes operative.
5. It could not be confirmed that the specific reference in the General Operating Instructions to switching activities for this type of location was reinforced from time to time with employees.
6. The complaint of the customer to yard crews concerning the running switch method of supplying cars to the Federated Cooperatives Limited warehouse was ignored by the crews with the explanation that it was the established procedure and that they knew what they were doing.

#### 3.2 *Cause*

The operating crew did not apply the prescribed operating procedure.



## 4.0 *Safety Action*

### 4.1 *Action Taken*

#### 4.1.1 *Yard Crew Instruction*

Two positions for senior train service employees were established to monitor yard crews and instruct the crews in the proper procedures and practices for performing their work. In addition, a Safety Flash was issued to bring this incident and the proper interpretation of the General Operating Instructions to the attention of train crews throughout the CN system.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, John W. Stants, and members Zita Brunet and Hugh MacNeil, authorized the release of this report on 21 September 1995.*



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