



## **RAILWAY OCCURRENCE REPORT**

**ALGOMA CENTRAL RAILWAY COMPANY  
DERAILMENT  
EXTRA 202 SOUTH  
MILE 287.55, NORTHERN SUBDIVISION  
STAVERT, ONTARIO  
26 FEBRUARY 1994**

**REPORT NUMBER R94T0063**

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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

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Derailment  
Extra 202 South  
Mile 287.55, Northern Subdivision  
Stavert, Ontario  
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### *Synopsis*

An Algoma Central Railway Company (ACR) southward train derailed one locomotive and the first 19 freight cars on tangent track at Mile 287.55 of the Northern Subdivision, 8.2 miles south of Hearst, Ontario.

No dangerous goods were involved and there were no injuries.

The Board determined that the derailment was the result of a pre-existent and undetected rail joint splice bar fracture which weakened the joint assembly, resulting in the fracture of the opposite splice bar and rail displacement under the locomotive consist. Contributing factors included light rail and poor track and roadbed conditions.

Ce rapport est également disponible en français.

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## 1.0 *Factual Information*

### 1.1 *The Accident*

An Algoma Central Railway Company (ACR) freight train, designated Extra 202 South, departed from Hearst, Ontario, Mile 295.7 of the Northern Subdivision, at 0925 eastern standard time (EST) on 26 February 1994, destined for Hawk Junction, Ontario, Mile 164.6.

As the train was travelling at approximately 33 mph on tangent track at Mile 287.55, the locomotive engineer felt the locomotive lurch and a train-initiated emergency application of the train brakes then occurred. After conducting the necessary emergency procedures, the train crew determined that the third locomotive (trailing) and the following 19 cars in the train had derailed.

No dangerous goods were involved and there were no injuries.

### 1.2 *Damage to Equipment*

There was slight damage to the trailing locomotive, and substantial damage to 19 empty gondola cars.

### 1.3 *Other Damage*

Three hundred feet of track was destroyed and an electrical power pole was knocked down.

### 1.4 *Personnel Information*

The train crew included a conductor, a locomotive engineer and two trainmen. The locomotive engineer and one trainman were riding in the lead locomotive. The other crew members were located in the caboose. All crew members were qualified for their respective

positions and met fitness and rest standards established to ensure the safe operation of trains.

### 1.5 *Train Information*

The train was powered by locomotives Nos. 202, 101 and 100 and was hauling 51 cars, 24 of which were empty, and a caboose. It was approximately 2,800 feet in length and weighed about 3,428 tons.

The train was inspected at Hearst before departure. No irregularities were noted.

### 1.6 *Particulars of the Track*

At the point of derailment, the subdivision was a single main track. The authorized maximum permissible train speed is 40 mph for passenger trains and 35 mph for freight trains. Usual traffic over this location consists of six passenger trains and six freight trains per week. ACR does not normally permit its heavy six-axle locomotives to operate on the section of track from Mile 277.5 to Mile 294.33.

The track in the area was tangent and located on the west half of a double-track embankment originally constructed in 1914. An old siding remained in place on the east half and was neither used nor maintained. Total embankment width was approximately 28 feet. The embankment was constructed of pit run gravel, built up approximately four feet above the original ground level. Ballast consisted of approximately six inches of slag, top-dressed as necessary to meet surfacing requirements.

The track from Mile 277.5 to Mile 294.33 consisted of 80-pound rail in 33-foot sections, manufactured in 1913 and laid in 1914. The tie plates were single-shouldered, the ties were softwood spaced 2,600 per mile and the rail was secured to ties with three spikes per tie and anchored with Cross Lock anchors. The track was last inspected on 25 February 1994, the day before the derailment, by a track supervisor operating a Hi-rail vehicle. No irregularities were noted

during this inspection. An examination of the track from Mile 277.5 to Mile 294.33 indicated numerous track joints with excessive movement from tie deterioration.

Approximately 30 per cent of the ties were defective and severely plate cut and spike killed from extensive gauge corrections. Numerous joint ties were shimmed with hardwood. The surface and line were poor particularly in the joint areas as a result of subgrade pumping and joint batter.

### *1.7 Method of Train Control*

Traffic in this area is controlled by the Occupancy Control System (OCS) authorized by the Canadian Rail Operating Rules (CROR) and supervised by a rail traffic controller (RTC) located in Sault Ste. Marie, Ontario.

### *1.8 Weather*

The skies were clear, visibility was unrestricted, and the temperature was minus 23 degrees Celsius.

### *1.9 Recorded Information*

There are no Hot Box and Dragging Equipment detectors on ACR track and the locomotives are not equipped with event recorders.

### *1.10 Occurrence Site Information*

Approaching the derailment site from the south, the third locomotive had derailed the trailing truck to the east and remained upright. The following 19 cars had also derailed to the east and were piled up over a distance of approximately 300 feet. A hydro line was severed and an adjacent roadway partially blocked.

Broken splice bars were securely bolted on the south end of the undamaged east rail under the last derailed car. The splice bar from the gauge side had a fracture surface that showed signs of polishing. The splice bar from the field side indicated a clean fresh break.

Both bars fractured directly opposite to each other at the centre of the joint. The section of east rail south of the broken splice bars was shattered for about two feet and the remaining portion was located intact in the ditch to the east of the right-of-way.

### *1.11 Other Information*

As a result of CN North America (CN) derailments, CN traffic had been re-routed over ACR track between Oba, Ontario, Mile 244.7, and Hearst from 18 January 1994 to 05 February 1994. A total of 18 CN trains travelled over ACR track for an additional combined tonnage of 61,369 tons. The last CN train to use this subdivision, CN Extra 9484 West, on 05 February 1994, included three CN locomotives, two of which were six-axle units each weighing more than 380,000 pounds.







## 2.0 *Analysis*

### 2.1 *Introduction*

The train operation conformed to company instructions and government safety standards. The rail separated under the train and the analysis, therefore, concentrates on the condition of the track and the role it played in the derailment.

### 2.2 *Consideration of the Facts*

#### 2.2.1 *The Derailment*

The derailment began at a rail joint where the gauge side rail joint splice bar had fractured. The fracture, as evidenced by the polished fracture surfaces, had remained undetected for an undetermined period of time. The remaining splice bar fractured under the lead locomotive. The spikes and rail anchors could not hold the rail in alignment and the rail shifted, derailing the third locomotive and the following 19 cars.

#### 2.2.2 *The Track*

This section of the Northern Subdivision featured light rail, poor tie conditions and irregular surface and line, particularly in the rail joint areas.

The additional traffic posed by the detouring of CN trains may have accelerated the deterioration of track and roadbed. It is also possible that the last CN train to use the ACR track on 05 February 1994, with a locomotive consist that included two heavy six-axle units, fractured the first splice bar to break at the derailment location. It is noteworthy that ACR would not normally allow this type of locomotive to operate on this section of the subdivision.

Rail joint splice bars are hidden from view by the rail head. The detection of a fractured rail joint splice bar during a Hi-rail inspection would have been difficult.



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## 3.0 *Conclusions*

### 3.1 *Findings*

1. Train operation at the time of derailment conformed to company instructions and government safety standards.
2. The gauge side splice bar had been broken for an undetermined period and was not seen during the visual inspection one day before the derailment.
3. The field side splice bar broke under the locomotive consist and allowed the rail to shift, initiating the derailment.
4. CN traffic may have accelerated track and roadbed deterioration and the initial fracture of the gauge side splice bar may have been caused by the forces imposed on the track and roadbed by two heavy six-axle locomotives on 05 February 1994.
5. ACR did not normally allow heavy six-axle locomotives to operate on this part of the subdivision.

### 3.2 *Cause*

The derailment was a result of a pre-existent and undetected rail joint splice bar fracture which weakened the joint assembly, resulting in the fracture of the opposite splice bar and rail displacement under the locomotive consist. Contributing factors included light rail and poor track and roadbed conditions.



## 4.0 Safety Action

### 4.1 Action Taken

#### 4.1.1 Rail Safety Information Letter

On 28 September 1994, the TSB sent a Rail Safety Information Letter to Transport Canada concerning adverse track conditions in the area of the derailment and the fact that ACR allows passenger trains to operate at speeds of 40 mph on this section of track. It was also mentioned that the increased tonnage on this subdivision, caused by the detoured CN trains, may have exacerbated the existing poor track conditions.

#### 4.1.2 Track Inspection - Transport Canada

Transport Canada advised that, as a result of the number of derailments occurring in Northern Ontario in 1994, a special track inspection of ACR's Northern subdivision was conducted by Surface Group safety officers. Several track defects were noted and reported to the railway; all defects were corrected by ACR.

#### 4.1.3 Reduced Speed and Increased Track Patrols - Algoma Central Railway Company

ACR has taken a number of initiatives to prevent recurrence. Sperry car testing was conducted in mid-April and, as a result, a number of defective rails were identified and changed. A 30-mph speed limit for passenger trains and a 25-mph speed limit for freight trains were imposed to minimize the severity of wheel impact loading on the rails.

Track patrol frequency has been increased from the required twice per week to four to five times per week throughout the year, except for the spring when patrols are made on a daily basis. ACR will continue to maintain weekend track patrols in advance of passenger trains.

The eight-man track section force assigned to the territory between Mile 244.7

and Mile 295.7 (Oba and Hearst) has been instructed to walk the track, paying special attention to the detection of rail defects, particularly in rail joint areas.

*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 12 April 1995.*

## TSB OFFICES

### HEAD OFFICE

#### HULL, QUEBEC\*

Place du Centre  
4<sup>th</sup> Floor  
200 Promenade du Portage  
Hull, Quebec  
K1A 1K8  
Phone (819) 994-3741  
Facsimile (819) 997-2239

### ENGINEERING

Engineering Laboratory  
1901 Research Road  
Gloucester, Ontario  
K1A 1K8  
Phone (613) 998-8230  
24 Hours (613) 998-3425  
Facsimile (613) 998-5572

### REGIONAL OFFICES

#### ST. JOHN'S, NEWFOUNDLAND

Marine  
Centre Baine Johnston  
10 Place Fort William  
1<sup>st</sup> Floor  
St. John's, Newfoundland  
A1C 1K4  
Phone (709) 772-4008  
Facsimile (709) 772-5806

#### GREATER HALIFAX, NOVA SCOTIA\*

Marine  
Metropolitain Place  
11<sup>th</sup> Floor  
99 Wyse Road  
Dartmouth, Nova Scotia  
B3A 4S5  
Phone (902) 426-2348  
24 Hours (902) 426-8043  
Facsimile (902) 426-5143

#### MONCTON, NEW BRUNSWICK

Pipeline, Rail and Air  
310 Baig Boulevard  
Moncton, New Brunswick  
E1E 1C8  
Phone (506) 851-7141  
24 Hours (506) 851-7381  
Facsimile (506) 851-7467

#### GREATER MONTREAL, QUEBEC\*

Pipeline, Rail and Air  
185 Dorval Avenue  
Suite 403  
Dorval, Quebec  
H9S 5J9  
Phone (514) 633-3246  
24 Hours (514) 633-3246  
Facsimile (514) 633-2944

#### GREATER QUÉBEC, QUEBEC\*

Marine, Pipeline and Rail  
1091 Chemin St. Louis  
Room 100  
Sillery, Quebec  
G1S 1E2  
Phone (418) 648-3576  
24 Hours (418) 648-3576  
Facsimile (418) 648-3656

#### GREATER TORONTO, ONTARIO

Marine, Pipeline, Rail and Air  
23 East Wilmot Street  
Richmond Hill, Ontario  
L4B 1A3  
Phone (905) 771-7676  
24 Hours (905) 771-7676  
Facsimile (905) 771-7709

#### PETROLIA, ONTARIO

Pipeline and Rail  
4495 Petrolia Street  
P.O. Box 1599  
Petrolia, Ontario  
N0N 1R0  
Phone (519) 882-3703  
Facsimile (519) 882-3705

#### WINNIPEG, MANITOBA

Pipeline, Rail and Air  
335 - 550 Century Street  
Winnipeg, Manitoba  
R3H 0Y1  
Phone (204) 983-5991  
24 Hours (204) 983-5548  
Facsimile (204) 983-8026

#### EDMONTON, ALBERTA

Pipeline, Rail and Air  
17803 - 106 A Avenue  
Edmonton, Alberta  
T5S 1V8  
Phone (403) 495-3865  
24 Hours (403) 495-3999  
Facsimile (403) 495-2079

#### CALGARY, ALBERTA

Pipeline and Rail  
Sam Livingstone Building  
510 - 12<sup>th</sup> Avenue SW  
Room 210, P.O. Box 222  
Calgary, Alberta  
T2R 0X5  
Phone (403) 299-3911  
24 Hours (403) 299-3912  
Facsimile (403) 299-3913

#### GREATER VANCOUVER, BRITISH COLUMBIA

Marine, Pipeline, Rail and Air  
4 - 3071 Number Five Road  
Richmond, British Columbia  
V6X 2T4  
Phone (604) 666-5826  
24 Hours (604) 666-5826  
Facsimile (604) 666-7230

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