

RAILWAY OCCURRENCE REPORT

**CANADIAN PACIFIC LIMITED
REPORTABLE INCIDENT
MILE 3.4, NORTH TORONTO SUBDIVISION
TORONTO, ONTARIO
22 FEBRUARY 1994**

REPORT NUMBER R94T0060



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.

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Synopsis

While approaching Signal 33-1, the crew of Canadian Pacific Limited (CP) train No. 409-22 observed that the signal was displaying a less restrictive indication than intended. Shortly after, the indication changed to the proper indication. The train proceeded without further incident.

The Board determined that the less restrictive indication on Signal 33-1 was caused by an unexplained time delay in the signal mechanism.

Ce rapport est également disponible en français.

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1.0 *Factual Information*

1.1 *The Occurrence*

Canadian Pacific Limited (CP) freight train No. 409-22 was travelling westward on the south track of the North Toronto Subdivision at approximately 25 mph. The rail traffic controller (RTC) lined the crossovers normal and cleared Signal 33-1 for train 409-22. The crew observed a "Medium to Clear" aspect meaning: "Proceed, medium speed passing signal and through turnouts." This aspect was improperly displayed as the RTC had requested a "Clear to Medium" aspect. The crew stopped the train before accepting the signal. During the conversation between the crew and the RTC with respect to the aspect, the signal changed to the proper aspect.

The signal was then taken out of service and the RTC allowed the train to leave.

1.2 *Personnel Information*

The train crew consisted of a conductor, a locomotive engineer and a trainman. They were all familiar with the North Toronto Subdivision and were qualified for their respective positions. They met fitness and rest standards established to ensure the safe operation of trains.

1.3 *Method of Train Control*

All train movements are controlled by the Centralized Traffic Control System authorized under the Canadian Rail Operating Rules (CROR) and supervised by the RTC located in Toronto, Ontario.

1.4 *Weather*

The temperature was minus five degrees Celsius, with light snowfall, ice pellets and blowing snow. Visibility was 2.5 miles with overcast conditions.

1.5 *Occurrence Site Information*

The incident occurred at Mile 3.4, on the south main track where the North Toronto Subdivision consists of two main tracks. Both tracks are tangent and level. Signal 33-1 is located on a cantilever structure and governs train movements approaching on the south main track.

1.6 *Tests and Research*

The signal mechanism was examined by:

- the CP Signals and Communications Department at the time of the incident;
- the CP Signal Shop in Montreal, Quebec;
- the TSB Engineering Laboratory in Ottawa, Ontario; and
- the General Railway Signal Company in Rochester, New York.

Testing of the signal control circuit indicated that an abnormally high current was required to properly operate the signal mechanism. In the field, it was found that the current required to operate the mechanism to show a yellow aspect was 0.03 to 0.034 amperes (A) instead of the normal 0.024 A.

Subsequent bench examinations and testing, however, failed to obtain the same readings and to discover any sign of physical obstruction retarding the signal mechanism.

A part-by-part evaluation of the completely disassembled mechanism resulted in the following findings:

- the permanent magnet assembly was charged to a lesser value than specified;
- counterweight pins had some corrosion spots; and
- excess oil was found at the "V" slots of the two armature bearings.

2.0 *Analysis*

2.1 *Consideration of the Facts*

The train was operated in compliance with government regulations and company procedures.

The crew observed the "Medium to Clear" aspect and reacted in a proper manner by not accepting the signal.

Signal 33-1 was appropriately taken out of service because of the time delay in displaying the proper aspect.

The vital circuits at the signal location were functioning properly and not considered to have caused the signal delay.

Dismantling and examination of the components of the mechanism did not provide any conclusive explanation concerning the behaviour of the signal.

The low magnetic point value of the components of the permanent magnet assembly, the corrosion of the counterweight pins, and the excess oil found on the "V" slots of the armature bearings are some areas of concern but do not explain the improper operation of the mechanism.

3.0 *Conclusions*

The less restrictive indication on Signal 33-1 was caused by an unexplained time delay in the signal mechanism.

3.1 *Findings*

1. Signal 33-1 was cleared by the rail traffic controller (RTC) to allow train 409-22 to proceed westward on the south main track on a "Clear to Medium" aspect.
2. The signal indication received was: "Proceed, medium speed passing signal and through turnouts."
3. Observing the field conditions, the train crew knew that the indication was incorrect.
4. The crew of train 409-22 brought the train to a stop before accepting the signal.
5. During the conversation between the crew and the RTC, the signal changed to the proper indication.
6. The ambient temperature was below freezing with blowing snow conditions.
7. Testing carried out after the incident indicated that an unusually high operating current was needed to operate the signal mechanism to show the yellow aspect.
8. Further testing failed to come up with the same high current readings.
9. The low magnetic point value of the components of the permanent magnet assembly, the corrosion of the counterweight pins, and the excess oil found on the "V" slots of the armature bearings are some areas of concern but do not explain the improper operation of the mechanism.

3.2 *Cause*

4.0 *Safety Action*

4.1 *Action Taken*

4.1.1 *Signal Design Standards*

Transport Canada (TC) has advised the Railway Association of Canada (RAC) of this occurrence so the members can be alerted to this type of signal failure.

TC has also requested that the RAC review the present signal design standards to determine if the design standards need modification.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, John W. Stants, and members Gerald E. Bennett, Zita Brunet, the Hon. Wilfred R. DuPont and Hugh MacNeil, authorized the release of this report on 28 February 1995.