Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

RAILWAY INVESTIGATION REPORT
R12D0063

UNPROTECTED OVERLAP OF AUTHORITY

AGENCE MÉTROPOLITAINE DE TRANSPORT
TRAINS AMT 94 AND AMT 93
MILE 40.8, ADIRONDACK SUBDIVISION
ADIRONDACK JUNCTION
MONTRÉAL, QUEBEC
13 SEPTEMBER 2012

Canada

Railway Investigation Report

Unprotected Overlap of Authority
Agence métropolitaine de transport
Trains AMT 94 and AMT 93
Mile 40.8, Adirondack Subdivision
Adirondack Junction
Montréal, Quebec
13 September 2012

Report Number R12D0063

Summary

At approximately 1737 Eastern Daylight Time on 13 September 2012, Agence métropolitaine de transport commuter train No. 94 (operating without passengers) was issued a written authority to pass stop signal 383C, located at Mile 38.3 within the Seaway Interlocking, near Montréal, Quebec, and to proceed northward on the west track of Canadian Pacific's Adirondack Subdivision. At about the same time, Agence métropolitaine de transport commuter train No. 93 (operating with passengers) received a permissive signal at Mile 40.8 to proceed southward and to cross over onto the same track as train No. 94. As a result, both trains had authority to occupy the same portion of track, in opposing directions. The overlap of authority was identified, and the situation was protected.

Ce rapport est également disponible en français.

Factual Information

On 13 September 2012, at 1715, [1] southbound Agence métropolitaine de transport (AMT) commuter train No. 93 (AMT 93) departed Montréal, Quebec, on the east track of Canadian Pacific's (CP) Adirondack Subdivision, destined for Candiac, Quebec (Figure 1). This regularly scheduled train comprised 1 locomotive and 4 coaches, and was operating with approximately 350 passengers. AMT 93 entered CP's Seaway Interlocking at LaSalle, Mile 42.4, and received a permissive signal at Adirondack Junction, Mile 40.8.

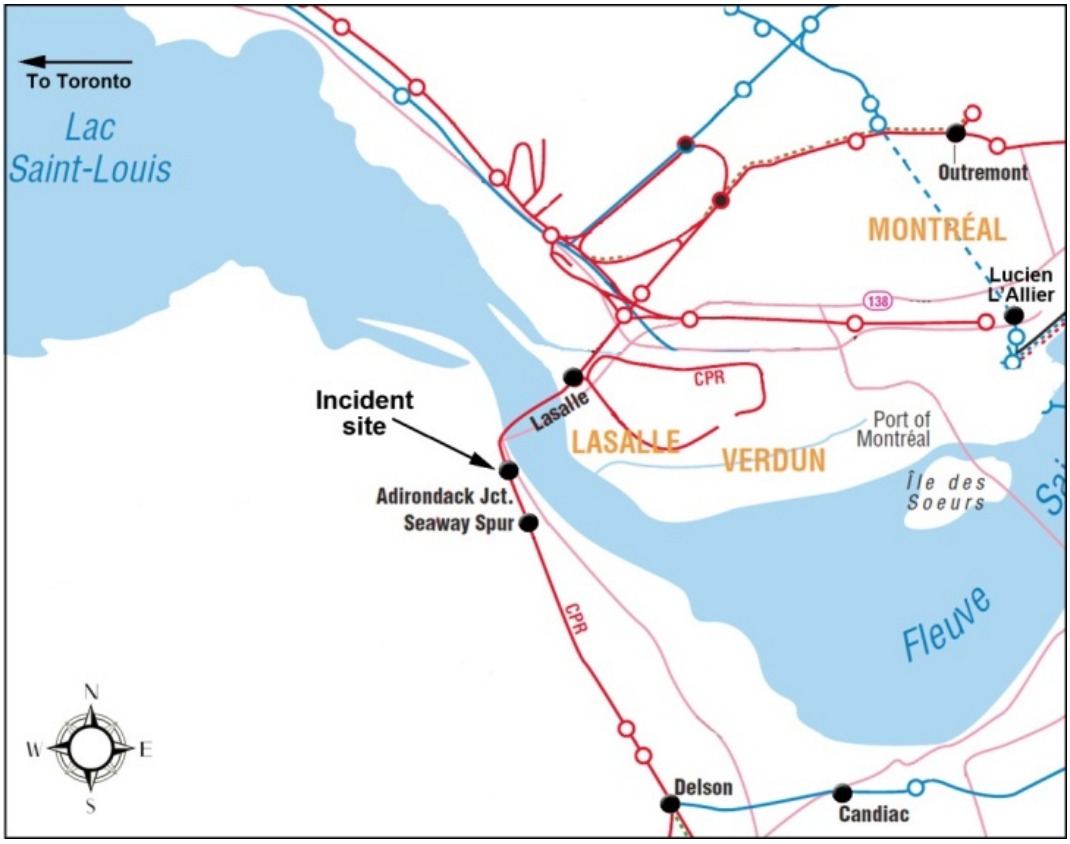

Figure 1. Location map (source: Railway Association of Canada, *Canadian Railway Atlas*)

At 1735, northbound AMT commuter train No. 94 (AMT 94) departed Candiac on the west track, destined for Montréal. This regularly scheduled train consisted of 1 locomotive and 4 coaches, and was operating with no passengers. At approximately 1736, AMT 94 was issued a written authority [2] to pass stop signal 383C, located at Seaway Spur, Mile 38.3, within the interlocking, and to continue on the west track.

---

1 All times are Eastern Daylight Time (Coordinated Universal Time minus 4 hours).

2 A written authority is normally transmitted by radio, copied in writing, and repeated to the sender to ensure accuracy.

AMT 93's crew, which was monitoring the standby channel stipulated in the timetable, overheard the Seaway Interlocking signalman's [3] broadcast of the pass-stop authority to AMT 94. Seconds later, AMT 93 passed the permissive medium to stop [4] indication on signal 408B at Mile 40.8 at a speed of 30 mph, and diverged to the west track (Figure 2). The AMT 93 crew members brought their train to a stop. They then contacted AMT 94 and the signalman, and determined that both trains were operating toward each other on the same track. The situation was protected. The 2 trains stopped approximately 2 miles apart.

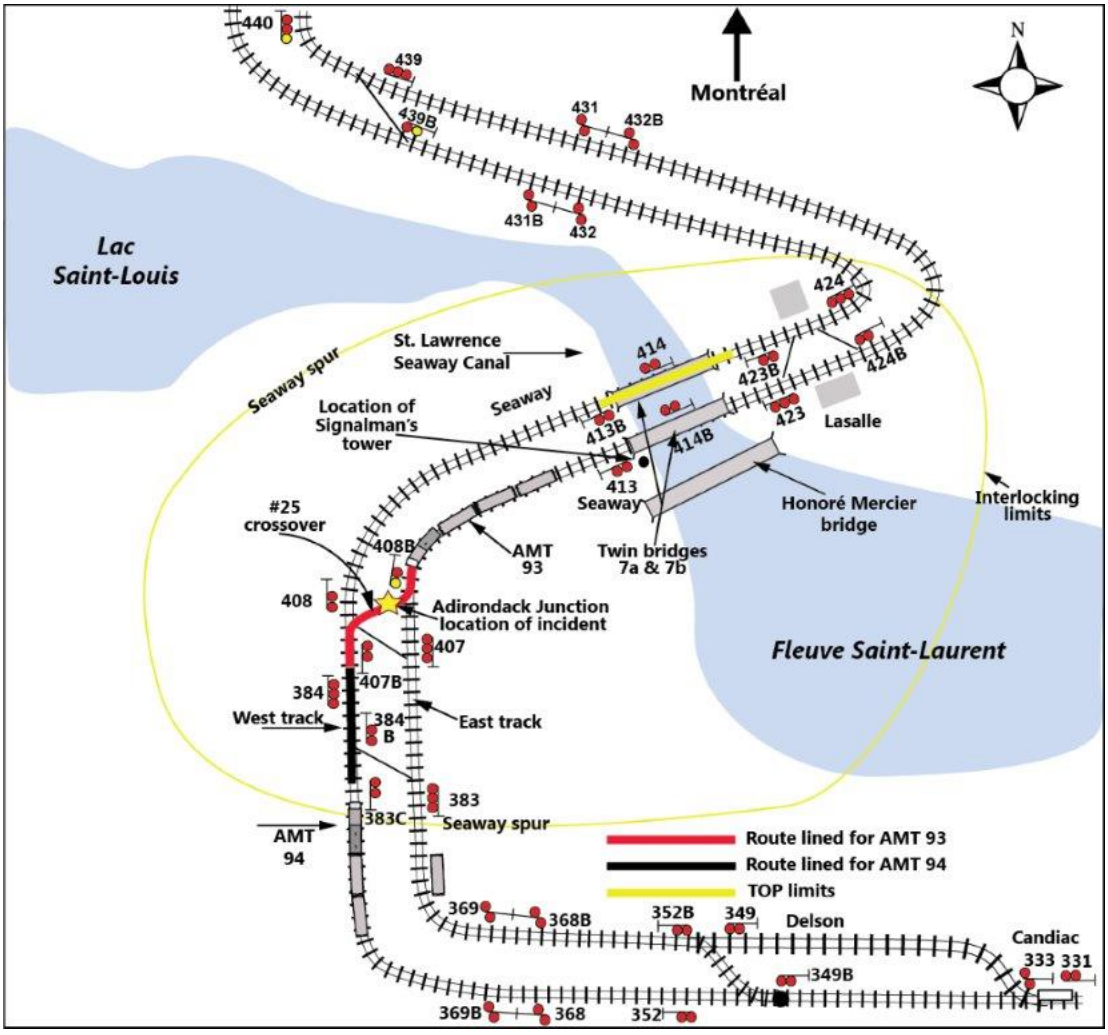

Figure 2. Location of occurrence

---

3 A signalman is the employee tasked with controlling an interlocking. The signalman's function is similar to that of a rail traffic controller.

4 *Canadian Rail Operating Rules* (CROR) Rule 427, medium to stop signal: proceed, medium speed passing signal and through turnouts, preparing to stop at next signal.

Both train crews were comprised of a locomotive engineer and a conductor. All crew members were qualified for their respective positions, met fitness and rest standards, and were familiar with the territory. In addition, the signalman was familiar with the rail traffic control system, was rested, and was qualified for the position.

Subdivision Information

The Adirondack Subdivision, which extends from Mile 20.0 (Saint-Jean, Quebec) to Mile 49.1 (Outremont, Quebec), consists of double track and single track. The Adirondack Subdivision is CP's main north/south corridor for commuter and freight traffic through the Montréal area. In the incident area, the maximum permissible speed on the west track is 40 mph for both passenger and freight trains. On the east track, the maximum permissible speed is 50 mph for passenger trains and 40 mph for freight trains. Train movements on the Adirondack Subdivision are controlled by the Occupancy Control System (OCS) from Saint-Jean to Candiac (Mile 33.0), and by the Centralized Traffic Control System (CTC) from Candiac to Outremont, as authorized by the *Canadian Rail Operating Rules* (CROR) and supervised by a rail traffic controller (RTC) in Montréal.

The track between Mile 38.3 (Seaway Spur) and Mile 42.4 (LaSalle) on the Adirondack Subdivision is referred as an interlocking. As defined by CROR, an interlocking is "an arrangement of interconnected signals and signal appliances for which interlocking rules and special instructions are in effect."

The Seaway Interlocking is designated as a remotely-controlled [5] interlocking. It is supervised by a signalman, who is located in a tower on the south shore of the Saint Lawrence River at Seaway, Quebec (Mile 41.4), next to twin CP bridges (7a and 7b). The twin bridges are equipped with a lift span to allow the passage of marine traffic. Except at shift change, there is only 1 signalman in the Seaway tower at any one time. Supervision is provided remotely from the Montréal RTC office.

Over this portion of track, train traffic consists of about 24 commuter trains per day, which has increased from 8 trains per day in 2008 and 12 trains per day in 2009. The majority of the commuter trains operate during the morning and afternoon rush hours. In addition, there are approximately 8 freight trains per day, and 11 marine vessels.

Before the Incident

On the day of the occurrence, the signalman had issued a track occupancy permit (TOP) [6] between signals 423B at LaSalle and 413B at Seaway Canal, on the west track north of Adirondack Junction. Trains were being rerouted onto the east track to travel around these

---

5 Controlled interlockings can be designated as either locally or remotely controlled, depending on the manner in which movements and maintenance activities are to be protected.

6 Track occupancy permit: A written authority provided to a track foreman, by a rail traffic controller or signalman, for the positive protection of track units or track work.

limits. [7] During the afternoon rush hour that day, the signalman had handled 10 commuter trains and 4 marine vessels.

The operational events occurring just before the incident are summarized as follows:

- Between about 1636 and 1640, the signalman was speaking on the telephone with the Montréal RTC to line signal 423 at LaSalle, as there had been problems with clearing the signal for AMT 92. A system reset was performed to clear the signal. When the signal eventually cleared, the signalman was instructed by the RTC to call back before attempting to clear the signal for the next northbound train. It was agreed that similar coordinated efforts would be required until the signal problem was diagnosed and repaired.

- At 1708:11, expecting difficulties with signal 423, the signalman re-contacted the Montréal RTC to facilitate the routing for northbound AMT commuter train No. 76 (AMT 76).

- At 1708:42, the signalman requested to reverse [8] the switches at the No. 25 crossover at Adirondack Junction for AMT 76, to facilitate its crossover from the west track back to the east track.

- At 17:09:00, the No. 25 crossover was locked in reverse position at Adirondack Junction (noted by a board indication).

- At 17:09:03, the signalman requested signal 407B for AMT 76.

- At 1709:28, AMT 76 crossed over from the west track to the east track at Adirondack Junction. This move would complete the meet between AMT 76 and southbound AMT commuter train No. 91, which was on the east track. Following this movement, the crossover switches (No. 25 crossover) remained in the reverse position. [9]

- At 1716, the signalman requested signal 408B at Adirondack Junction for southward train AMT 93 on the east track. The switches of No. 25 crossover were in the reverse position, lining AMT 93 toward the west track.

- At 1720, the signalman requested signal 383C for northward AMT 94 on the west track, but it did not clear.

---

7 Throughout the summer of 2012, ties were being changed on the west track of the bridge located above the Saint Lawrence Seaway Canal.

8 Reverse refers to the position of the switch lined and locked for a diverging movement onto an adjacent track.

9 After a movement clears a crossover, the crossover is typically set back to the normal position by the signalman. However, there are no special rules or formal procedures for this task.

- At 1722, the Saint Lambert Operations Centre [10] contacted the signalman to request that the 7a and 7b bridges be lifted for the *Algoma Guardian* vessel, which was operating downstream, approaching the Seaway location.

- At 1723, the Saint Lambert Operations Centre contacted the signalman again with an updated estimated time of arrival for the *Algoma Guardian* vessel.

- At 1733, the signalman spoke with the Montreal RTC to verify that the next northbound AMT train would be train 94, and explained that signal 383C would not clear.

- At 1736, the signalman issued a written authority to AMT 94 to pass stop signal 383C and proceed northward on the west track. When this pass-stop authority was issued, the signalman completed the switch/signal blocking verification form. The signalman, however, did not recheck the opposing signals or apply the wooden blocks to ensure they were blocked at Stop.

- At 1737, southbound AMT 93 passed signal 408B at Adirondack Junction, and then stopped shortly after entering the crossover.

Traffic Control System at Seaway Interlocking

The Seaway Interlocking control system was installed in 1959. Since its installation, there had been no significant changes in the way that this control system was being operated. The signalman is responsible for controlling track movements and protecting track maintenance activities through the interlocking. In addition, the signalman controls the twin rail bridges 7a and 7b at Seaway for marine vessels travelling through the Saint Lawrence Seaway Canal.

The traffic control board in the Seaway tower is manually operated. It is separated into 3 distinct sections (Photo 1):

- The top section displays track layout, switch location, signal location, and movements through the interlocking.

- The middle section controls the positioning of crossover switches by use of toggles. When the toggle is placed to the right, the crossover switch would be activated to move to its reverse position. For normal position, the toggle would be placed to the left. When the crossover switch is locked in the reverse position, a yellow light illuminates above the toggle switch. If the crossover switch is locked in the normal position, a green light illuminates.

- The bottom section of the control board also contains toggle switches that are used to request signals. When the crossover switches have been lined, the signalman requests a corresponding signal by moving the lower toggle switch to the right (south) or to the left (north). If the signal is permissive, a green light is displayed. Otherwise, a red light appears above the corresponding toggle switch.

---

[10] This operations centre is part of the Saint Lawrence Seaway Management Corporation, located in Saint-Lambert, Quebec. It owns bridges 7a and 7b. The operator communicates to the Seaway signalman when bridges need to be lifted for marine traffic.

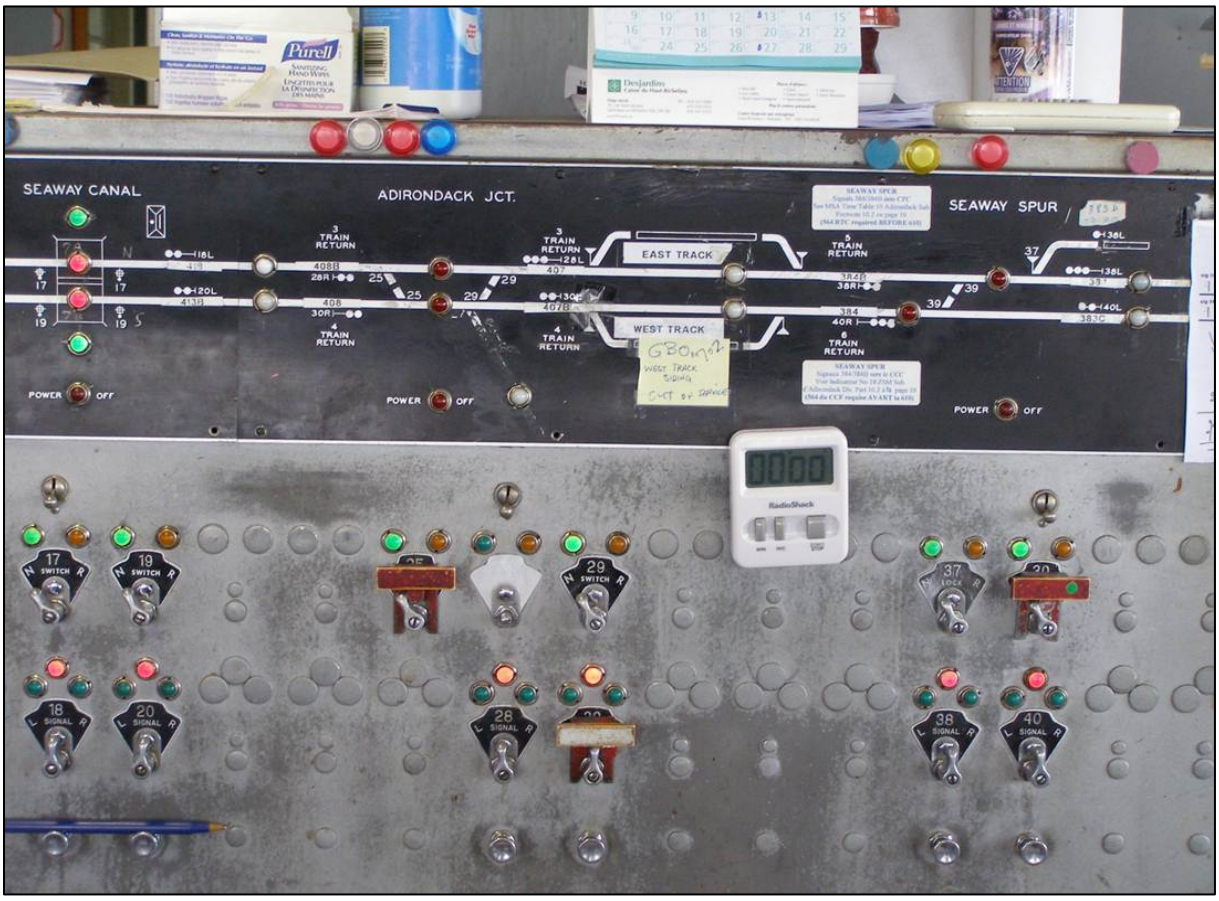

Photo 1. Traffic control board for Seaway Interlocking

When written authorities such as TOPs or pass-stop authorities [11] are issued and after all switches and signal indications have been checked, the signalman will manually apply blocking on the traffic control board to prevent and protect other opposing movements from entering the same limits. Blocking devices (wooden blocking pins) are placed over the toggles to prevent inadvertent changes to the switch position and to the signals.

Within the Seaway Interlocking, there had been a history of problems with clearing signals. [12] Over a 12-month period (September 2011 to September 2012), 53 trouble tickets related to clearing signals had been reported to CP's Signal Department (31 at Seaway, 11 at Seaway Spur, 10 at LaSalle, and 1 at Adirondack Junction).

---

11 Pass-stop authorities are to be issued only when safe to do so, if a signalman is unable to provide a permissive signal indication for an intended movement.

12 Clearing signals: a favorable electronic response to a signalman's request for changing a signal in the office and in the field to something other than stop.

Requirements of a Pass-stop Authority in a Remotely Controlled Interlocking

To issue a pass-stop authority in a remotely controlled interlocking, CROR Rule 610 states (in part):

> (a) A movement must have authority to pass a remotely-controlled interlocking signal indicating Stop. The signalman may authorize the movement to pass the signal but before doing so must ensure that there is no conflicting movement in the route to be used, and that all devices controlling signals governing conflicting movements are blocked at Stop. The authorization must specify the route to be used, and must be in writing.
>
> (b) The movement so authorized must move at RESTRICTED speed [13] to the next signal or Block End sign.

At Seaway Interlocking, in addition to CROR Rule 610, the signalman must complete a switch/signal blocking verification form containing the authorization number and the movement designation. The form is placed on the interlocking board at a location that will be as close as possible to the blocking devices, ensuring that it will not obstruct the view of other lights, indicators, and/or information displayed on the board.

Seaway Interlocking Signal System

Within the Seaway Interlocking, the east track is normally used for northbound freight trains and the west track for southbound freight trains. This directional operation is facilitated with interconnected dwarf signals [14] that provide movements with the standard protection of 2 blocks. The signal system can also accommodate movements contrary to this directional standard (i.e., southbound movements on the east track or northbound movements on the west track). Such movements are governed by dwarf signals that are limited to displaying indications for the block being operated in, regardless of how permissive the next signal is.

Within the Seaway Interlocking, all of the station platforms for commuter rail passengers are accessed from the east track. When southbound commuter trains are operating on the east track, to facilitate a station stop and then remain on that track, the most permissive signal indication provided is a medium to stop (yellow/red). However, if a southbound train crosses over on to the west track (i.e., back into normal directional operation), a more permissive signal indication, medium to clear (G/R), can be displayed (Figure 3).

---

[13] Restricted speed: A speed that will permit stopping within one-half the range of vision of equipment, also prepared to stop short of a switch not properly lined and in no case exceeding SLOW speed (15 mph).

[14] Dwarf signals are positioned close the ground in areas where high mast signals would create a restricted clearances hazard.

In this occurrence, AMT 93 had a medium to stop indication at signal 408B. The next signal on the west track (signal 384) had not yet been requested by the signalman. This signal indication (medium to stop) was the same indication that a crew would see when lined to continue southward on the east track.

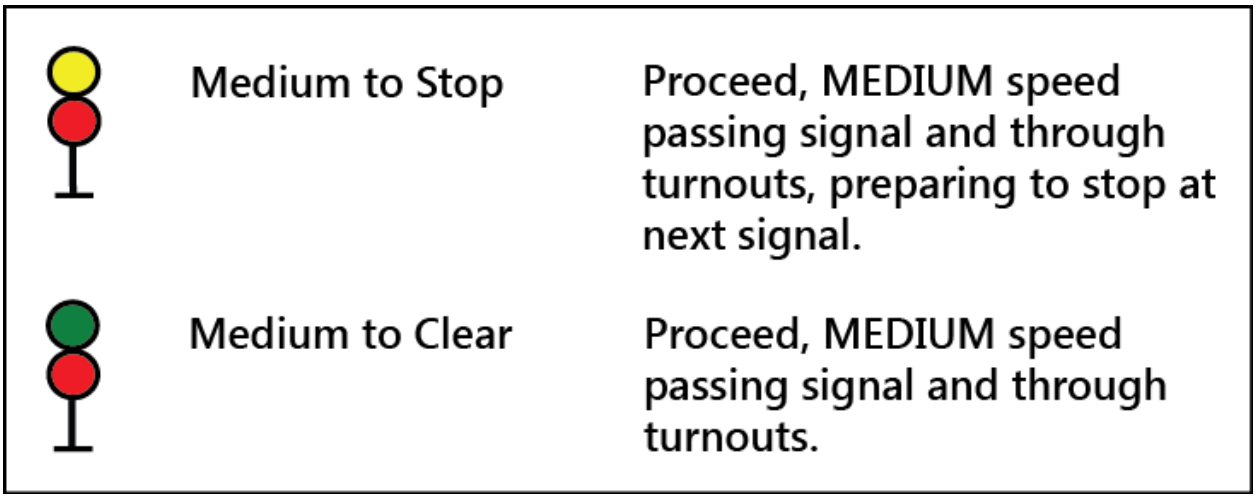

Figure 3. Dwarf signal indications

Electronic Blocking for Rail Traffic Control Systems

The rail traffic control system ensures that signals and switches are lined and switches are locked. On the RTC display of a modern rail traffic control system, signal block information is presented in a graphic form (Photo 2).

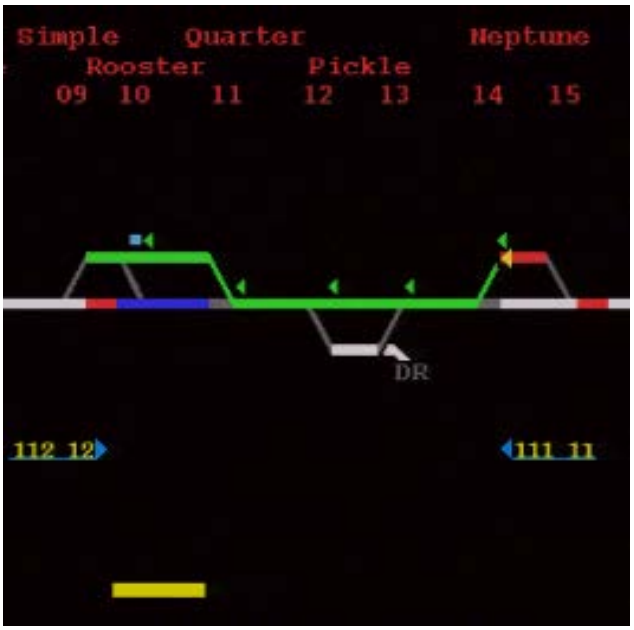

Photo 2. Modern rail traffic control system visual display.
(Note: Red bars indicate train occupancy [train ID numbers are shown below in yellow]; green bars indicate lined route; blue indicates track authority such as

> a pass-stop authority, or track occupancy permit (TOP); and the yellow bar indicates that the authority is for a pass-stop authority. Tracks above and below the main track represent sidings.)

Modern computerized rail traffic control systems provide a defence barrier against certain errors that can lead to overlapping of authorities. This defence barrier is in the form of electronic "blocking." Electronic blocking is automatically generated when the RTC selects the proposed limits for the "authority" (e.g., a pass-stop authority).

Electronic blocking ensures that the movement is protected from opposing movements. Switch positions and signals cannot be inadvertently selected to line movements into the protected section of track. Electronic blocking takes effect after the "complete time" [15] is given by the RTC who has verified that the limits provided to the railway worker have been correctly copied in writing and repeated.

Proficiency Testing for Rail Traffic Controllers

Transport Canada (TC), in its *Safety Management System (SMS) Regulations*, stipulates that

> a railway company shall implement and maintain a safety management system that includes, at a minimum, the following components: [...] h) systems for ensuring that employees and any other persons to whom the railway company grants access to its property, have appropriate skills and training and adequate supervision to ensure that they comply with all safety requirements.

To abide by the above requirements, CP conducts annual proficiency tests of RTCs (including signalmen), as per its manual entitled *Proficiency Tests in Conjunction with Compliance Assurance Monitoring System (CAMS) for Rail Traffic Controllers* (proficiency test manual). CP's proficiency test manual provides guidance on the conduct of a test applicable to signal blocking in CTC. One such test involves comparing voice recordings with paper authorities and blocking confirmation forms that are filled out after blocking has been placed. There is no test specific to signal blocking by a signalman at a remotely controlled interlocking.

For this occurrence, between May 2011 (when the signalman was qualified to work at Seaway Interlocking) and the day of the incident, the signalman had not been subject to any RTC proficiency tests.

Situational Awareness, Distraction, and Mental Models

Situational awareness is defined as "the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future." [16]

---

15 The complete time is the time given by the signalman and copied by the employee to signify that the authority is in effect.

16 M. Endsley, Toward a theory of situation awareness in dynamic systems, *Human Factors*, 37(1) (1995), pages 32–64

Effective situational awareness involves:

- perceiving critical factors in the operational environment,
- understanding what the factors mean,
- projecting what will happen within the system in the near future, and
- taking appropriate action when required.

Situational awareness may break down due to limitations in human attention, information processing, and memory. Accurate mental models are necessary to maintain situational awareness and to allow for effective decision-making. Mental models are internal representations, or a mental picture, of how a person perceives the world around him or her at a given point in time. Once a mental model is formed, it can be difficult to alter. Alteration requires new information that is sufficiently compelling for the individual to re-evaluate his or her mental model.

A complex system is one in which there are multiple interactions between many different components. [17] A task is complex if there are a number of different components associated with it, if the level of interaction among the components is significant, and if the degree to which the relationship between input and output cues changes over time. [18] In complex systems, it is important to avoid becoming distracted. Operator distraction can be defined as "the diversion of attention away from activities critical for safe operations toward a competing activity, resulting in inattention." [19]

---

17 D. Rind, Complexity and climate, *Science*, 284(5411) (1999), pages 105−107

18 R. Wood, Task complexity: Definition of the construct, *Organizational Behavior and Human Decision Processes*, 37 (1986), pages 60−82

19 M.A. Regan, C. Hallett and C.P. Gordon, Driver distraction and driver inattention: Definition, relationship and taxonomy, *Accident Analysis and Prevention*, 43(5) (2011), pages 1771−1781

Analysis

There were no track, rolling stock, or train handling anomalies noted that may have contributed to the incident. This analysis will focus on authorization of trains past Stop signals at the Seaway Interlocking, proficiency testing of signalmen, and situational awareness / operational distraction.

The Incident

The incident occurred during the afternoon rush hour for commuter trains (when train activity is at its highest). Adding to the high traffic that day, a track occupancy permit (TOP) was in effect on the west track that resulted in the traffic in both directions being routed on to the east track. Approximately an hour before the incident, the signalman was experiencing difficulty with clearing signal 423 for northbound train Agence métropolitaine de transport (AMT) 92 on the east track at LaSalle. During telephone communication between the signalman and the rail traffic controller (RTC), it was determined that a coordinated system reset was required to clear the signal. Consequently, the signalman and the RTC established that they would need to communicate directly whenever a northbound train was to be routed past this signal.

Subsequently, northbound train AMT 76 travelled from the west track to the east track using the No. 25 crossover at Adirondack Junction. Typically, once the northbound train completes the movement to the east track, the signalman would line the crossover switches back to normal. However, as previously agreed, the signalman contacted the RTC for assistance to clear signal 423 at LaSalle. The additional task of communicating directly with the RTC for assistance to clear the signal at LaSalle was an operational distraction. Consequently, the crossover switches at Adirondack Junction were not returned to normal position after the passage of AMT 76.

With the crossover switches at Adirondack Junction in the reverse position, southbound AMT 93 encountered a permissive signal indication at signal 408B, where it was inadvertently lined though the crossover to continue on the west track. The signalman did not recall that the crossover was in the reverse position, and had assumed that it had been restored to normal.

Anticipating the arrival of northbound AMT 94, the signalman attempted unsuccessfully to clear signal 383C. Due to the signalman's past difficulties with clearing signals, the signalman's mental model was that a similar problem was occurring at this location. Consequently, the signalman omitted to recheck the opposing signals and to apply signal blocking for AMT 94. The signalman did not recognize that signal 383C was in fact responding appropriately (i.e., Stop), because opposing train AMT 93 was lined onto the same track. Believing that the Stop signal was a result of a malfunction, the signalman issued a written pass-stop authority to AMT 94, resulting in the overlap of authority.

The crew on AMT 93 expected to remain on the east track, given that all passenger platforms are accessed from the east track. Furthermore, the medium to stop signal indication that they received at Adirondack Junction was the same indication that they would expect to see when continuing southward on the east track. Given the signal indication encountered and the expectation that they would be continuing on the east track, it was not until AMT 93 crew members overheard the issuance of the pass-stop authority and saw the switch points that they realized they were lined toward the opposing train.

Defence Barriers Concerning Rule 610 of the Canadian Rail Operating Rules

Unlike more modern rail traffic control systems that provide additional defence barriers, the Seaway Interlocking control system in use at the time of the incident has no associated software logic to trigger automatic blocking or to provide a text-based prompt when there are conflicting movements. The interlocking control system at Seaway depends on the signalman remembering each rule and manually applying adequate blocking (wooden blocks placed over toggle switches) to protect authorities. In addition, the yellow light below the track display indicating that the crossover is in the reverse position may not always be sufficiently compelling to remind the signalman that the switch is not lined correctly. Without a visual display in which track occupancy, signal blocking, and text-based prompts are presented graphically when the limits of a proposed authority are selected, signalmen at Seaway Interlocking who depend on manual signal blocking may not immediately become aware of potential conflicting train movements, increasing the risk of an overlap in authority and the possibility of a collision.

Proficiency Testing of Signalmen

To comply with Transport Canada's safety management system requirements, the railway conducts proficiency tests for signalmen at the Seaway Interlocking. These proficiency tests are intended to evaluate whether employees have appropriate knowledge, skills, and training to perform their tasks safely and effectively. In the year preceding this occurrence, no proficiency tests had been conducted on the signalman involved in this occurrence.

During proficiency testing with an RTC using a modern rail traffic control system, authorities can be collected electronically, and the establishment of blocking can be verified through electronic records. This information can be cross-referenced with radio transcripts to ensure that blocking is adequately applied.

Within the Seaway Interlocking, which is controlled by a signalman and a manual traffic control board, switch and signal blocking forms are used to record written authority numbers and movements involved. However, there is no easy way to verify that the authorities were protected through the use of wooden blocking pins to physically prevent the lining of signals or switches into such limits. When proficiency testing cannot adequately verify the operational functions of manual signal blocking, inadvertent actions and decisions by the signalman can remain undetected and uncorrected, increasing the risk of signal blocking errors.

Findings

Findings as to Causes and Contributing Factors

1. The additional task of communicating directly with the rail traffic controller for assistance to clear the signal at LaSalle was an operational distraction. Consequently, the crossover switches at Adirondack Junction were not returned to normal position after the passage of Agence métropolitaine de transport (AMT) 76.

2. With the crossover switches in the reverse position, southbound AMT 93 was inadvertently lined to the west track.

3. Anticipating the arrival of northbound AMT 94, the signalman attempted unsuccessfully to clear signal 383C. Due to the signalman's past difficulties with clearing signals, the signalman's mental model was that a similar problem was occurring at this location. Consequently, the signalman omitted to recheck the opposing signals and to apply signal blocking for AMT 94.

4. The signalman did not recognize that signal 383C was in fact responding appropriately (i.e., Stop), because opposing train AMT 93 was lined onto the same track.

5. Believing that the Stop signal was a result of a malfunction, the signalman issued a written pass-stop authority to AMT 94, resulting in the overlap of authority.

Findings as to Risk

1. Without a visual display in which track occupancy, signal blocking, and text-based prompts are presented graphically when the limits of a proposed authority are selected, signalmen at Seaway Interlocking who depend on manual signal blocking may not immediately become aware of potential conflicting train movements, increasing the risk of an overlap in authority and the possibility of a collision.

2. When proficiency testing cannot adequately verify the operational functions of manual signal blocking, inadvertent actions and decisions by the signalman can remain undetected and uncorrected, increasing the risk of signal blocking errors.

Other Findings

1. Given the signal indication encountered and the expectation that they would be continuing on the east track, it was not until AMT 93 crew members overheard the issuance of the pass-stop authority and saw the switch points that they realized they were lined toward the opposing train.

Safety Action

Safety Action Taken

Transportation Safety Board

On 02 November 2012, the Transportation Safety Board issued Rail Safety Advisory 05.12 indicating that, unlike modern rail traffic controller systems, the Seaway interlocking does not provide a robust defence barrier to prevent overlaps of authority:

- Blocking is not automatically triggered when the limits of the authority are selected.
- The train control system does not automatically ensure that signals, switch positions, and opposing movements are all lined and locked adequately.
- Signal block information is not presented in a graphic form on a visual display.

The rail safety advisory states that when there is an overlap of authority, and given the recent increase in commuter train traffic at this location, Transport Canada may wish to review the Seaway interlocking control system to ensure the safe application of switch and signal blocking.

Transport Canada

Transport Canada followed up with Canadian Pacific on the use of signal blocking devices at Seaway Interlocking. Transport Canada was advised that the following actions had been taken:

- Canadian Pacific conducted an internal investigation following this incident, and confirmed that all physical signalling components were working as intended.
- Rules and procedures at Canadian Pacific were reviewed, but no changes were made.
- A safety flash was issued by Canadian Pacific to remind employees of rules and procedures and to raise awareness.
- Additional training and coaching was provided to the signalman involved in the incident.

Canadian Pacific

An Agence métropolitaine de transport upgrade project was started that includes the replacement of the old code system (i.e., Seaway Interlocking control system). This project is scheduled for 2015.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 19 September 2013. It was officially released on 13 November 2013.

Visit the Transportation Safety Board's website (www.bst-tsb.gc.ca) for information about the Transportation Safety Board and its products and services. You will also find the Watchlist, which identifies the transportation safety issues that pose the greatest risk to Canadians. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.