# ANNUAL REPORT
## TO PARLIAMENT 2019–20

Transportation Safety Board of Canada

Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Canada

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Bureau de la sécurité des transports du Canada

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23 June 2020

The Honourable Dominic LeBlanc, P.C., M.P.
President of the Queen's Privy Council for Canada
House of Commons
Ottawa, Ontario K1A 0A3

Dear Minister,

In accordance with subsection 13(3) of the *Canadian Transportation Accident Investigation and Safety Board Act*, the Board is pleased to submit, through you, its Annual Report to Parliament for the period 1 April 2019 to 31 March 2020.

Yours sincerely,

Kathleen Fox
Chair

# MESSSAGE FROM THE CHAIR

The fiscal year just past was one of both continuity and change for the Transportation Safety Board of Canada (TSB).

Building on the successful 2018 introduction of the new Policy on Occurrence Classification, 2019–20 saw us working through a large caseload—with 84 investigations in progress at year-end. We also shared more information about transportation safety with the public than ever before through our limited-scope investigation reports and other communications vehicles.

Similarly, our extensive study on safety issues in the air-taxi sector shed light on risks in an important part of Canada's aviation industry. Air taxi operators play a crucial role in moving people and goods—particularly in remote locations—but have a troubling and persistent accident history. In the final report of our study, which is the culmination of a five-year investigation, we recommended that both Transport Canada and industry associations step up to take concrete measures to raise the bar on air-taxi safety.

The January 2020 downing of Ukrainian International Airlines Flight 752 marked a tragic start to this new decade. The TSB appointed an Expert in accordance with the *Convention on International Civil Aviation* and deployed two investigators to Tehran to visit the accident site and meet with Iranian investigators. We will continue, to the greatest extent possible, to try to be involved in this investigation, which is being led by the Aircraft Accident Investigation Bureau of the Islamic Republic of Iran. We want to do our part to find out what happened and why—for the families and for all Canadians.

As we continued in these traditional roles in 2019–20, there was change among the Board and senior management. In particular, André Lapointe, a seasoned public service executive, became the TSB's new Chief Operating Officer. Previously Assistant Deputy Minister, Corporate Services, and Chief Financial Officer at Transport Canada, André succeeds Jean Laporte, who retired in September 2019 after 35 years in the transportation safety field.

I look forward to tapping into the new ideas and fresh perspectives that have come with these and other changes in the TSB's management team in recent months. Together, we will spend time in 2020–21 developing a new strategic plan to guide the organization for the next five years.

An important focus of that plan will be responding to the effects of the COVID-19 pandemic.

Canada's response to this worldwide event accelerated our move to a digital workplace. Steps we had already taken, including introducing electronic, and portable, business tools—along with excellent work from our information management and technology teams—have allowed us to continue operating with little disruption throughout the ongoing pandemic period.

This solid foundation will serve us well as we continue to advance transportation safety during what promises to be a time of substantial change, not only in how and where we do our work but also in the transportation industry itself.

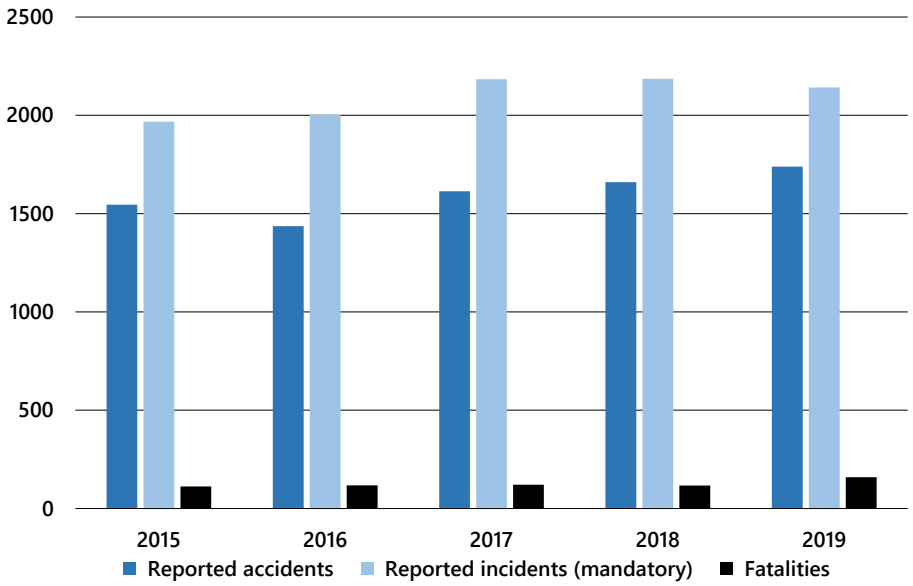
Kathleen Fox

# THE YEAR IN RESULTS

In 2019–20, staff from the Transportation Safety Board of Canada (TSB) assessed thousands of accidents and incidents that occurred across Canada in the aviation, marine, pipeline and rail sectors (see the definitions in the Policy on Occurrence Classification).

TSB personnel then deployed to the sites of some of these occurrences in person to collect data and carry out analysis in order to identify the causes and contributing factors, and highlight known and emerging safety concerns—all in an effort to improve transportation safety in Canada.

**Figure 1. Transportation occurrences reported to the TSB, 2015 to 2019**




The total number of occurrences reported to the TSB (as required under the *Transportation Safety Board Regulations*) in the 2019 calendar year (3881) was slightly more (0.9%) than the 2018 total of 3846.

The overall number of accidents reported has increased each year since 2016, with the 2019 total (1739) being almost 5% above the 2018 level (1660), and 7% higher than the 10-year average of 1626.

There were 36% more fatalities (159) across all transportation sectors in 2019 than there were in 2018 (117). The 2019 figure represents a 13% increase in fatalities over the 10-year average of 140.

The 2142 incidents reported to the TSB in 2019 is a slight decrease (2%) from the 2018 figure (2186), but 23% higher than the 10-year average (1746). This difference partly results from changes made in 2014 to TSB reporting requirements.

## THE TSB AT WORK

### DEPLOYMENTS

TSB investigators deployed 60 times during the 2019–20 fiscal year (down from 79 the previous year) in response to occurrences in all sectors. These deployments took staff from the TSB regional offices and Head Office to locations across the country.

### INVESTIGATIONS

**Table 1. TSB caseload, 2018–19 and 2019–20**

| | 2018–19 | 2019–20 |
|---|---|---|
| Investigations started during year | 81 | 66 |
| Investigations completed during year | 78 | 50 |
| In progress on 31 March of each year | 68 | 84 |

In 2019–20, the TSB began 66 new investigations and completed 50 across all four transportation sectors (aviation sector reports; marine sector reports; pipeline sector reports; rail sector reports) and in all four classes (from in-depth and complex to limited scope).

Average completion times increased, both overall and for the various classes of investigations, although only by four days in the case of the limited-scope class 4 investigations (from 224 days in 2018–19 to 228 days in 2019–20). These investigations accounted for 52% of the total cases closed during the year. In them, the TSB quickly gathers, analyzes and reports the facts of straightforward occurrences, freeing up resources for more complex investigations that have greater potential for advancing transportation safety.

In support of TSB investigations, engineers, technicians and human factors specialists began 247 projects and completed 231 technical reports in 2019–20. They also began 23 projects and completed 16 technical reports for foreign investigation agencies.

### SAFETY COMMUNICATIONS PRODUCTS

**Table 2. Safety communications products issued, 2019–20**

| Safety advisories | Safety information letters | Safety concerns | Recommendations |
|---|---|---|---|
| 15 | 6 | 0 | 5 |

While investigations are ongoing, the TSB issues safety advisories and safety information letters to notify regulatory and industry stakeholders of unsafe conditions. These communications may suggest remedial action to reduce safety risks or share observations to promote greater safety.

Safety concerns, which are usually communicated in final investigation reports, provide a marker to regulators and industry that the TSB's five-member Board has identified a safety deficiency for which it does not yet have sufficient information to make a recommendation for corrective action.

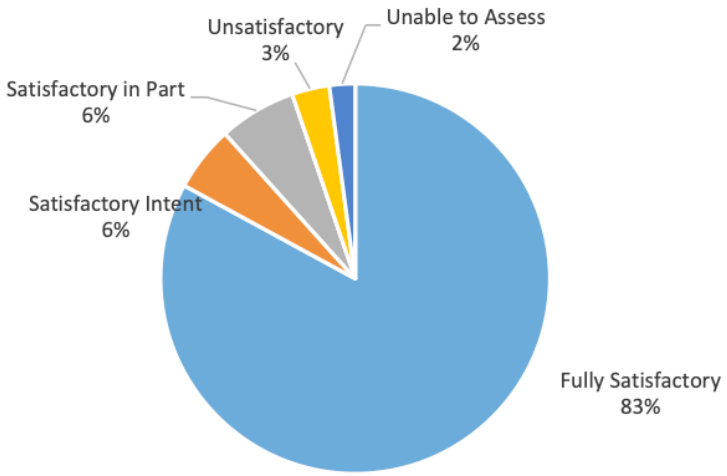
The Board issued five recommendations in 2019–20, all of which were the result of aviation investigations. The Board makes recommendations when systemic deficiencies pose significant risks to the transportation system and, therefore, warrant the highest attention of regulators and industry.

Federal ministers must respond to the Board's recommendations within 90 days, setting out specific actions their department plans to take. Board members then review and rate these responses.

Each year, the Board reassesses outstanding recommendations as part of ongoing efforts to urge stakeholders to take action on the safety issues TSB investigations have identified. In 2019–20, the Board reassessed 13 outstanding recommendations as Fully Satisfactory: 10 in aviation and 3 in rail.

Since 1990, the Board has made 609 recommendations. By the end of 2019–20, it had given 83% of the responses to these recommendations the highest rating of Fully Satisfactory (up from 81.5% at the end of 2018–19). This means that stakeholders, including Transport Canada, had taken action to substantially reduce the safety deficiencies the Board had identified.

**Figure 2. Board assessments of responses to recommendations from 29 March 1990 to 31 March 2020**




At 31 March 2020, there were 92 outstanding recommendations, slightly less than half of which date from 10 years ago or more. The Board is concerned about the slow progress on these older recommendations—an issue that has been on the TSB Watchlist of key safety issues since 2016.

**Table 3. Age of outstanding recommendations, 31 March 2020**

| Age of recommendations | Aviation | Marine | Rail | Total |
|---|---|---|---|---|
| Less than 1 year | 5 | 0 | 0 | 5 (5%) |
| 1 year to less than 7 years | 21 | 10 | 10 | 41 (45%) |
| 7 years to less than 10 years | 3 | 2 | 0 | 5 (5%) |
| **Sub-total** | 29 | 12 | 10 | 51 (55%) |
| 10 years to less than 15 years | 13 | 2 | 0 | 15 (16%) |
| 15 years to less than 20 years | 7 | 2 | 3 | 12 (13%) |
| 20 years or more | 7 | 6 | 1 | 14 (15%) |
| **Sub-total** | 27 | 10 | 4 | 41 (45%) |
| **Total** | 56 | 22 | 14 | 92 (100%) |

## WATCHLIST 2018

The TSB publishes its Watchlist every two years, so 2019–20 was the mid-cycle year for the 2018 version of this list of safety issues.

This period was a good opportunity to consult stakeholders to obtain their insights into the issues—including multi-modal issues such as fatigue management, and safety management and oversight—and learn about any actions they are taking to address them.

In September 2019, the TSB sent questionnaires to a number of key stakeholders in all four transportation sectors to solicit their input. The survey responses informed subsequent panel presentations and other discussions the TSB held with industry members at meetings of the Air Transport Association of Canada, Helicopter Association of Canada and Canadian Marine Advisory Council in November 2019, and the Canadian Aviation Safety Collaboration Forum in January 2020. The TSB consulted the Railway Association of Canada, Canadian National Railway Company, VIA Rail Canada Inc. and Canadian Pacific Railway in February 2020.

This input is feeding into the work of the Board to prepare the next edition of the Watchlist, which will be published in the fall of 2020.

## SECURITAS

The TSB operates the SECURITAS program to allow transportation employees and the Canadian public to report, in confidence, unsafe transportation acts and conditions they observe.

In 2019–20, the TSB received 274 new SECURITAS reports, a 59% increase from 2018–19, with each sector receiving more reports than it had the year before: 91% more in aviation; 42% more in marine and 34% more in rail. These increases may have been due to a variety of factors, including the ongoing impact of the shutdown of Transport Canada's Civil Aviation Issues Reporting System in 2016–17, and the TSB's growing social media presence and active industry outreach program. There were no pipeline-related reports to SECURITAS in 2019–20.

The trusted agents who handle SECURITAS reports on behalf of the TSB closed 261 reports over the course of 2019–20. Here are some notable examples of safety actions being taken in light of SECURITAS reports:

**Unreported floatplane crash:** A SECURITAS report informed the TSB that a floatplane crash had not been reported by the company. The TSB regional office contacted the company and learned that the owner was unaware the crash was a reportable occurrence. The TSB informed the owner that, due to the extent of the damage, it fell under the definition of an accident. It was classified as a Class 5 investigation and entered as such in the Aviation Safety Information System.

**Airport employee:** A number of SECURITAS reports informed the TSB that an airport employee working on a ramp and fuelling aircraft was a known drug user and dealer. Transport Canada was informed, and the Royal Canadian Mountain Police took appropriate action.

**Ferry maintenance:** A SECURITAS report related to the maintenance of the machinery on board a ferry and contained concerns for the safety of the vessel and crew. Transport Canada subsequently carried out an inspection, identifying a number of deficiencies and action items. Transport Canada gave the inspection report to the ferry's owners and the classification society.

**Safety onboard a tug:** Another SECURITAS report related to stability on board a tug, with concern for the safety of the vessel and crew. Transport Canada carried out an inspection upon receiving this information from the trusted agent.

**Maintenance of railway crossing:** A SECURITAS report noted that planks moved up and down when a crossing was traversed. The track supervisor directed an immediate inspection and found slight movement of the planks. They were fixed in place with lag bolts.

**Safety defects:** A SECURITAS report noted that a defective rail car had been released into service. In response, mechanical supervisors and carmen were coached to ensure they understood that all equipment placed into service must be free from safety defects, that they must enter information about defects into the railway's system without any unnecessary delay, and that any defect can be escalated to ensure it is handled appropriately.

## COMMUNICATIONS AND OUTREACH: PROVIDING CLEAR, TIMELY AND OPEN INFORMATION

Active and regular communications and outreach are important aspects of the TSB's efforts to advance transportation safety. Through its website, social media channels and in-person events, the TSB reaches industry and government stakeholders, and members of the public across Canada and around the world.

Table 4. TSB media and stakeholder outreach activities, 2019–20

| Media requests | Statistics requests (media) | Interviews | News conferences | Industry outreach events |
|---|---|---|---|---|
| 741 | 10 | 129 | 3 | 63 |

Table 5. TSB communications products, 2019–20

| Deployment notices | Investigation webpages | Media advisories | News releases | Investigation reports |
|---|---|---|---|---|
| 60 | 61 | 4 | 55 | 58 |

Table 6. TSB social media presence, 2019–20

| Lifetime views on YouTube | Lifetime views on Flickr | Twitter followers |
|---|---|---|
| 2 977 909 | 8 366 435 | 24 329 |

### OUTREACH ACTIVITIES

The TSB had the rare opportunity in June 2019 to host the heads of 16 independent safety investigation authorities from member countries of the **International Transportation Safety Association** for three days of meetings in Quebec City. With the goal of sharing best practices and learning from the experiences of others, attendees covered topics such as safety deficiencies, studies and recommendations, investigation techniques, and training and recruiting strategies for investigators. The conference was also a platform for open and frank discussions among members on strategic issues and concerns.

In October 2019, the Air Branch held its annual **TSB Air Safety Investigator Workshop** in Cornwall, Ontario. The event was particularly successful, with presentations covering a wide array of contemporary air safety topics. This event had the largest attendance in its history, with approximately 80 participants, including TSB investigators, Board members, government representatives and industry stakeholders, such as airlines, manufacturers and aircrew labour unions. The workshop also welcomed air safety investigators from Denmark, Finland, Iceland, Norway, Sweden and the United States.

The TSB is a founding member of the Canadian Marine Industry Foundation, which was formally launched in November 2019. The non-profit foundation is a national forum to connect

marine stakeholders to work together to increase the number of Canadians that choose marine careers in the public and private sector. In that regard, the Foundation will help the TSB recruit and develop individuals seeking to pursue a career in marine transportation safety.

The TSB released two **videos** in 2019–20, which are available on its YouTube channel:

- the Tug girding video, which has more than 88 000 views and has received wide international recognition, focuses on a common safety issue in the marine towing industry. The TSB created this video to illustrate the factors leading to girding and recovery methods (related investigation: M18P0230); and
- Sky's the limit recognizes women's contributions to the TSB and transportation safety in the air, marine, pipeline and rail sectors in Canada.

In conjunction with the release of the report of an in-depth TSB investigation into safety issues in Canada's air-taxi sector, Board Chair Kathy Fox penned an **article for Wings magazine** about the need to raise the bar on air-taxi safety.

## PARLIAMENTARY ACTIVITIES

The Board Chair and TSB officials appeared before the House of Commons Standing Committee on Transport, Infrastructure and Communities twice in 2019–20.

The first appearance, on 2 April 2019, focused on bus safety. The Chair spoke about the TSB investigation (R13T0192) into the fatal 2013 collision between an Ottawa city bus and a VIA Rail passenger train. In its investigation, the TSB identified 15 causal and contributing factors and issued five recommendations. Three of them were directly related to the safety of buses.

In June 2019, the committee issued its report on bus safety, with nine recommendations, some of which mirrored those in the TSB investigation—in particular, that Transport Canada develop crashworthiness standards for passenger buses in excess of 11 793 kg as well as a standard for crashworthy event data recorders.

On 20 March 2020, the Chair and the Director of Investigations for the Air Branch appeared before the committee to answer questions about the aircraft certification process in Canada.

## TRAINING FOR INVESTIGATORS ON INTERACTIONS WITH INDIGENOUS PEOPLES

Over the course of 2019–20, the TSB developed and implemented a strategy to guide its interactions with Indigenous peoples during investigations. This strategy aligns the TSB with the government's priority of reconciliation and renewed relationship with Indigenous peoples. It also contributes to meeting two of the TSB's strategic priorities: engaging stakeholders and improving investigation policies, procedures and tools.

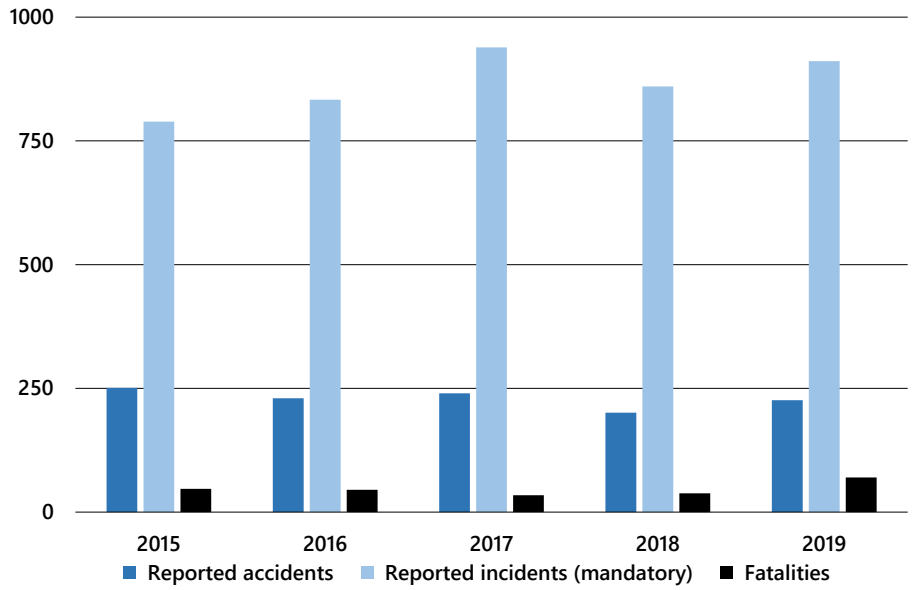
Under the strategy, the TSB held awareness training for investigators and media relations staff, reached out to national Indigenous associations and developed guidance for investigators. Looking ahead, the TSB plans to integrate training on interactions with Indigenous peoples into its comprehensive investigator-training program.

# AVIATION SECTOR

## THE YEAR IN REVIEW

The Transportation Safety Board of Canada (TSB) recorded 226 aviation accidents during 2019. This is a 12% increase from 2018, but still lower than the 10-year average of 258. In general, aviation accidents in Canada have been declining over the past decade. Of 226 accidents, 217 involved Canadian-registered aircraft.

**Figure 3. Aviation accidents, incidents and fatalities, 2015 to 2019**




In 2019, there were 26 fatal accidents involving Canadian-registered aircraft. However, none of these involved airliners or commuter aircraft. The majority of fatal accidents involved privately owned aircraft. Fatalities involving commercially operated flights were mainly in the air-taxi sector. The total number of resulting fatalities (70) was the highest since 2010 and included 11 deaths in foreign-registered aircraft operating in Canada.

Eight accidents in 2019 involved a release of dangerous goods. While this is similar to 2018 (seven), it is higher than the average over the previous decade of about four per year.

In addition, 911 aviation incidents were reported to the TSB in 2019. This represents a rise from 860 in 2018, and remains above the yearly average of 777 observed between 2009 and 2018. This may be linked to an improved reporting culture in the industry and the widespread adoption of safety management systems among operators.

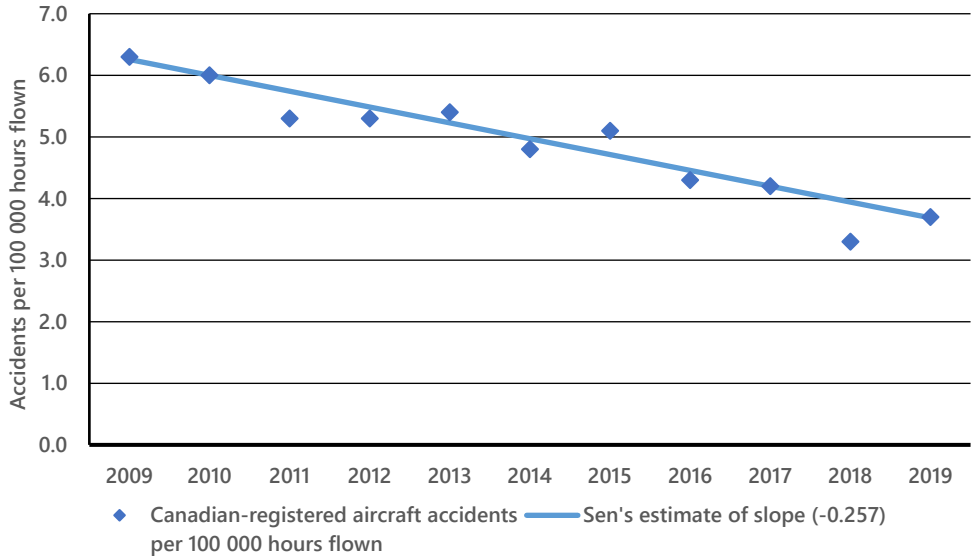
Over 90% of incidents (832) involved Canadian-registered aircraft, with 651 of these incidents occurring in Canada. The number of incidents that took place elsewhere (181) is high compared to the 10-year average of 85. The TSB continues to monitor this type of incident to determine whether there is a trend developing that warrants more detailed analysis.

## ACCIDENT RATE: A MEASURE OF AVIATION SAFETY

The accident rate for Canadian-registered aircraft (excluding ultralights) per 100 000 hours flown has followed a downward trend since 2009. These aircraft flew an estimated 5.2 million hours in Canada and abroad in 2019. With 195 accidents over that period, the accident rate is

3.7 accidents per 100 000 hours flown, above the 2018 rate of 3.3, but below the 10-year average of 4.9.

**Figure 4. Canadian-registered aircraft accident rate, 2009 to 2019**




## INVESTIGATIONS

TSB staff deployed to 36 aviation occurrences in 2019–20—two fewer than in 2018–19— began 39 investigations and completed 28.

**Table 7. TSB aviation activities, 2018–19 and 2019–20**

| | 2018–19 | 2019–20 |
|---|---|---|
| Deployments | 38 | 36 |
| Investigations started | 38 | 39 |
| Investigations completed | 38 | 28 |
| Investigations in progress on 31 March of each year | 25 | 36 |

**Table 8. Aviation investigations completed, 2018–19 and 2019–20**

| Class (investigation type) | Completed | | Completion target (days) | Average duration (days) | |
|---|---|---|---|---|---|
| | 2018–19 | 2019–20 | | 2018–19 | 2019–20 |
| 1 (safety issue) | 1 | 1* | 730 | 658 | 1696 |
| 2 (complex) | 2 | 1 | 600 | 550 | 686 |
| 3 (detailed) | 8 | 8 | 450 | 447 | 428 |
| 4 (limited scope) | 27 | 18 | 220 | 192 | 212 |

*This was a comprehensive, five-year study of safety issues in the air-taxi sector.

### IN-DEPTH REPORT IDENTIFIES RISKS IN AIR-TAXI SECTOR

In 2015, the TSB began an in-depth safety issue investigation into the risks that persist in air-taxi operations across Canada (A15H0001). The investigation required significant resources and time in order to identify, document and analyze various safety topics, and included both human factors and macro analysis.

Air taxis are single- and multi-engine aircraft (other than turbo-jets) that have a maximum certificated take-off weight of 19 000 pounds and can seat nine or fewer passengers. These aircraft provide a wide variety of services throughout Canada, often in remote locations where there is less infrastructure available than at large airports and where access to basic weather information and the latest technology may be limited.

The Board published the report on the investigation, *Raising the bar on safety: Reducing the risks associated with air-taxi operations in Canada*, in November 2019. The investigation found that air-taxi accidents result from two main underlying factors: the acceptance of unsafe practices and the inadequate management of operational hazards

To address these issues, the Board issued four recommendations aimed at improving safety in the air-taxi sector of Canadian aviation—a sector that continues to have more accidents, causing more fatalities, than all other sectors of commercial aviation in Canada combined:

- that Transport Canada collaborate with industry associations to develop strategies, education products and tools to help air-taxi operators and their clients eliminate the acceptance of unsafe practices (Recommendation A19-02);
- that industry associations such as the Air Transport Association of Canada, Helicopter Association of Canada, Association Québécoise du Transport Aérien, Floatplane Operators Association and Northern Air Transport Association promote proactive safety management processes and safety culture with air-taxi operators to address the safety deficiencies identified during the TSB investigation through training and sharing of best practices, tools and safety data specific to air-taxi operations (Recommendation A19-03);
- that Transport Canada review the gaps identified in the investigation regarding Subpart 703 of the *Canadian Aviation Regulations* and associated standards, and update the relevant regulations and standards (Recommendation A19-04); and
- that Transport Canada require all commercial operators to collect and report hours flown and movement data for their aircraft by *Canadian Aviation Regulations* subpart and aircraft type, and that Transport Canada publish those data (Recommendation A19-05).

The Board received responses to these recommendations in the first quarter of 2020 (see Appendix A for details) and completed its assessment of them in March 2020.

## CLEAR REGULATIONS ON SAFETY BELT USE NEEDED

The TSB's investigation (A17O0264) into the December 2017 collision with terrain of a Hydro One Networks Airbus Helicopters AS 350 B2 near Tweed, Ontario, revealed that a bag that was inadequately secured blew off an external platform, struck the tail rotor in flight and rendered the aircraft uncontrollable. The pilot and all three passengers, who were power line technicians, were fatally injured.

The TSB quickly issued Aviation Safety Advisory A17O0264-D1-A1, "Unsecured cargo and unrestrained passengers in helicopters," on 21 December 2017. In it, the TSB alerted Transport Canada and industry stakeholders to the risks associated with unsecured cargo and unrestrained passengers in helicopters, and advocated for prompt action to address this safety issue.

The investigation report highlighted the ambiguity in the definition of "safety belt" in subsection 101.1(1) of the *Canadian Aviation Regulations*. The intent of this regulation is for passengers to always use shoulder harnesses when they are available. However, if regulations are not clear in requiring individuals to use all available components of a safety belt, they may not use shoulder harnesses as intended, increasing the risk of injury or death.

Consequently, the Board issued Recommendation A19-01 along with the final investigation report in October 2019. The recommendation calls on Transport Canada to amend the *Canadian Aviation Regulations* to remove any ambiguity associated with the definition of "safety belt."

The Board received Transport Canada's response to this recommendation in the first quarter of 2020 (see Appendix A for details).

## RISKS ASSOCIATED WITH ULTRALIGHT WING BRACKETS

On 30 July 2018, a privately operated Quad City Challenger II advanced ultralight aircraft crashed into trees en route from North Bay to Rockcliffe, Ontario, after the right wing separated from the aircraft. The single occupant was fatally injured.

As part of its investigation (A18O0106), the TSB issued Aviation Safety Advisory A18O0106-D1-A1, "Quad City Challenger II Advanced Ultralight – Bracket Failure," to alert Transport Canada to the possible risks associated with the failure of the attachment brackets that secure the wing lift struts on the aircraft.

Quad City, the Canadian distributor of the Challenger II, is conducting a stress analysis on the addition of a fixture to reduce flexing and spread loads around the bolthole, where fatigue cracks appear to start.

In response to the safety advisory, Transport Canada issued Civil Aviation Safety Alert 2019-02 to inform owners of the possible failure of the brackets and the need for disassembly, inspection and part replacement.

## IMMEDIATE ACTION REQUIRED TO ENSURE FUNCTIONING EMERGENCY EXITS

The TSB's investigation (A18W0129) into the August 2018 capsize during a water landing of a Cessna U2016G on Little Doctor Lake, Northwest Territories, highlighted the need for design improvements to the aircraft's emergency exits. While the pilot and one passenger escaped the submerged fuselage, the remaining three passengers did not.

The investigation found that, although all doors were functional, the extended wing flaps used for landing had blocked the forward portion of the rear cargo doors. Based on this observation, the TSB issued Aviation Safety Advisory A18W0129-D1-A1 to highlight the significant safety issue involving Cessna 206 aircraft that are fitted with rear double cargo doors. Over the years, these doors have been identified as a risk to passengers in emergency situations. As a result, the TSB and other investigative agencies have been advocating for changes to the door design.

Transport Canada responded to the safety advisory by stating its intention to make a formal submission to the U.S. Federal Aviation Administration (FAA) requiring Cessna to develop, deploy and mandate improvements to the cargo door design to ensure successful egress in the event of an accident on water.

In April 2020, Transport Canada issued Airworthiness Directive CF-2020-10 in response to the safety advisory to impose new limits on how Cessna 206s can be configured and loaded. In addition, the directive noted that the FAA now requires 206s to include a door at the front on the right-hand side of the cabin. Transport Canada considers that this door offers a viable means of emergency egress for passengers in the front and centre-row seats in circumstances such as those in the 2018 occurrence.

The investigation also highlighted a number of risk factors. In particular, if the passenger safety briefing is incomplete, passengers may not know how to escape the aircraft in an emergency. In this occurrence, a pre-flight briefing was provided during which the operation of the rear cargo doors was demonstrated. However, no instructions were provided on what to do if the doors were blocked due to flap deployment.

Following the occurrence, the company stopped operating the Cessna 206 on floats. It also began providing underwater egress training for all floatplane flight crews, and increased training and experience requirements for new crew members.

## INSPECTION METHOD QUESTIONED AS PART OF TSB INVESTIGATION

The TSB investigated the March 2019 collision of a privately registered Piper J3C-65 aircraft on skis with the frozen surface of Snowshoe Lake in Ontario (A19C0026). Both the pilot and passenger sustained fatal injuries when the pilot lost control of the aircraft during the visual flight rules flight.

As part of the investigation, the TSB issued Aviation Safety Advisory A19C0026-D1-A1, "Federal Aviation Administration Airworthiness Directive 2015-08-04 Reliability of Main Spar Wing Lift Assembly Inspection – Punch Test Method." The TSB wished to draw Transport Canada's attention to the contrast between the results of two separate methods for determining the amount of corrosion within the strut assembly, stating that one of the methods—the punch test—can be inconclusive and therefore unreliable. The TSB further advised Transport Canada that it needs to review current inspection methods to ensure they are a reliable way to identify the unsafe condition.

In its response, Transport Canada reported that it had obtained and shared with the FAA a copy of the TSB's engineering report and entered into discussions with the FAA about having an alternative to the punch test that would provide more conclusive results. However, the FAA indicated that, after its investigation with the aircraft manufacturer, it is moving towards removing the punch test as an inspection method.

Not knowing when this will happen, Transport Canada reported that it is planning to take proactive action by issuing a unilateral airworthiness directive to remove the punch test as an inspection method for detecting lift strut corrosion.

## SAFETY ADVISORIES AND SAFETY INFORMATION LETTERS

The TSB issued additional safety advisories and safety information letters in 2019–20 as part of investigations into occurrences during the year:

- January 2019 alternating current (AC) connector failures on a de Havilland DHC-8-402 aircraft, leading to diversion of flight to Calgary International Airport, Alberta (A19W0001):
    - Air Safety Advisory A19W0001-D1-A1 noted that the variable-frequency AC power feeder connectors in DHC-8-400 series aircraft, installed between the AC contactor box and the flight compartment's variable-frequency AC circuit breaker panel, have a history of failure due to arcing. The TSB encouraged Transport Canada to address this safety issue and work with de Havilland to develop a more robust strategy for inspection and repair/replacement of the connectors.
- July 2019 collision with terrain of Robinson R44 helicopter near Lac Valtrie, Quebec, with fatal injury of two individuals (A19Q0109):

    - Air Safety Advisory A19Q0109-D1-A1 identified a safety issue involving the failure of the Kannad 406 AF-compact emergency locator transmitter switch locking system. The TSB also suggested that the periodic inspection procedures for these transmitters be revised so that such faults can be detected and corrected.

- October 2019 loss of braking and runway excursion of a de Havilland DHC-8-102 aircraft at Pickle Lake Airport, Ontario (A19C0136):
    - Aviation Safety Information Letter A19C0136-D1-L1 addressed the emergency procedure in the DHC-8-102's Aircraft Flight Manual/Quick Reference Handbook for when the "WT ON WHEELS" caution light comes on. The TSB encouraged Transport Canada to work with the manufacturer to amend the procedure to include specific information about the possibility that the aircraft may not respond to anti-skid brakes and nose wheel steering input if two proximity sensors have failed.
- October 2019 in-flight breakup (right wing became detached from the fuselage) of a de Havilland DHC-3T aircraft near Little Grand Rapids, Manitoba, with fatal injury of the pilot and two passengers (A19C0138):
    - Air Safety Advisory A19C0138-D1-A1 identified an issue with the wing strut attachment inspection, finding that it may not be adequate for identifying cracks that form. The TSB encouraged Transport Canada to work with Viking Air Ltd., the aircraft type certificate holder, to amend the Supplementary Inspection and Corrosion Control Manual or to issue a new airworthiness directive to include inspection requirements outlined in Viking's Alert Service Bulletin V3/0011.

## PROGRESS ON OUTSTANDING RECOMMENDATIONS

Of the 36 aviation recommendations the Board assessed and reassessed in 2019–20, 12 were closed. Among these, 10 were closed as Fully Satisfactory and 2 as Satisfactory in Part.

Among the recommendations closed as Fully Satisfactory were Recommendation A99-02 and Recommendation A99-03, which date from 1999 and which the Board had issued in the wake of the Swissair accident off the coast of Nova Scotia the previous year. Four other recommendations issued as part of that investigation (A98H0003) were also closed in 2019–20.

One of the shortcomings the TSB identified during its investigation was the limited recording capacity of the aircraft's cockpit voice recorder (CVR). The CVR was able to record only 30 minutes, and therefore did not capture the timeframe when the fire that led to the accident started. In light of this, the Board recommended (Recommendation A99-02) to Transport Canada and the European Joint Aviation Authorities that, as of 1 January 2005, all aircraft that require both a flight data recorder and a CVR be required to be fitted with a CVR having a recording capacity of at least two hours.

Recommendation A99-03 focused on the Swissair aircraft's lack of a dedicated independent power supply to power the CVR and the cockpit area microphone in the event that normal aircraft power sources to the CVR were interrupted. To address this, the Board recommended that as of 1 January 2005, for all aircraft equipped with CVRs having a recording capacity of at least two hours, a dedicated independent power supply be installed adjacent or integral to the CVR, to power the CVR and the cockpit area microphone for 10 minutes whenever normal aircraft power sources to the CVR are interrupted.

In May 2019, the amendments to the *Canadian Aviation Regulations* for flight data recorders and CVRs were published in the *Canada Gazette*, Part II. The Board is of the view that these

amendments, which will come into effect in May 2023, will address the safety deficiencies associated with both recommendations.

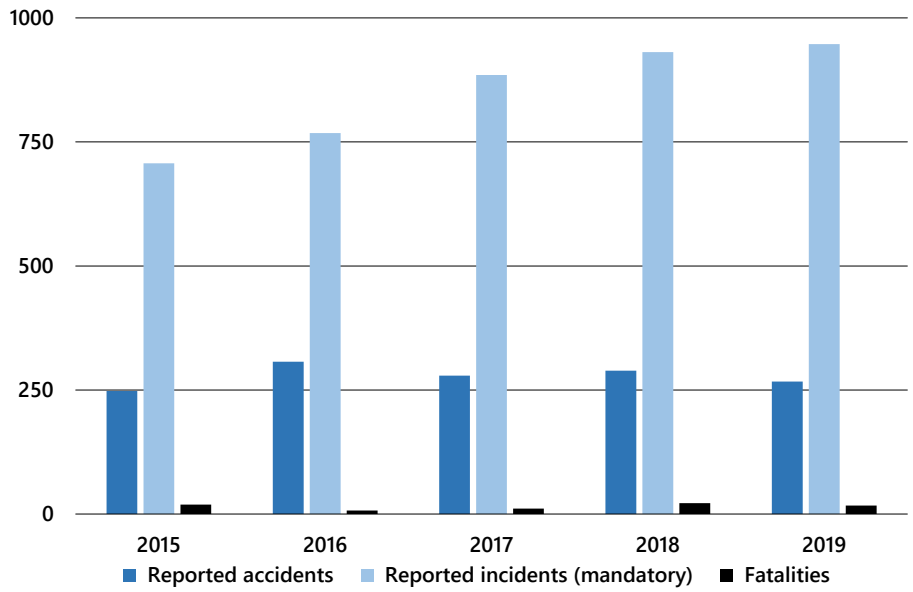
The remaining 24 recommendations the Board assessed and reassessed in 2019–20 obtained the following ratings: Satisfactory Intent (7); Satisfactory in Part (7); Unable to Assess (7) and Unsatisfactory (3).

# MARINE SECTOR

## THE YEAR IN REVIEW

There were 267 marine accidents reported to the Transportation Safety Board of Canada (TSB) in 2019, below the 2018 total of 289 and the 10-year average of 298. In 2019, 78% of marine accidents were shipping accidents, compared to 83% on average over the previous 10 years. The remaining 22% of marine accidents in 2019 were accidents aboard ship, above the 10-year annual average of 17%.

**Figure 5. Marine accidents, incidents and fatalities, 2015 to 2019**




In 2019, 17 marine fatalities were reported, below the 2018 total of 22, but slightly above the 10-year average of 15.2. Thirteen of the 17 fatalities occurred aboard ship, in contrast to 2018 when most fatalities (14 of 22) involved shipping accidents.

As in previous years, the majority of the marine fatalities (10 of the 17) were related to commercial fishing (Canadian-flag vessels in Canadian waters). Due to this continuing trend, commercial fishing safety is a Watchlist 2018 issue.

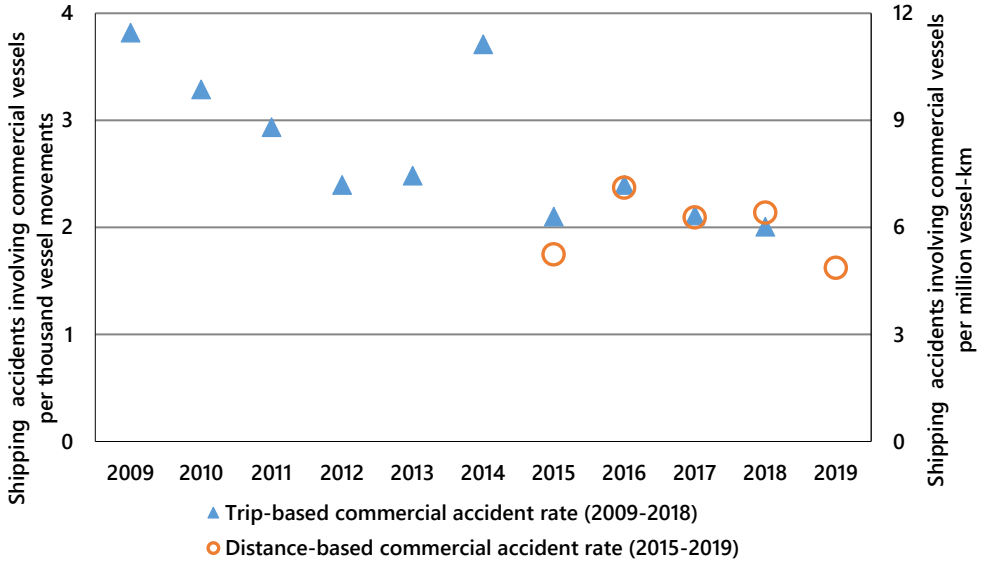
There were 230 vessels involved in the 207 shipping accidents that took place in 2019. In 2018, 267 vessels were involved in 233 shipping accidents. The highest decrease was observed in the Pacific region (to 90 from 119).

The number of marine incidents reported to the TSB increased to 947 in 2019, which is only a 2% increase from 2018, but a 65% increase from the 10-year average of 573. As in previous years, most reportable incidents (84%) were related to the total failure of machinery or technical systems. The increase in incidents of this type is due largely to changes made in 2014 to TSB reporting requirements.

## ACCIDENT RATE: A MEASURE OF MARINE SAFETY

According to Transport Canada, 2019 marine activity (commercial vessel-kilometres) for Canadian commercial non-fishing vessels over 15 gross tons (excluding passenger vessels and cruise ships) was 12% above the 2015 to 2018 average. The 2019 accident rate was 4.9 accidents per million commercial vessel-kilometres, lower than the 2015-to-2018 average of 6.3. (Transport Canada now provides a comprehensive distance-based metric of commercial marine activity in Canadian waters beginning from 2015. However, a five-year series is too short to test for meaningful trends, and vessel movements are no longer captured.)

**Figure 6. Accident rate, Canadian commercial non-fishing vessels, 2009 to 2019**




## INVESTIGATIONS

TSB staff deployed to 8 marine occurrences in 2019–20—down by 7 from 2018–19—and began 7 investigations.

**Table 9. TSB marine activities, 2018–19 and 2019–20**

| Year | 2018–19 | 2019–20 |
|---|---|---|
| Deployments | 15 | 8 |
| Investigations started | 20 | 7 |
| Investigations completed | 22 | 8 |
| Investigations in progress on 31 March of each year | 19 | 18 |

Of the 8 marine investigations the TSB completed in 2019–20, 5 were detailed class 3 investigations and 3 were limited-scope class 4s. The average time to complete the class 3 investigations was 548 days (up from 417 in 2018–19). The average duration of the class 4 investigations was 341 days, an increase from 294 days the previous year.

Internal resourcing issues, combined with a significant amount of workload from previous years, meant that the TSB focused its efforts on fewer marine occurrences in 2019–20.

Table 10. Marine investigations completed, 2018–19 and 2019–20

| Class (investigation type) | Completed | | Completion target (days) | Average duration (days) | |
|---|---|---|---|---|---|
| | 2018–19 | 2019–20 | | 2018–19 | 2019–20 |
| 2 (complex) | 2 | 0 | 600 | 574 | n/a |
| 3 (detailed) | 7 | 5 | 450 | 417 | 548 |
| 4 (limited scope) | 13 | 3 | 220 | 294 | 341 |

## CREW TO BE FULLY TRAINED IN LIFE-SAVING EQUIPMENT

During 2019–20, the TSB closed three investigations into three instances of passenger ferry lifeboats and rescue boats suddenly dropping into the water during drills.

In the first instance (M17A0391), the forward release hook on a lifeboat on the passenger ferry *Northern Ranger* suddenly released during scheduled operational testing in October 2017 in Nain, Newfoundland and Labrador. The four crew members on board were injured. The TSB found that the lifeboat fell because the release hook had been improperly reset, and its safety defence did not operate in compliance with the *Life-Saving Appliance Code*.

The TSB issued Marine Safety Advisory MSA 04/18 regarding the models of the release hooks involved in this occurrence. The ferry operator subsequently prohibited crew from being in lifeboats during retrieval.

## OPERATIONAL UPDATES, INCLUDING CREW TRAINING, MUST ACCOMPANY EQUIPMENT CHANGES

In the second investigation (M18P0087), the TSB found that incorrect securement had led to the 2018 uncontrolled fall during a drill of a rescue boat and its crew from the passenger ferry *Queen of Cumberland* in Swartz Bay, British Columbia.

The vessel had undergone a mid-life upgrade in 2016, during which the rescue boat davit, a device used to hoist and lower rescue boats and lifeboats, was changed. However, corresponding updates to operational and maintenance procedures were not made, and others went unidentified and unresolved.

Following the occurrence, the operator, BC Ferries, prohibited personnel from being on board rescue boats while they are being raised and lowered, except during emergencies. The operator also provided updated training on the operations and limitations of rescue boat davits, and updated its maintenance procedures.

In the third lifeboat-related investigation completed in 2019–20 (M18P0257), the TSB determined that a combination of inadequate risk assessment, informal practices and insufficient supervision led to two crew members' falling from a rescue boat during a passenger ferry emergency drill. This occurrence, involving the *Spirit of Vancouver Island*, also took place at the Swartz Bay Ferry Terminal, a few months after the *Queen of Cumberland* occurrence.

The investigation determined that the rescue boats on board the *Spirit of Vancouver Island* had been replaced with another model that had different physical characteristics from the original, including having a greater overall height. However, the davits were not changed to match, and crew members had developed an informal practice to compensate. Further, in this occurrence, the chief officer's high workload and simultaneous tasks at multiple locations meant he was not available to supervise the drill.

BC Ferries had voluntarily adopted a safety management system but did not identify hazards related to changing the rescue boat type. If key components of a safety management system, such as carrying out risk assessments when there are changes in equipment aboard ships, are not managed effectively and necessary updates to maintenance systems and schedules are not made, there is a risk that maintenance will be inadequate or overlooked. In addition, if changes to operational procedures and training are not made, the crew may not be proficient in the use of the equipment. Both of these factors increase the risk of equipment failures, accidents and injuries, and there is a risk that the safety of passengers and crew will be compromised. Safety management and oversight is a Watchlist 2018 issue.

Following the occurrences, BC Ferries made a number of changes to policies and procedures related to rescue boat operations.

## IMPACT OF VESSEL MODIFICATIONS MUST BE TESTED TO ENSURE SAFETY

The TSB investigated the December 2018 sinking of the lobster fishing vessel *Charlene A* in St. Margaret's Bay, Nova Scotia (M18A0425). The four crew members were wearing lifejackets and were rescued by another fishing vessel.

The vessel had been modified in the summer of 2018, when a stern extension and hinged tailgate-style bulwark (an extension of the vessel's side above the level of the vessel's exterior deck) was installed. However, the master did not determine whether the vessel had sufficient reserves of stability that would allow it to be safely modified. After the modifications were completed, no stability assessment was conducted, nor was a record of stability prepared, as is required by the *Fishing Vessel Safety Regulations*. Similarly, a fishing vessel modification history form was not completed.

Under the regulations, it is the responsibility of the master and the authorized representative of a fishing vessel to ensure the vessel complies with regulatory and safety requirements. When stability assessments are not conducted, these individuals and the crew may be unaware of adverse changes in vessel stability resulting from the modifications that may affect safety.

## RISKS ASSOCIATED WITH GIRDING REMAIN UNADDRESSED

The TSB's investigation (M18P0230) of the August 2018 girding and capsizing of the *George H Ledcor* in British Columbia highlighted risks associated with a lack of awareness of the factors leading to girding, informal work practices and insufficient guidance and training in the towing industry.

Girding occurs when a vessel is pulled broadside by a towline force and is unable to manoeuvre out of this position. From 2005 to 2018, the TSB received reports of 26 girding occurrences resulting in 21 capsizings. A video the TSB produced in 2019–20 explains factors that lead to girding and recovery methods.

The investigation into the 2018 occurrence highlighted a number of risk factors, notably a lack of initial and recurring training of tug masters and the towing industry's continued reliance on tug masters to manage girding hazards through ship-handling skills and informal practices.

The vessel's owner took a number of steps to reduce the likelihood of similar accidents. It supplemented its safety management system with procedures on how to recognize and avoid girding. It introduced voyage simulator and classroom training for its masters and mates. It also installed additional standard abort mechanisms in common locations on all company vessels.

## SAFETY ADVISORIES

The TSB issued additional safety advisories in 2019–20 as part of investigations into marine occurrences:

- September 2018 capsizing of the fishing vessel *Kyla Anne* with three people on board, 1.3 nautical miles north of North Cape, Prince Edward Island (M18A0303):
    - Marine Safety Advisory MSA 03/19 referenced a lack of consultation between Fisheries and Oceans Canada and Transport Canada about the safety of lobster harvesters returning to their home port through the corridor in lobster fishing area 24.
- March 2019 striking of dock by roll-on/roll-off passenger ferry *Apollo* while berthing in Matane, Quebec (M19C0054):
    - Marine Safety Advisory MSA 01/19 addressed the state of seaworthiness of the *Apollo*.
- May 2019 sudden drop of the clump weight of the fishing vessel *Newfoundland Victor* during repairs, which pulled the net and a crew member into the water (M19A0211):
    - Marine Safety Advisory MSA 02/19 reviewed deficiencies regarding the winch brake system and the development of work procedures on board at the time of the occurrence.

## PROGRESS ON OUTSTANDING RECOMMENDATIONS

The Board reassessed 20 marine recommendations in 2019–20, closing none of them.

Among these recommendations were four that progressed from various ratings to Satisfactory Intent. This included Recommendation M94-06, which had a rating of Unsatisfactory at the end of 2018–19, due to the Board's concern about Transport Canada's protracted delays in responding to it. In the recommendation, the Board had asked Transport Canada to require the installation of water-level detectors in all compartments below the waterline on large fishing vessels.

In January 2019, Transport Canada indicated that Phase 3 of the *Fishing Vessel Safety Regulations* would address this recommendation when the *Large Fishing Vessel Regulations* (LFVR) are repealed. In the interim, Transport Canada is now proposing to amend the existing LFVR to require the installation of water-level detectors on large fishing vessels in all compartments below the waterline. The amendment to the LFVR is expected to be published in the *Canada Gazette*, Part I in the fall of 2020. Once implemented, the amendment would mitigate the risk associated with this safety deficiency. The Board considers the response to the recommendation to show Satisfactory Intent.

The Board downgraded two recommendations to Unable to Assess from Satisfactory in Part and Unsatisfactory, respectively, since Transport Canada had not provided a response specific enough to satisfy the intent of these recommendations. Recommendation M17-02 recommended that Transport Canada take steps to ensure that small passenger enterprises have a safety management system. With Recommendation M18-02, the Board recommended that Transport Canada require vessel owners whose watchkeepers' work and rest periods are regulated by the *Marine Personnel Regulations* to implement a comprehensive fatigue management plan tailored specifically for their operation, to reduce the risk of fatigue. Fatigue management is a Watchlist 2018 issue.

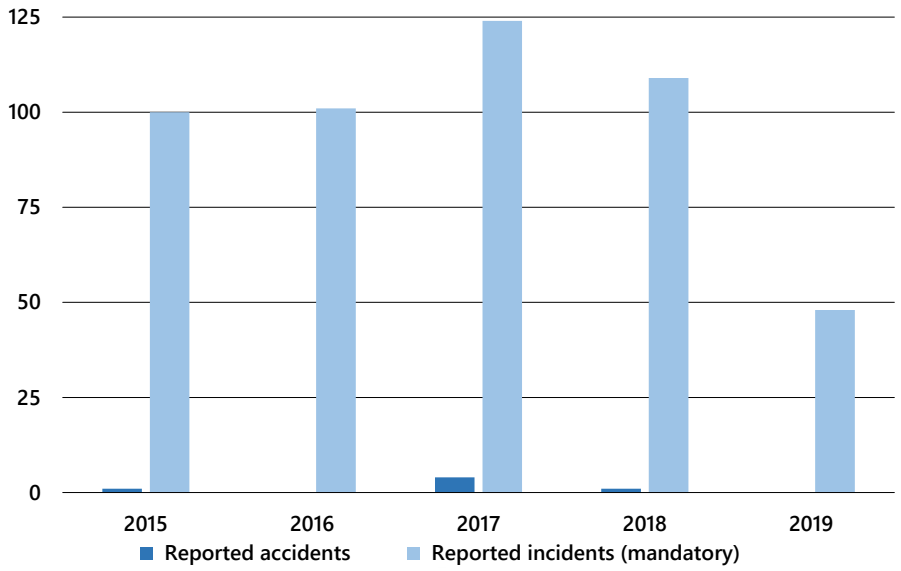
There were 21 active marine recommendations as of March 31, 2020. These recommendations have the following ratings: Satisfactory Intent (11), Satisfactory in Part (6), Unsatisfactory (1) and Unable to Assess (3).

# PIPELINE SECTOR

## THE YEAR IN REVIEW

The Transportation Safety Board of Canada (TSB) received 48 reports of pipeline occurrences in 2019 (56% fewer than in 2018). All of them were incidents rather than accidents, compared to the one accident in 2018. The number of occurrences is well below the 10-year average of 132, including 6 accidents.

**Figure 7. Pipeline accidents and incidents, 2015 to 2019**




Once again, there were no serious injuries or fatalities arising directly from the operation of any federally regulated pipeline, as has been the case since the TSB's inception in 1990.

Of all 48 incidents in 2019, 20 involved a release of product:

- The proportion of incidents involving product release (42%) in 2019 is approximately equal to the proportion in 2018 (38%) and far below the 10-year average (73%).
- Most of the incidents involving product release resulted in the release of hydrocarbon gas (80%), as has been the case each year since 2015.
- Four other incidents involved the release of low vapour pressure hydrocarbons (as defined in Canadian Standards Association Standard Z662); as of July 2014, the minimum reporting threshold for releases of low vapour pressure hydrocarbons was established at 1.5 $m^3$.

The TSB's *Statistical Summary of Pipeline Occurrences in 2019* contains more information on product releases during the year.

The 48 incidents in 2019 are considerably fewer than the average of 99 per year over the previous 10 years. The difference is mostly due to changes that were introduced in 2014 to the occurrence reporting criteria.

In 2019, only 13 incidents involved geotechnical, hydrotechnical or environmental activity—slope movements or river erosion, for example—down from 44 in 2018. This remains, however, above the average of 7 such events per year over the previous 10 years. The higher level of reported incidents since 2017 may be related to increased regulatory enforcement. Increased

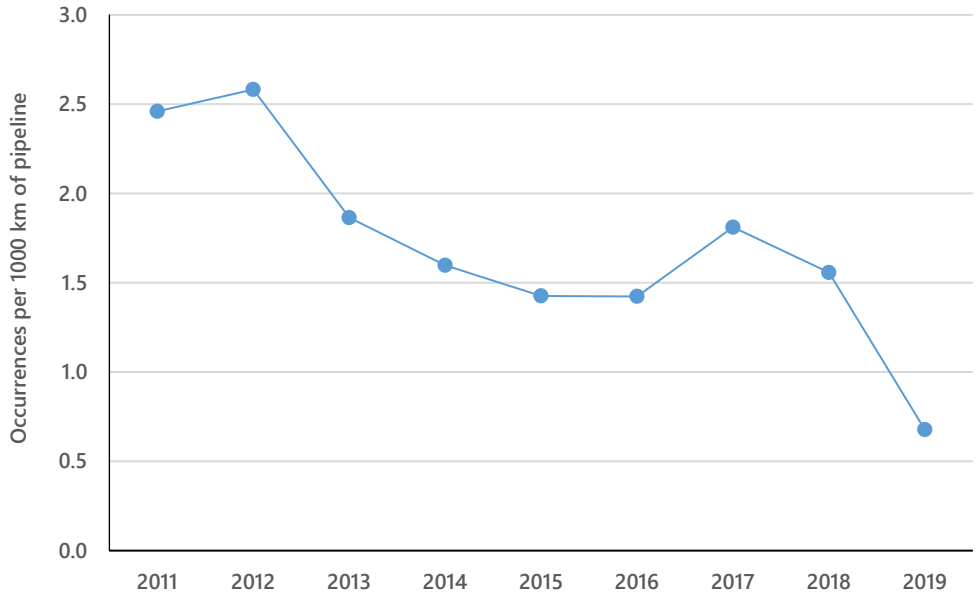
company inspections and reporting, as well as varied weather patterns and hydrotechnical activity over the last three years, are additional factors that may have contributed to this rise and decline.

Alberta accounted for the most occurrences in 2019 (19 out of 48), while British Columbia had 12 and Ontario 6. The remaining 12 occurrences were spread across Quebec, the Northwest Territories, Manitoba and Saskatchewan.

## OCCURRENCE RATE: A MEASURE OF PIPELINE SAFETY

There were 70 860 km of federally regulated pipeline operating in Canada in 2019, according to the Canada Energy Regulator (formerly the National Energy Board). The 48 pipeline-related incidents reported to the TSB for the year result in an occurrence rate per 1000 km of operating pipeline of 0.7. This is down from the 2018 rate of 1.6 and continues the overall reduction since 2011. The 2019 rate is also below the average of 1.8 occurrences per 1000 km since 2011.

**Figure 8. Pipeline occurrence rate, 2011 to 2019**




## INVESTIGATIONS

There were no pipeline-related occurrences to which TSB staff deployed in 2019–20, compared to one in 2018–19. Consequently, the TSB began no new investigations in 2019–20.

**Table 11. TSB pipeline activities, 2018–19 and 2019–20**

| | 2018–19 | 2019–20 |
|---|---|---|
| Deployments | 1 | 0 |
| Investigations started | 2 | 0 |
| Investigations completed | 2 | 1 |
| Investigations in progress on 31 March of each year | 1 | 0 |

The TSB completed one pipeline investigation in 2019–20, a detailed class 3 investigation that took 513 days.

**Table 12. Pipeline investigations completed, 2018–19 and 2019–20**

| Class (investigation type) | Completed | | Completion target (days) | Average duration (days) | |
|---|---|---|---|---|---|
| | 2018–19 | 2019–20 | | 2018–19 | 2019–20 |
| 3 (detailed) | 0 | 1 | 450 | n/a | 513 |
| 4 (limited scope) | 1 | 0 | 220 | 264 | n/a |

## STRESS CORROSION CRACKING MANAGEMENT PRACTICES FELL SHORT PRIOR TO PIPELINE RUPTURE

A TSB pipeline investigation (P18H0088) found that deficiencies in predicting the extent of stress corrosion cracking and a deferred inspection contributed to a pipeline rupture and fire near Prince George in 2018.

The model the pipeline operator used to predict stress corrosion cracking growth under its hazard management plan did not take into account all potential uncertainties, which resulted in cracks growing at higher rates than expected. Additionally, an inspection of this pipeline segment scheduled for 2017 was deferred until the fall of 2018. As a result, the existing cracks remained undetected.

Although emergency response activities mitigated the impacts of the occurrence, the investigation determined that not all nearby communities and operators of nearby pipelines had been included in emergency response exercises that had taken place in the four years prior to the occurrence. If pipeline emergency response exercises are not conducted periodically with all potentially affected stakeholders, gaps in emergency response plans may not be identified, thereby increasing the risk that all parties will not be sufficiently prepared to respond to a pipeline emergency.

Following the occurrence, the TSB issued Pipeline Safety Advisory 617-02/19 to Westcoast Energy Inc. suggesting that it might wish to review its stress corrosion cracking management practices, including inspection intervals, to mitigate the risks associated with the polyethylene tape-coated pipe involved in this occurrence. In response, Westcoast revised several aspects of its inspection practices and integrity management program for this pipeline.

The Canada Energy Regulator restricted operating pressures until it approved the engineering assessments submitted by the operator to ensure safe operation of the relevant segments of the pipeline. The Regulator also conducted field inspections to ensure regulatory requirements were met.

## PROGRESS ON OUTSTANDING RECOMMENDATIONS

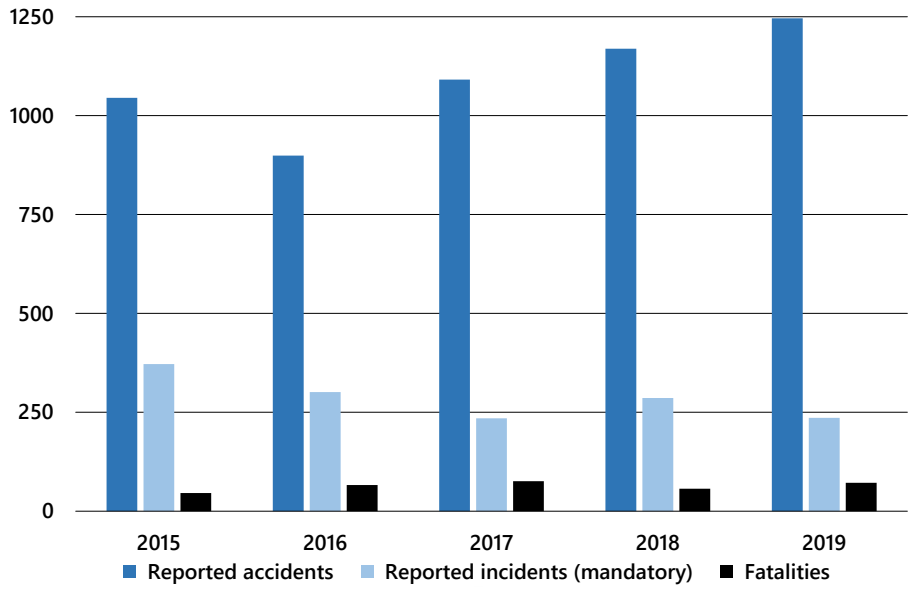
The Board issued no pipeline safety recommendations in 2019–20 and had previously assessed all pipeline recommendations as Fully Satisfactory.

# RAIL SECTOR

## THE YEAR IN REVIEW

Overall, 1246 railway accidents were reported to the Transportation Safety Board of Canada (TSB) in 2019, 7% more than in 2018 and a 17% increase from the 10-year average of 1064.

**Figure 9. Rail accidents, incidents and fatalities, 2015 to 2019**




There were 72 rail-related fatalities reported in 2019, 15 more than the previous year but comparable to the 10-year average of 73. Among the 2019 fatalities, 38 involved trespassers, compared to 34 in 2018 and the 10-year average of 43.

The number of crossing accident fatalities increased in 2019 (28) compared to 2018 (19) and was higher than the 10-year average of 22. To better understand these data, the TSB is examining the underlying factors for crossing accidents, including why these have increased by roughly six each month from December to February over the past 13 years. The analysis so far indicates weather-related factors are responsible, rather than reduced daylight in winter.

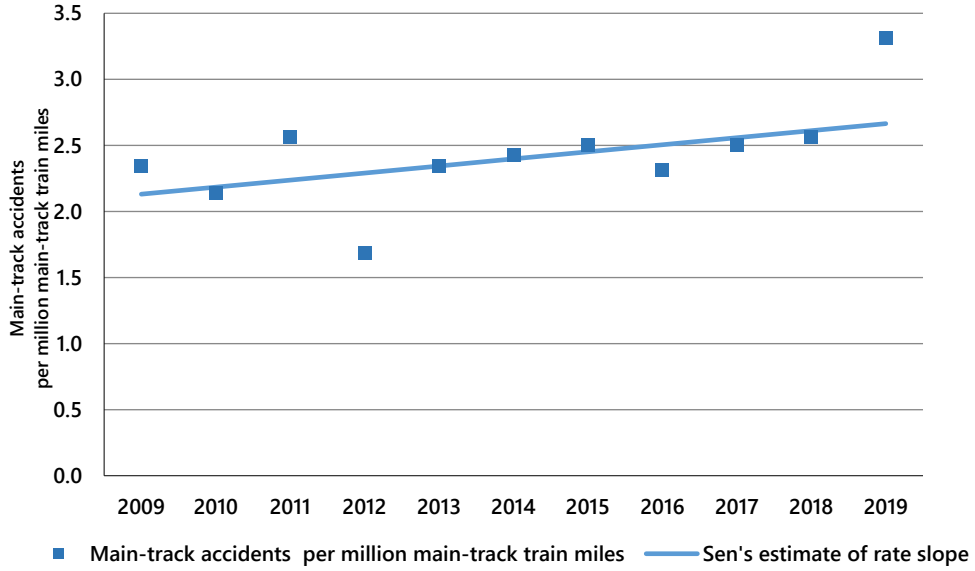
Among all railway accidents reported to the TSB in 2019, 169 involved dangerous goods. This is up from 125 in 2017 and from the 10-year average of 127. Eight accidents in 2019 resulted in dangerous goods being released.

There were 236 railway incidents reported to the TSB in 2019, a 17% decrease from 2018 (286), and a 12% decrease from the 10-year average (269). Incidents involving movements that exceeded limits of authority accounted for 57% (137) of all railway incidents in 2019—four fewer than in 2018 but above the 10-year average of 121.

## ACCIDENT RATE: A MEASURE OF RAIL SAFETY

According to Transport Canada data, 2019 main-track (non-yard) rail activity increased by 1% from 2018. The main-track accident rate in 2019 was 3.3 accidents per million main-track train-miles, up from 2.6 in 2018 and above the 10-year average of 2.3.

**Figure 10. Main-track accident rate, 2009 to 2019**




## INVESTIGATIONS

TSB staff deployed to 16 rail occurrences in 2019–20, one fewer than in 2018–19, and began 20 investigations.

**Table 13. TSB rail activities, 2018–19 and 2019–20**

| | 2018–19 | 2019–20 |
|---|---|---|
| Deployments | 17 | 16 |
| Investigations started | 21 | 20 |
| Investigations completed | 16 | 13 |
| Investigations in progress on 31 March of each year | 23 | 30 |

Of the 13 rail investigations the TSB completed in 2019–20, 8 were detailed class 3 investigations and 5 were limited-scope class 4s. The average time to complete the class 3 investigations was 520 days (up from 447 in 2018–19). The duration of the class 4 investigations was 219 days, a slight increase from the previous year.

**Table 14. Rail investigations completed, 2018–19 and 2019–20**

| Class (investigation type) | Completed | | Completion target (days) | Average duration (days) | |
|---|---|---|---|---|---|
| | 2018–19 | 2019–20 | | 2018–19 | 2019–20 |
| 2 (complex) | 2 | 0 | 600 | 672 | n/a |
| 3 (detailed) | 7 | 8 | 450 | 447 | 520 |
| 4 (limited scope) | 7 | 5 | 220 | 214 | 219 |

## ASSESSING RISKS OF OPERATIONAL CHANGES ESSENTIAL

The TSB's investigation into the 2017 fatal injury of a yard helper during overnight switching operations in a Canadian Pacific Railway yard in Montréal (R17D0123) found the lack of a risk assessment following a significant change in operations to be a contributing factor to the occurrence, along with fatigue and task interruption.

The St-Luc Yard changed its switching operations in 2012 but did not conduct a risk assessment at that time, since the company's safety management system did not require one. Consequently, Canadian Pacific Railway missed the opportunity to identify and mitigate any new hazards the changes created.

The short break the yard helper took from his post shifted his focus away from his duties. This led him to incorrectly align the locomotives carrying out the switching activities away from the destination track. It is likely that the yard helper's fatigue also contributed to the incorrect alignment of the crossover switch.

Both safety management and oversight and fatigue management are Watchlist 2018 issues, and the TSB investigation (R16C0065) into a September 2016 collision and derailment of Canadian Pacific Railway trains in Calgary also focused on the importance of risk assessments.

For its part, Canadian Pacific Railway conducted employee awareness campaigns focusing on the hazards present when working on or near tracks and the associated risk mitigation processes.

## IMPROVEMENTS AT RAIL CROSSINGS FOR INDIVIDUALS IN WHEELCHAIRS STILL NEEDED

With the completion of two investigations in the last three years into the fatal injury of a person in a wheelchair at a railway crossing, the TSB continues to shine the spotlight on the need to improve safety at crossings designated for persons using assistive devices.

A May 2018 accident (R18V0127) saw an individual's motorized wheelchair become immobilized in a crossing in Chilliwack and then struck by a freight train. The investigation determined that, as the person in the wheelchair was crossing the tracks, both of the chair's rear caster wheels likely rotated and fell into the 103 mm gap between the sidewalk and the rail (known as a flangeway).

The investigation also found that impending changes to Transport Canada's *Grade Crossings Standards,* which will reduce the maximum flangeway width to 75 mm at designated crossings, would not have prevented the 50 mm caster wheels of the chair involved in this accident from becoming lodged in the flangeway.

Following the accident, Transport Canada issued a letter of non-compliance and concern to Canadian National Railway Company that identified a number of safety concerns with the crossing. Transport Canada also issued a notice to the City of Chilliwack outlining concerns with the sidewalks and road approaches. The municipal authorities subsequently arranged for an engineering assessment of the crossing and for improvement work, which was completed in April 2020.

In response to Recommendation R18-01, which the Board made after an investigation into an occurrence in Moncton in 2016 (R16M0026), Transport Canada said it had taken steps to identify and assess engineering options that would help improve crossing safety for persons using assistive devices. The Board has assessed this response as showing Satisfactory Intent.

The TSB is continuing to monitor Transport Canada's progress on its planned activities and will monitor other related safety actions taken by the industry and road authorities.

## SAFETY-CRITICAL INFORMATION MUST BE ACCURATE AND DISSEMINATED EFFECTIVELY

A collision between a train and a track machine in October 2018 near Crysler, Ontario, resulted from a gap in track-clearing procedures that prevented the timely sharing of safety-critical information among railway engineering employees who were engaged in track work, the TSB investigation (R18H0105) found.

At the time of the occurrence, a trainee was operating the track machine (a Unimat tamper) under the supervision of a trainer. However, the trainer was not aware that a train was approaching or that the tamping tools had been lifted and extended toward the adjacent track. In addition, since the tamper was not on the list of equipment for which work heads must be pulled in and work stopped when trains operate on adjacent tracks, engineering staff did not mention when it was time to clear the track.

The TSB issued Rail Safety Advisory 617-09/18 on 16 November 2018. It stated that, given the potential risks when trains operate through work sites, Transport Canada might wish to review the application of Rule 42 of the *Canadian Rail Operating Rules*. This Rule allows ongoing work activities when a train is passing on the adjacent track.

Canadian National Railway Company added the Unimat tamper to its clearing procedures for track services, and shared these procedures with engineering staff in the Eastern Region. The company also posted labels inside the cab of machines that are restricted from working while trains are passing on an adjacent track.

## PROCEDURES AND TRAINING NEEDED TO ENSURE CARGO IN FLAT CARS IS PROPERLY SECURED

A TSB investigation (R18D0069) found that cargo that had been inadequately secured and fell from an A-frame flat car led to the derailment of 22 cars of a Canadian Pacific Railway train near Saint-Polycarpe, Quebec, in July 2018.

The TSB issued Rail Safety Advisory 617-07/18 to Transport Canada on 9 October 2018. The Safety Advisory focused on Canadian Pacific Railway's loading practices for cars with open tops. This was because the lateral movement of a top-heavy load that had not been properly secured had led to a boxcar striking a section of stock rail that had fallen from the A-frame flat car that preceded it and derailing. The investigation also determined that there had been no inspection to Railway Association of Canada standards of the car before it was released for travel.

This occurrence confirms the TSB's view that when railways do not develop and implement procedures for the safe loading and securement of rail cars, and do not train personnel to assess top loading, cargo may not be properly loaded and/or secured. This increases the risk that material could fall off a rail car during train operations.

In its response to the safety advisory, Transport Canada told the TSB that it had followed up with the railway and confirmed that it had adequately addressed the problem that had led to the occurrence. For its part, Canadian Pacific Railway issued a written procedure on loading and inspection of A-frame flat cars and trained its employees on it.

## SAFETY ADVISORIES

The TSB issued additional safety advisories in 2019–20 as part of investigations into derailments and releases of dangerous goods.

- February 2019 derailment of 99 freight cars and 2 locomotives near Field, British Columbia, and fatal injury of the three crew members (R19C0015):
  - Rail Safety Advisory 617-04/19 advised Transport Canada to ensure that effective safety procedures are applied to all trains stopped due to an emergency on both "heavy grades" and "mountain grades."
  - Rail Safety Advisory 617-05/19 advised Transport Canada to review the efficacy of air brake system inspection and maintenance procedures for grain hopper cars used in unit train operations, and ensure that these cars can be operated safely at all times.
- April 2019 derailment of two coaches of a VIA Rail passenger train near Moncton (R19M0018):
  - Rail Safety Advisory 617-06/19 encouraged Transport Canada to review how rail condition monitoring is performed at railway crossings and provide guidance (as necessary) to ensure these inspections are conducted in an effective and consistent manner.
- June 2019 derailment of 44 freight cars and the mid-train remote locomotive on the Canadian side of the Canadian National Railway Company tunnel between Sarnia and Port Huron, Michigan, and release of sulphuric acid (R19T0107):
  - Rail Safety Advisory 617-08/19 suggested that, for the safety of operating crew members, Transport Canada ensure that railways have specific instructions or guidance in their emergency procedures for conducting train inspections following a derailment in a tunnel when dangerous goods are involved.
  - Rail Safety Advisory 617-09/19 suggested that, given the potentially significant consequences of a freight car sustaining structural failure during train operations, Transport Canada and the Federal Railroad Administration may wish to ensure that railways and car owners have procedures in place to identify, inspect and repair (as required) bathtub gondola cars that are equipped with stub sills, particularly those that are being used in scrap iron and steel service, which were constructed in the late 1970s and early 1980s.
- February 2020 derailment of 32 tank cars near Guernsey, Saskatchewan, with resulting release of product and a pool fire (R20W0025):
  - Rail Safety Advisory 617-02/20 suggested that Transport Canada further review and modify key train speeds, as appropriate, based on various train risk profiles, while also considering other factors that influence the severity of a derailment.
  - Rail Safety Advisory 617-03/20 advised Transport Canada that the current *Rules Respecting Track Safety* do not address the increased risks associated with the operation of key trains and that it should, therefore, consider revising these rules to include enhanced track standards for key routes.

## PROGRESS ON OUTSTANDING RECOMMENDATIONS

Of the 15 rail recommendations the Board reassessed in 2019–20, 3 were closed as Fully Satisfactory.

Among those closed was Recommendation R07-04, which the Board had issued in the wake of the derailment of 18 tank cars and the release of approximately 200 000 L of gasoline and

diesel fuel in the marshy area of the Grande Plée Bleue, near Saint-Henri-de-Lévis, Quebec, in 2004.

The damage sustained by the Class 111A tank cars involved in this occurrence and the risks posed by the subsequent product release were typical of that identified in previous TSB investigations. The Class 111A tank cars' weaknesses have been acknowledged by the regulator and industry, resulting in measures, including standards, to mitigate risk in the event of a derailment. However, the safety enhancements included in the standards did not apply to Class 111A tank cars with a maximum gross weight of 263 000 pounds or less, or to other non-pressurized tank cars. Consequently, a large number of the existing tank cars carrying dangerous goods were vulnerable to puncture, even during derailments at moderate operating speeds. The Board recommended that Transport Canada extend the safety provisions of the construction standards applicable to 286 000 pound cars to all new non-pressurized tank cars carrying dangerous goods.

This recommendation is related to Recommendation R14-01, in which the Board recommended that all Class 111 tank cars used to transport flammable liquids meet enhanced protection standards that significantly reduce the risk of product loss when these cars are involved in accidents. Recommendation R07-04 is for new tank cars only and includes consideration for non-flammable dangerous goods transported in these cars.

In January 2018, Transport Canada published a new edition of tank car standard TP14877, which consolidated the requirements for the Class 117 tank car for flammable liquids, and re-affirmed the requirements for enhanced Class 111 cars for the remaining non-pressure liquid dangerous goods. This new edition of the standard was published in the *Canada Gazette*, Part II, and took effect in the *Transportation of Dangerous Goods Regulations* in July 2019. Given that initiatives have been implemented to mitigate the ongoing residual risks, the Board considered the response to Recommendation R07-04 to be Fully Satisfactory and closed this recommendation.

The remaining 12 recommendations the Board reassessed in 2019–20 obtained the following ratings: Satisfactory Intent (9) and Satisfactory in Part (3).

# WHO WE ARE AND WHAT WE DO

The Transportation Safety Board of Canada (TSB) advances transportation safety in the aviation, marine, pipeline and rail transportation sectors in Canada:

- It conducts independent investigations into selected occurrences and makes findings about their causes and any contributing factors.
- It identifies safety deficiencies arising in transportation occurrences and makes recommendations to eliminate or reduce them.
- It reports publicly about its investigations and findings.

As part of its investigations, the TSB reviews developments in transportation safety and identifies safety risks that governments and the transportation industry must address in order to reduce the risk of injury and loss.

## ROLE OF THE BOARD

The Board, which comprises up to five members, including the Chair, approves all investigation reports, makes findings and issues recommendations.

### THE BOARD

**Kathleen Fox**
Chair

**Joseph Hincke**
Board member

**Faye Ackermans**
Board member

**Paul Dittmann**
Board member

**Kenneth Potter**
Board member

The TSB website contains biographies of each Board member.

In making findings, the Board does not assign fault or determine civil or criminal liability for an occurrence. Rather, it seeks to find out what happened and why in an objective manner, independent from government, and all other departments and agencies involved in transportation, and free from any conflict of interest. It also draws impartial conclusions and makes recommendations to those best placed to take action.

## ABOUT THE TSB

A staff of 220, led by the Chief Operating Officer and senior management, supports the Board. The work of the organization is guided by a five-year strategic plan and five core values:

- Respect: We are committed to treating all individuals and organizations with consideration, courtesy, discretion and fairness.
- Openness: We actively share and exchange information to advance transportation safety.
- Safety: We maintain and promote a positive and proactive safety culture.
- Integrity: We are guided by honesty, impartiality, propriety and accountability for our actions and decisions.
- Excellence: We maintain a highly skilled and knowledgeable team of professionals through leadership, innovation and commitment to continuous improvement in the delivery of our products and services.

TSB investigators are professionals with years of experience in the various transportation modes the TSB covers. They work in collaboration with engineering and technical specialists, human factors investigators and industry analysts, all of whom are supported by small teams of communications specialists, corporate services professionals and administrative officers.

The TSB's headquarters is in Gatineau, Quebec. The TSB also has a laboratory in Ottawa, and regional offices in Vancouver, Edmonton, Calgary, Winnipeg, Toronto, Montréal, Quebec City and Dartmouth.

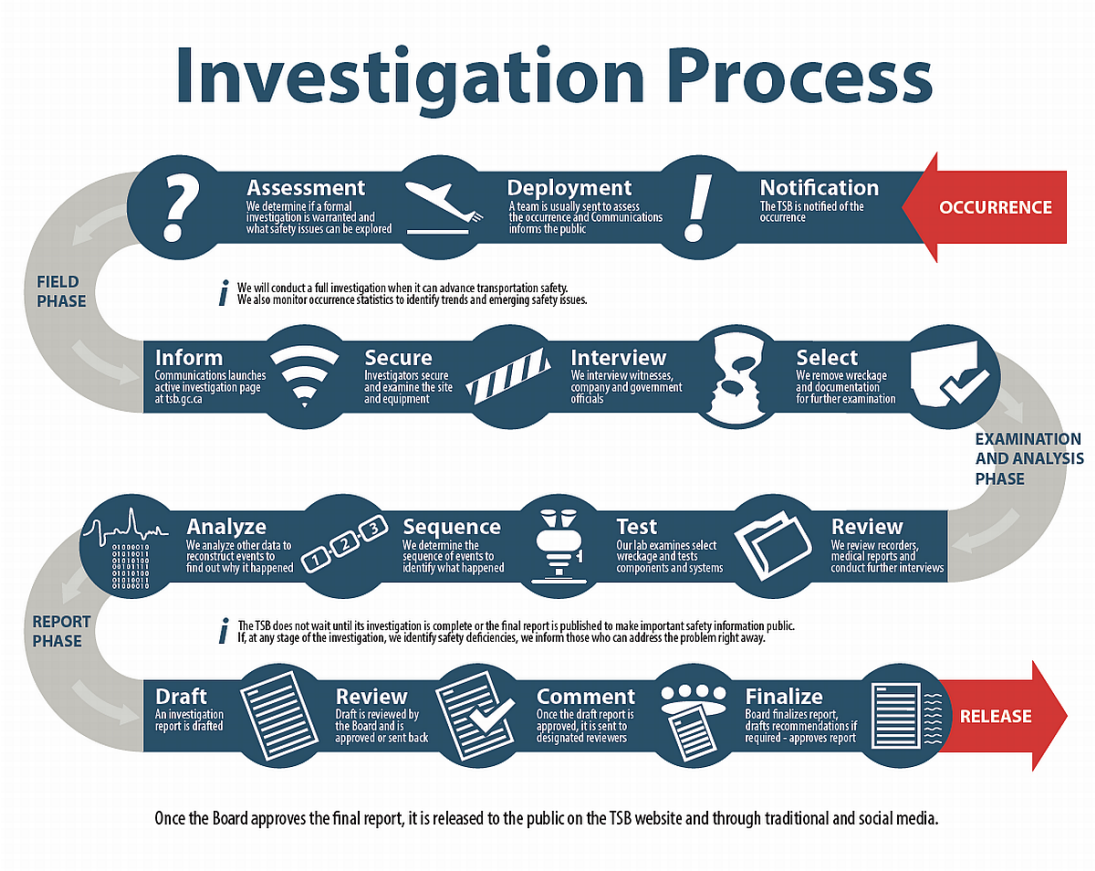
## THE INVESTIGATION PROCESS

There are three main phases of the investigation process. During the field phase, investigators collect data and assess the occurrence. This generally involves travelling to the scene of the occurrence, securing the site and documenting it, conducting interviews and selecting wreckage for further examination. Unless the investigation is limited to data collection, an investigation page is created and posted to the website, and is updated periodically as the investigation progresses.

During the examination and analysis phase, investigators review the data to determine the sequence of events leading to the occurrence and the underlying causes and contributing factors.

In the report phase, investigators draft a report on the investigation, which then goes through a review and approval process, prior to public release.

Figure 11. The TSB investigation process from occurrence to report



# APPENDICES

## APPENDIX A: INVESTIGATION REPORTS RELEASED IN 2019–20 AND RELATED SAFETY ACTIONS

The following is a list of the investigation reports the Transportation Safety Board of Canada (TSB) released during 2019–20. Each entry includes details of any safety actions taken during the investigation and after the report was published, and a link to the main page for the investigation. The list is organized by transportation sector and in the order in which the occurrences took place.

### AVIATION SECTOR

**SAFETY ISSUE INVESTIGATION REPORT A15H0001**
Risks Associated with Air-Taxi Operations in Canada

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| SAFETY ACTIONS | The **Board** issued four recommendations as part of this investigation.<br><br>Recommendation A19-02: that Transport Canada collaborate with industry associations to develop strategies, education products and tools to help air-taxi operators and their clients eliminate the acceptance of unsafe practices.<br><br>**Transport Canada** has begun planning a campaign focused on safety in the air-taxi sector, including discussing key potential safety pillars and the need for industry collaboration with representatives of the air-taxi sector. Any campaign will be modelled on the General Aviation Safety Campaign. Examples of topics the air-taxi safety campaign could focus on are "pushing the weather" and "flying overweight." Transport Canada expected to begin the campaign by the end of fall 2020.<br><br>Recommendation A19-03: that industry associations promote proactive safety management processes and safety culture with air-taxi operators to address the safety deficiencies identified during the TSB investigation through training and sharing of best practices, tools and safety data specific to air-taxi operations.<br><br>The **Air Transport Association of Canada** noted that it has for many years been encouraging all members, including those in the air-taxi sector, to develop and use safety management processes and to develop an accompanying safety culture. The association's efforts have included developing specific safety management system tools and training for members.<br><br>The **Northern Air Transport Association** indicated it would continue to help improve the overall system safety and promote the investigation through, for example, events taking place as part NATA 44, the northern and remote aviation conference that was to have been held in Whitehorse in April 2020. Further, the association noted that the recent decision by the Floatplane Operators Association to become a member with the goal of furthering the development of "North Star" best practices supports the TSB recommendations.<br><br>Recommendation A19-04: that Transport Canada review the gaps identified in the investigation regarding Subpart 703 of the *Canadian Aviation Regulations* and associated standards, and update the relevant regulations and standards.<br><br>**Training and qualifications**: Transport Canada is reviewing training and qualification requirements in all subparts of the Regulations. This includes examining pilot proficiency check schedules, training captain and instructor qualification requirements, operator training curriculum requirements, approved check pilot manuals and flight test guides and the expanded approval of flight training devices, particularly for subparts 702 (aerial work operators) and 703 (air-taxi operators) of the Regulations. Communication and consultation with industry is to begin in 2020, with drafting of regulatory material by 2022. Implementation of identified changes would be expected in 2023. Transport Canada is also developing a regulatory package anticipated for publication in the *Canada Gazette* Part I in 2020–21 focused on training irritants related to personnel training, qualifications and licensing. |

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| | **Improvements to older aircraft**: Transport Canada is currently updating Airworthiness Manual Chapter 523 Normal, Utility, Aerobatic and Commuter Category Aeroplanes to facilitate design changes on normal category airplanes. The changes will ease the introduction of "life-saving technologies" (angle of attack indicator, and moving map GPS displays, for example) with less certification administrative burden than is currently required. Transport Canada expected to submit the related documentation for consultation through the Canadian Aviation Regulation Advisory Council process early in 2020.<br><br>**Fatigue in aircraft maintenance engineers**: Transport Canada has been working to address the issue of fatigue in aviation, including updating flight and duty time limits for pilots. It is also providing support and input to the amendments to the *Canada Labour Code*. Employment and Social Development Canada has proposed to better align the code with international standards and improved employee work-life balance. These could have a positive impact on fatigue management.<br><br>The Air Transport Association of Canada, while supporting a review of the gaps in Subpart 703 of the *Canadian Aviation Regulations* and associated standards, expects due consultation on any necessary amendments through the Canadian Aviation Regulation Advisory Council consultation process.<br><br>Recommendation A19-05: that Transport Canada require all commercial operators to collect and report hours flown and movement data for their aircraft by *Canadian Aviation Regulations* subpart and aircraft type, and that Transport Canada publish those data.<br><br>Transport Canada will consult with industry by the end of 2020, evaluate what has already been done regarding data collection and reporting, determine what data/information is missing and consider the requirements and best approaches for obtaining the necessary activity data. The consultations would be followed by an internal summary of the consultations results, which the department would likely shared on its "Let's Talk Transportation" web page. Transport Canada expects to be better positioned by summer/fall 2021 to determine whether a regulatory proposal would be appropriate.<br><br>The Air Transport Association of Canada supports data collection and reporting on a voluntary basis only. In the association's view, Statistics Canada must be tasked with developing a simple and not time-consuming data collection method that is not onerous for air-taxi operators, given their limited resources, including with regard to cost. The association will, however, agree to work with the Government of Canada to provide relevant input to such a data-gathering methodology and program. |

**Investigation report A17O0264**
Collision with terrain, Hydro One Networks Inc., Airbus Helicopters AS 350 B2 (helicopter), C-GOHS (commercially operated aircraft), Tweed, Ontario, 8 nautical miles NNE, 14 December 2017

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| SAFETY ACTIONS | The **TSB** issued Aviation Safety Advisory A17O0264-D1-A1, "Unsecured cargo and unrestrained passengers in helicopters," on 21 December 2017.<br><br>The **Board** issued Recommendation A19-01: that Transport Canada amend the *Canadian Aviation Regulations* to remove any ambiguity associated with the definition of "safety belt."<br><br>In its January 2020 response to the recommendation, **Transport Canada** stated that it had begun assessing the regulatory impact of changing the definition of "safety belt" in subsection 101.1(1) of the *Canadian Aviation Regulations*. This assessment includes the possible effects the modification would have on other parts of the Regulations.<br><br>In its assessment of this response, the Board was encouraged that Transport Canada has initiated work to address this safety deficiency, as a change in the definition of "safety belt," when fully implemented, will mitigate the risk associated with the safety deficiency identified in this recommendation. For this reason, the Board considered Transport Canada's response to show Satisfactory Intent.<br><br>Transport Canada officials also informally consulted with stakeholders about the possible impact of the recommended change at the Helicopter Association of Canada annual meeting in November 2019.<br><br>In an Aviation Safety Letter, Transport Canada republished an article highlighting the importance of pilots wearing both the lap strap and shoulder harness portion of the safety belt. The letter also explained that the intent of section 101.01 of the *Canadian Aviation* |

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| | *Regulations* is for pilots to wear both the lap strap and shoulder harness when they have been installed.<br><br>Transport Canada subsequently issued a Civil Aviation Safety Alert to remind all operators about the correct usage of passenger seatbelts and the importance of securing cargo.<br><br>**Hydro One Networks Inc.** took the following corrective actions:<br><br>• suspended operations involving the Air Stair;<br>• completed a comprehensive revision of the Helicopter Services Operations Manual to include enhancements to training program requirements, revised job descriptions and documentation procedures;<br>• received approval from Transport Canada for its new Company Operations Manual;<br>• reviewed, restructured and reassigned multiple Hydro One Document System documents, and further developed them into aviation standard operating procedures;<br>• expanded the Flying in the Wire Environment training beyond Hydro One aircrew and aircraft maintenance engineers to more than 100 line managers, field supervisors and contractor helicopter pilots;<br>• required all flight crew to complete crew resource management training in anticipation of the training being required under the *Canadian Aviation Regulations*;<br>• developed the training within the crew resource management training module for essential persons assigned onboard duties;<br>• restructured and delivered training program and flight following protocol for all company flight followers;<br>• began investigating the introduction of simulator training to enhance emergency procedures training for all pilots;<br>• completed the reorganization of the helicopter services operation, creating a separate line of business, with a director reporting to the vice president, Shared Services, and a full-time dedicated aviation safety manager;<br>• recruited a director of helicopter services to develop and implement business objectives and a long-term strategy for the department;<br>• recruited a manager of aviation safety to support the development and implementation of a safety management system;<br>• engaged an independent design approval representative to review all aspects of the certification of the Air Stair, including the flight manual supplements;<br>• conducted comprehensive audits of all third-party helicopter contractors to ensure alignment with Hydro One expectations;<br>• completed a macro-level assessment of all flight risks common to specialized tasks conducted by Helicopter Services;<br>• repositioned Helicopter Services as a stand-alone business unit within Shared Services to improve corporate communication and integration;<br>• added the position of fleet analyst to support business and corporate administrative activities;<br>• added the position of operations coordinator to support safe and efficient job planning and line of business integration;<br>• added the term position of occupational health and safety coordinator to support the Helicopter Services safety program;<br>• implemented a tablet-based electronic flight bag program to facilitate flight crew access to current policies, procedures and reference documents in the field, detailed aircraft performance and flight planning information, and real-time weather information in flight;<br>• carried out an updated training program for Distribution Operations Management Centre personnel assigned flight following duties;<br>• evaluated equipment to support the phased implementation of a flight data management program for gathering flight operations data to support proactive safety management system activity; and<br>• communicated with all operations employees to reinforce current work procedures, including the fact that everyone inside the helicopter is to wear a seatbelt, including a shoulder harness (when provided). |

**INVESTIGATION REPORT A18P0031**
Loss of control and collision with terrain, Island Express Air Inc., Beechcraft King Air B100, C-GIAE (commercially operated aircraft), Abbotsford Airport, British Columbia, 23 February 2018

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| SAFETY ACTIONS | **Island Express Air Inc.** voluntarily suspended operations, and **Transport Canada** suspended the company's operating certificates until it had undergone recertification. The company subsequently took the following safety actions:<br>• grounded an identical King Air B100 in its fleet and subsequently removed it from the company's operating certificate, since it did not comply with airworthiness regulations;<br>• overhauled company publications, including the company operations manual, to include detailed de-icing information, and operational flight plan and crew resources management training, and removed single-pilot instrument flight rules;<br>• developed a practical winter operations course;<br>• enhanced the company's training program, including training for instructors;<br>• increased the minimum pilot training times for all aircraft;<br>• introduced electronic flight books and new flight planning software;<br>• introduced new operational flight plan and technical dispatch procedures to ensure aircraft are dispatched safely;<br>• hired additional administration and maintenance personnel to help reduce workload on company personnel;<br>• implemented a new flight crew schedule to combat pilot fatigue; and<br>• initiated a non-punitive reporting system as the basis for a functioning safety management system.<br><br>Transport Canada completed three initial pilot proficiency check rides on Island Express flight crews to validate the completeness and effectiveness of its training programs. This included conducting a monitor ride on a company-approved check pilot.<br><br>After learning that an independent propeller repair station was referencing out-of-date installation information, **Hartzell Propeller/Hartzell Engine Technologies** removed all references to the old configuration from a procedures manual and reviewed other possible conflicts between historical and current information.<br><br>The company's flight department reviewed procedures for de-icing, established "no-go" criteria and identified what conditions require de-icing to take place. |

**INVESTIGATION REPORT A18Q0069**
Loss of separation between a commercially operated aircraft and a privately registered aircraft, NAV CANADA, Montreal Area Control Centre, Montréal/Pierre Elliott Trudeau International Airport, Quebec, 18 nautical miles NE, 16 May 2018

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| SAFETY ACTIONS | **NAV CANADA** reported taking a number of safety actions.<br><br>NAV CANADA and local management continue to concentrate efforts on ensuring adequate staffing resources for the Montreal Terminal as well as all other specialties.<br><br>Several supervisor team meetings have taken place to reinforce the application of standard procedures, and interventions have taken place to correct deviations.<br><br>The entry point at St-Félix de Valois (UFX) was eliminated in the summer of 2018, considerably reducing the probability of confusion over control responsibilities for a non-standard flight operating within Montreal Terminal. All aircraft that would have previously entered via UFX now enter the Terminal via the published STAR over the MAIRE fix. Operations directives were published to communicate these changes. Since this event, the supervisors have been tasked with ensuring that standard procedures, as laid out in the Unit Operations Manual, are applied. The elimination of the UFX entry point is intended to reduce the likelihood of such an event reoccurring.<br><br>An operations directive was issued and will be applied in order to standardize and improve overall Terminal operations in a number of areas and to keep workload to a safe limit.<br><br>Another operations directive emphasized uniformity of work methods and the need to take extra care when opening and closing sectors. It also referenced following best practices such as broader range scanning to ensure all aircraft are accounted for when opening and |

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| | closing sectors. The directive also provided better guidance on whose responsibility a certain aircraft could be, particularly aircraft operating in non-standard situations.<br><br>NAV CANADA issued an operations directive for all specialties with Montreal Area Control Centre to address the issue of team supervisors performing on-the-job instruction and the inherent dangers of possible distraction due to their supervisory duties. This directive aimed to raise staff awareness of priorities and best practices. It also aimed to raise awareness of all stakeholders involved in Area Control Centre operations of the supervisor's role and responsibilities, and the importance of timely coordination with them. |

**INVESTIGATION REPORT A18O0106**

In-flight separation of right wing, Quad City Challenger II (advanced ultralight), C-IGKT (privately registered aircraft), North Bay, Ontario, 14.3 nautical miles E, 30 July 2018

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| SAFETY ACTIONS | The **TSB** issued Aviation Safety Advisory A18O0106-D1-A1, "Quad City Challenger II Advanced Ultralight – Bracket Failure," to alert Transport Canada to the possible risks associated with the failure of attachment brackets securing wing lift struts on the aircraft.<br><br>**Quad City**, the Canadian distributor of the Challenger II, is conducting a stress analysis on the addition of a fixture under the head of the bolt that secures the lower strut attachment brackets to the fuselage longerons. The purpose of this fixture is to reduce flexing and to spread loads around the bolt hole, where fatigue cracks appear to start.<br><br>**Transport Canada**, Quad City and other agencies are working together to determine the causes of the failure and to publish safety alerts with amended maintenance directives and inspection processes. The safety alerts will serve the following purposes:<br><br>• provide details on the possibility of cyclic loading of the lower strut attachment brackets;<br>• require the removal and inspection of the brackets before further flight;<br>• require that installation, configuration, inspection, assembly and replacement criteria and processes be amended;<br>• require that maintenance checklists and the high-time airframe inspection document be amended;<br>• require that bracket inspection and replacement intervals be amended;<br>• provide information on the bracket service life for aircraft used as trainers and those operating in rough terrain;<br>• warn against using the strut-to-fuselage junction as a step or installing fuel tanks or baggage pods on the main struts or jury struts; and<br>• recommend that the heavy load saddle kit be installed.<br><br>On 1 March 2019, Transport Canada published Civil Aviation Safety Alert 2019-02 to inform owners of the possible failure of the brackets and the need for disassembly, inspection and part replacement.<br><br>Quad City intends to issue a safety alert to Challenger owners that will explain the updated maintenance instructions. |

**INVESTIGATION REPORT A18W0116**

Power loss and loss of control in flight, Aries Aviation International, Piper PA-31, C-FNCI (commercially operated aircraft), Calgary/Springbank Airport, Alberta, 40 nautical miles SW, 1 August 2018

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| SAFETY ACTIONS | **Aries Aviation International** purchased individual cannula-style oxygen masks for each of its pilots.<br><br>In addition, the company updated its operations manual to include a statement that all crew members must use oxygen continuously at cabin altitudes above 10 000 feet and any time below 10 000 feet to enhance performance or reduce fatigue.<br><br>Aries made several changes to its training program, including putting greater focus on oxygen use in annual training and phasing in the use of a PA-31 flight simulator so flight crews will be able to have a training practice on it. In addition, management will schedule field visits during survey work. Training will also be enhanced for both pilots and maintenance engineers in light of the overall decrease in workforce experience in the aviation industry. |

**INVESTIGATION REPORT A18W0129**
Capsize on water landing, Simpson Air (1981) Limited, Cessna U206G, C-FNEQ (commercially operated aircraft), Little Doctor Lake, Northwest Territories, 16 August 2018

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| SAFETY ACTIONS | **Simpson Air (1981) Limited** decided it would no longer operate the Cessna 206 on floats. In addition, it introduced underwater egress training for all seasonal floatplane flight crew. New floatplane flight crew will be required to undertake a 50-hour bush float course or have 500 hours of previous float experience.<br><br>The **TSB** issued Aviation Safety Advisory A18W0129-D1-A1, "Blocked double cargo door with flaps extended," on 18 February 2019.<br><br>In response, **Transport Canada** reported that it had completed a preliminary risk assessment and was planning to make a formal safety recommendation to the Federal Aviation Administration. In it, Transport Canada would inform that body of the final risk assessment and ask it to require Cessna to develop, deploy and mandate improvements to the cargo door design to ensure successful egress in the event of an accident terminating in the water.<br><br>In April 2020, Transport Canada issued Airworthiness Directive CF-2020-10 in response to the safety advisory to impose new limits on how Cessna 206s can be configured and loaded. In addition, the directive notes that the FAA now requires 206s to include a door at the front on the right-hand side of the cabin. Transport Canada considers that this door offers a viable means of emergency egress for passengers in the front and centre-row seats in circumstances such as those in the 2018 occurrence. |

**INVESTIGATION REPORT A18O0150**
Mid-air collision, Cessna 150G, C-FGMZ (privately registered aircraft), and NLG Air Inc., Piper PA-42 Cheyenne III, C-FCSL (private operator/business aviation aircraft), Ottawa/Carp Airport, Ontario, 1.3 nautical miles S, 4 November 2018

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A18O0153**
Collision with terrain, Piper PA-28R-200, C-GDUM (privately registered aircraft), Brantford Airport, Ontario, 13 November 2018

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| SAFETY ACTIONS | **Technisonic Industries Ltd.**, the emergency locator transmitter manufacturer, issued Service Bulletin SB ELT19-01 on 22 March 2019. The Service Bulletin recommended that the inertia switch be tested annually for proper operation and be replaced every five years. Technisonic plans to distribute the information to all purchasers of emergency locator transmitter batteries to ensure maximum awareness of this recommendation. |

**INVESTIGATION REPORT A18Q0186**
Collision with terrain, Eurocopter EC120B (helicopter), C-FSII (privately registered aircraft), Sainte-Agathe-des-Monts, Quebec, 5 nautical miles W, 19 November 2018

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A18P0177**
Runway incursion and risk of collision, Pacific Coastal Airlines Ltd., Beechcraft 1900C, C-GIPC (commercially operated aircraft), and City of Trail airport vehicle (Chevrolet Silverado 1500), Trail Airport, British Columbia, 12 December 2018

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| SAFETY ACTIONS | **Pacific Coastal Airlines Ltd.** filed internal safety management system hazard reports, as required, and began an internal investigation to develop hazard mitigation.<br><br>The **Trail Airport** took a number of safety actions:<br>• developed site-specific, clear and workable very high frequency radio check and operating procedures;<br>• reviewed and amended Airport Vehicle Operator Permit procedures to include procedures for entering and exiting the runway;<br>• developed procedures for airside operations to assist vehicle operators when they find themselves on a runway occupied by an aircraft; |

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| | • identified communication protocols to improve safety at the airport, and changed related procedures, as needed;<br>• amended the Apron Management Plan;<br>• improved the Airport Staff Training Manual;<br>• retrained and retested employees for Airport Vehicle Operator Permits and radio procedures, and developed individual learning plans for employees so they could become confident operating a very high frequency aeronautical radio;<br>• mounted ground and aviation radios in the skid steer and Snowplow 2 to increase situational awareness, and installed ground radio speakers in all airport equipment;<br>• revised procedures in the winter operations manual related to staffing levels and airside snow clearing when a commercial air carrier is en route;<br>• provided feedback to the airline requesting radio communication when the aircraft is on final approach (15 to 20 minutes) and on short final approach; and<br>• identified all duties superfluous to core responsibilities and determined how these tasks can be managed without affecting day-to-day operations. The airport manager published guidelines concerning these tasks in the Airport Staff Training Manual and trained staff on these guidelines.<br>Employees reviewed the airport's procedure for communicating a near-miss incident and met to discuss informal radio operating procedures, including what to do when the other operator does not respond to a radio communication, and shared responsibility for safety and communication. |

**INVESTIGATION REPORT A19Q0010**
Runway excursion during take-off roll, Air Creebec Inc., de Havilland DHC-8-102, C-GTCO (commercially operated aircraft), Rouyn-Noranda Airport, Quebec, 23 January 2019

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| SAFETY ACTIONS | **Air Creebec** added the requirement that certain of its pilots fly with an accompanying pilot to the list of criteria in its automated flight and crew management system. Consequently, the system no longer pairs two pilots with the same restriction on the same flight. |

**INVESTIGATION REPORT A19Q0015**
Runway incursion, Aéroports de Montréal, four Oshkosh Corporation HT Tractors (snowplow-sweepers) and a commercially operated aircraft, Montréal/Pierre Elliott Trudeau International Airport, Quebec, 2 February 2019

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| SAFETY ACTIONS | **Aéroports de Montréal** (ADM) put an additional supervisor on duty for the rest of the day of the occurrence and held a debriefing with the team leader and convoy lead. Meetings were held to raise awareness of runway incursions, and to obtain employee feedback on the occurrence.<br><br>An internal investigation within the ADM safety management system included brainstorming/mapping and a risk analysis.<br><br>ADM reviewed its procedures on preventing runway incursions during operations and modified three safe work practices to indicate the following:<br><br>• once the control tower has given clearance, the supervisor or team leader clears operators to proceed onto the runway;<br>• once the supervisor or team leader has given clearance, the operator reads back the clearance using appropriate phraseology; and<br>• when the operator at the head of the convoy is at the runway holding position, the operator must confirm with the supervisor or team leader that the operator is in position and is ready to proceed before the convoy proceeds onto the runway.<br><br>ADM has modified its training for employees by adding presentations that deal specifically with runway incursions. It also added runway incursions to the agenda for the next meeting of the ADM and NAV CANADA Runway Safety Action Team, which was to be held in January 2020. |

**INVESTIGATION REPORT A19A0012**
Loss of control during rollout, Air Canada, Boeing 767-375, C-FTCA (commercially operated aircraft), Halifax/Stanfield International Airport, Nova Scotia, 4 March 2019

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| SAFETY ACTIONS | The **Halifax International Airport Authority** implemented a mandatory briefing checklist to ensure that the outgoing airfield maintenance supervisor properly briefs their incoming counterpart during shift changeovers in inclement weather.<br><br>To ensure they are all using a common weather information provider, field supervisors now have access to a default weather forecast and observation website via a cellular-enabled tablet mounted in the airfield maintenance supervisor's vehicle.<br><br>A next-generation runway weather information system was installed in July 2019, doubling the number of sensors on the field. As well, the system is designed to automatically refresh on the airfield maintenance supervisor's portable electronic device.<br><br>**Air Canada** is upgrading its runway condition reporting system to include automatic updates of runway conditions.<br><br>Starting in the fall of 2019, the **Moncton Area Control Centre** and the **Halifax Tower** were to conduct annual winter operation briefings to refresh controllers on winter airport operations.<br><br>**NAV CANADA** reported that the Halifax Terminal and Halifax Tower conducted a joint two-day refresher that included the winter operations briefing and giving staff a first-hand look at the airport layout so they could better understand the subtleties of the operation.<br><br>Local NAV CANADA officials also reviewed the braking action phraseology used during the occurrence and worked with counterparts at Head Office to standardize the permitted variations. |

**INVESTIGATION REPORT A19C0016**
Controlled flight into terrain, Amik Aviation Ltd., Cessna 208B Caravan, C-FAFV (commercially operated aircraft), Little Grand Rapids Airport, Manitoba, 0.75 nautical miles S, 4 March 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19O0026**
Collision with terrain, Robinson Helicopter Company R66 (helicopter), C-GAUA (privately registered aircraft), Timmins (Victor M. Power) Airport, Ontario, 18 nautical miles WNW, 4 March 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19C0026**
Wing lift strut assembly failure and collision with terrain, Piper J3C-65, C-FLDQ (privately registered aircraft), Snowshoe Lake, Ontario, 30 March 2019

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| SAFETY ACTIONS | The **TSB** issued Air Safety Advisory A19C0026-D1-A1, "Federal Aviation Administration Airworthiness Directive 2015-08-04 Reliability of Main Spar Wing Lift Assembly Inspection – Punch Test Method" on 13 August 2019.<br><br>In its response, **Transport Canada** reported that it had obtained and shared with the Federal Aviation Administration (FAA) a copy of the TSB's engineering report. Subsequent activities have focused on two areas.<br><br>**Investigating the possibility of a fleet airworthiness issue**: Based on the condition of the failed lift strut documented in the TSB laboratory report, Transport Canada said it was of the view that if the inspections required by FAA's Airworthiness Directive had been carried out, the failed strut would most likely have been removed from service. Combined with a review of Transport Canada's service difficulty reporting system, which did not identify any additional instances of in-service lift strut failure, Transport Canada concluded that the potential for corrosion in Piper aircraft lift struts is effectively managed and fleet wide safety action was not required.<br><br>**Determining the reliability of the punch test inspection method to detect corrosion**: Transport Canada entered into discussions with the FAA about having an alternative to the punch test that would provide more conclusive results. However, the FAA indicated that, |

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| | after its investigation with the aircraft manufacturer, it is moving towards removing the punch test as an inspection method.<br><br>Not knowing when this will happen, Transport Canada reported that it is planning to take proactive action by issuing a unilateral airworthiness directive to remove the punch test as an inspection method for detecting lift strut corrosion. A precise timeframe for implementing this unilateral airworthiness directive has not been determined. Transport Canada is also reviewing other airworthiness directives that refer to the punch test to determine whether they should be revised. |

**INVESTIGATION REPORT A19A0025**
Controlled flight into terrain, Piper PA-46-350P, N757NY (privately registered aircraft), Makkovik Airport, Newfoundland and Labrador, 35 nautical miles SE, 1 May 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19W0052**
Forced landing, Douglas DC3C-S1C3G (commercially operated aircraft), Hay River/Merlyn Carter Airport, Northwest Territories, 3 May 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19Q0073**
Loss of control and collision with terrain, ULM Québec Inc., DTA Voyageur II 912S (basic ultralight), C-IULM (privately registered aircraft), St-Cuthbert (ULM Québec) Aerodrome, Quebec, 24 May 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19W0063**
Loss of control and collision with terrain after takeoff, Cessna 170B, N4512C (privately registered aircraft), Whitehorse/Erik Nielsen International Airport, Yukon, 27 May 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19C0053**
Collision with terrain, Piper PA-12 (privately registered aircraft), Domain Lake, Ontario, 29 May 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19Q0088**
Loss of control during initial climb and collision with ground, Pitts S2E (amateur-built aircraft), C-GONV (privately registered aircraft), Saint-Jean-Port-Joli, Quebec, 16 June 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19Q0096**
Collision with terrain, Rans S-6ES Coyote II (advanced ultralight), C-IIJJ (privately registered aircraft), Rougemont, Quebec, 1 July 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19Q0107**
Collision with trees, de Havilland DHC-2 Mk.1 (Beaver), C-GRHF (privately registered aircraft), Chibougamau, Quebec, 43 nautical miles S, 12 July 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19W0094**
Hard landing, WestJet Encore Ltd., Bombardier DHC-8-402, C-FKWE (commercially operated aircraft), Edmonton International Airport, Alberta, 19 July 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19W0099**
Mid-air collision, Cu Nim Gliding Club, Cessna 182N, C-FPZE (privately registered aircraft), and Schleicher ASK 21 (glider), C-FLTY (privately registered aircraft), Black Diamond/Cu Nim Aerodrome, Alberta, 0.5 nautical miles SW, 26 July 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT A19Q0146**
Collision with terrain, Bel Air Laurentien Aviation Inc., Cessna U206G on floats, C-GPPZ (commercially operated aircraft), Lac-à-la-Tortue, Quebec, 22 August 2019

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| SAFETY ACTIONS | **Bel Air Laurentien Aviation Inc.** checked the dipstick of its other Cessna 206s and confirmed that the fuel level indication was accurate for both tanks. The company also introduced a procedure making it mandatory to check the fuel level with a dipstick every time the aircraft is fuelled and after every two sightseeing flights. |

## MARINE SECTOR

**INVESTIGATION REPORT M17A0391**
Lifeboat release hook failure, passenger ferry *Northern Ranger,* Nain, Newfoundland and Labrador, 11 October 2017

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| SAFETY ACTIONS | The **TSB** issued Marine Safety Advisory MSA 04/18, "Failure of lifeboat release hook," to Jiangsu Jiaoyan Marine Equipment Co., Ltd., RINA Classification Society, Nunatsiavut Marine Inc., Transport Canada Marine Safety and Security, and the members of the International Association of Classification Societies.<br><br>**Nunatsiavut Marine Inc.** prohibited the crew from being in lifeboats during retrieval.<br><br>**Transport Canada** issued a Ship Safety Bulletin to inform the marine community of safety measures concerning life-saving appliances. The department also released FlagStateNet FSN 01-2019 to bring this incident to the attention of inspectors and surveyors, and provided guidance material to all marine safety inspectors and recognized organization surveyors on monitoring vessels equipped with these life-saving appliances. |

**INVESTIGATION REPORT M18C0018**
Onboard fatality, bulk carrier *Sage Amazon,* Port-Daniel-Gascons, Quebec, 17 March 2018

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| SAFETY ACTIONS | The **Republic of Liberia**, the flag state for the *Sage Amazon*, conducted an investigation into the occurrence and recorded it in its files for future reference and analysis. However, it did not release its report, since the death was the result of a fatigue-induced heart attack. |

**INVESTIGATION REPORT M18P0087**
Uncontrolled fall of rescue boat, Queen of Cumberland, Swartz Bay, British Columbia, 18 April 2018

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| SAFETY ACTIONS | **British Columbia Ferry Services Inc.** issued operational guidelines:<br>• fleet-wide Operations Bulletin advising of the occurrence and prohibiting the use of all luffing davits throughout the fleet, except in emergencies; and<br>• Fleet Operations Directive advising that a fleet-wide technical inspection of all rescue boat davits was in progress to verify the equipment's fitness for purpose, extending the "emergency use only" restrictions to all davits and requiring any routine launches to be conducted without crew members in the rescue boat.<br>A second Fleet Operations Directive removed the "emergency use only" restrictions on davit and rescue boat operations. However, these had to be reinstated after an occurrence with a rescue boat on board the *Spirit of Vancouver Island*. Other than for real emergencies, |

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| | no personnel are permitted to be in the rescue boat when it is being lowered and/or raised.<br><br>The company issued a report on its inquiry into the *Queen of Cumberland* occurrence, including 11 recommendations covering issues ranging from reviewing davit design and operator warnings, and improving emergency-scene management at terminals (including drills) to developing and enforcing new governance and quality assurance processes in the computerized maintenance management system.<br><br>Subsequently, the company reported that it had taken further safety actions, including replacing the davit, providing and operations manual for it and training the crew on its operations and limitations, reviewing asset records and job plans in the computerized maintenance management system for the rescue boat davit systems in all fleet vessels, and setting up a new group to manage safety-critical assets in the fleet.<br><br>The company also issued a memo to all employees highlighting the importance of reporting safety events. |

**INVESTIGATION REPORT M18P0230**
Girding and capsizing, tug *George H Ledcor*, north arm of the Fraser River, British Columbia, 13 August 2018

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| SAFETY ACTIONS | **Ledcor Resources and Transportation Inc.** implemented the following safety actions:<br>• conducted a job hazard analysis and added to its domestic safety management system safe work practices for using assist tugs, including sharing information on assist tug positioning and communication protocols;<br>• added directions and procedures to the domestic safety management system for recognizing and avoiding girding situations;<br>• added the location and function of the abort mechanisms to the vessel-specific familiarization requirements;<br>• held general crew meetings, conducted hazard analyses, and delivered a presentation to masters to raise awareness of girding;<br>• ensured that all masters discuss the use of the abort mechanism during safety drills, including when and how to activate the mechanism;<br>• instituted a two-day training and familiarization program for all masters and mates using a vessel voyage simulator and classroom training to learn about girding situations and strategies to avoid them; and<br>• installed additional abort mechanisms of a standard design in common locations throughout its fleet of tugs, making them more visible, illuminating them and adding an audible alarm. |

**INVESTIGATION REPORT M18P0257**
Crew fall overboard from rescue boat, roll-on/roll-off passenger ferry *Spirit of Vancouver Island,* Swartz Bay, British Columbia, 31 August 2018

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| SAFETY ACTIONS | **British Columbia Ferry Services Inc.** has taken the following safety actions:<br>• created and resourced the Asset Management Services Office;<br>• updated all vessel-specific manual procedures, checklists and quick reference guides related to rescue boat operations;<br>• completed its rescue boat policy with Fleet Operations Manual policy updates;<br>• checked crew proficiency by recording the date and the drill the employee participated in in the employee's Marine Emergency Duties book, which the officer in charge of the drill then initials;<br>• updated its risk management policy to require a task analysis or risk assessment when introducing or modifying safety-critical assets;<br>• created the Nautical Equipment Management Office to assist in the management and quality assurance of safety-critical assets by reviewing policy, procedures and equipment as part of an ongoing Asset Management Improvement Strategy;<br>• added more focus on equipment readiness during audits; and<br>• developed a controlled fall system for rescue boat crew. |

**INVESTIGATION REPORT M18C0328**
Possible bottom contact, bulk carrier *Maccoa,* Kahnawake, Quebec, 6 November 2018

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT M18A0425**
Taking on water and sinking, fishing vessel *Charlene A,* Boutiliers Cove, Nova Scotia, 1 December 2018

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT M19C0043**
Striking of a wharf, roll-on/roll-off passenger ferry *Apollo,* Godbout, Quebec, 25 February 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

## PIPELINE SECTOR

**INVESTIGATION REPORT P18H0088**
Pipeline rupture and fire, Westcoast Energy Inc., 36-inch transmission south mainline loop, kilometre post 29.838, Prince George, British Columbia, 9 October 2018

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| SAFETY ACTIONS | The **TSB** sent Pipeline Safety Advisory 617-02/19, "Management of stress corrosion cracking on susceptible pipelines," to Enbridge Inc. on 26 June 2019. In the safety advisory, the TSB indicated that, given the presence of pipe that is susceptible to stress corrosion cracking on the affected pipeline, Westcoast Energy Inc. might wish to review its related management practices, including in-line inspection intervals, to mitigate the risks associated with polyethylene tape-coated pipe.<br><br>In response to the safety advisory, **Westcoast Energy Inc.** advised the TSB that it had reviewed its stress corrosion management practices and made several improvements to its stress corrosion cracking management program. Among them were changes to how it establishes re-inspection intervals for electromagnetic acoustic transducer in-line inspections. Westcoast also conducted inline pipeline inspections of the 30- and 36-inch natural gas pipeline on the transmission south system.<br><br>Westcoast noted in its response that it had implemented a more conservative approach to responding to pipeline inspection data that might identify areas requiring closer monitoring or earlier maintenance work.<br><br>Westcoast implemented other program improvements, including to workstreams associated with the integrity management program. The company also improved its emergency response program to clarify expectations for engaging stakeholders in emergency response exercises.<br><br>In October 2018, the **National Energy Board** (now the Canada Energy Regulator) issued and then revised an inspection officer order with regard to returning the affected pipeline to service, and the pressure restrictions under which it could operate. In addition, the National Energy Board performed field inspections and examined Westcoast's integrity management practices to verify that regulatory requirements were being met, and held technical meetings with Westcoast to evaluate crack detection tool reliability and to run validation processes.<br><br>The National Energy Board required Westcoast to submit engineering assessments to ensure safe operation of the affected pipeline. Based on these assessments, the National Energy Board had lifted all operating pressure restrictions by January 2020. |

## RAIL SECTOR

**INVESTIGATION REPORT R17D0123**
Employee fatality, Canadian Pacific Railway, yard assignment FS23, Mile 46.9, Adirondack Subdivision, St-Luc Yard, Montréal, Quebec, 8 November 2017

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| SAFETY ACTIONS | Through a memorandum of understanding with Employment and Social Development Canada, **Transport Canada** conducted an investigation under Part II of the *Canada Labour Code* into the yard helper's death. The investigation sought to understand the circumstances surrounding his death to prevent a recurrence and determine whether Part II of the Code had been violated.<br><br>**Canadian Pacific Railway** took the following corrective actions:<br><br>• conducted a system-wide campaign focused on the hazards present when working on or near tracks, as well as the associated risk mitigation processes;<br>• initiated a system-wide awareness campaign to review the rules and hazards associated with close/restricted clearances on the railway; and<br>• initiated the Critical Safety Rules program to increase awareness of the dangers of working on or near tracks, as well as the required risk mitigation processes. |

**INVESTIGATION REPORT R18W0007**
Main track derailment, Canadian National Railway Company, freight train M31731-04, Mile 166.33, Redditt Subdivision, Rennie, Manitoba, 6 January 2018

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT R18T0006**
Crossing accident, Canadian National Railway Company, freight train Q14891-08, Mile 77.66, Dundas Subdivision, London, Ontario, 9 January 2018

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| SAFETY ACTIONS | The **City of London** required snowplow operators employed by its sidewalk snow-clearing contractors to participate in a City-led review of safe operating practices at railway crossings. The City distributed guidance documents on clearing snow at crossings to snowplow operators at this review session. |

**INVESTIGATION REPORT R18T0058**
Trespassing accident, Canadian Pacific Railway, freight train 141-17, Mile 16.82, Galt Subdivision, Mississauga, Ontario, 18 March 2018

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| SAFETY ACTIONS | The **TSB** issued Rail Safety Advisory 617-02/18, "Deterrence of trespassing activity on railway property," to Transport Canada and Operation Lifesaver on 17 May 2018. The safety advisory noted unauthorized pathways near an overpass barrier leading to a railway right-of-way, indicating that frequent trespassing was highly likely. Given the inherent risks of trespassing on railway property, the TSB suggested that Transport Canada, Operation Lifesaver, railway companies and local municipalities might wish to review and modify their strategies (as necessary) to control access to railway property, to enforce trespassing-related laws effectively and to educate people on the associated risks.<br><br>**Operation Lifesaver** indicated in its response that it would continue to focus on delivering anti-trespassing messages to Canadians in an effort to reduce the number of trespassing incidents.<br><br>In its response, **Canadian Pacific Railway** provided information on its comprehensive community safety and security program.<br><br>In May 2019, the railway installed more fencing between the overpass barrier and the edge of the fence, and installed another "No Trespassing" sign. |

Investigation report **R18Q0046**
Uncontrolled movement and derailment of rolling stock on non-main track, Quebec North Shore and Labrador Railway, Sept-Îles Yard, Sept-Îles, Quebec, 1 May 2018

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| SAFETY ACTIONS | The **Quebec North Shore and Labrador Railway** conducted an internal investigation and took the following actions: |

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| | • issued Circular No. 18-508, "Rolling Stock Switching Operation with Air," which stated that all crews must ensure that rolling stock is charged with air and has sufficient operational brakes;<br>• eliminated the separate areas of Sept-Îles Yard in order to standardize operating rules in the yard and foster better overall understanding;<br>• implemented new lock-out procedures for the protection of employees;<br>• evaluated all derails and their placement on the tracks leading to the repair shops; and<br>• initiated a project to replace sliding derails with switch derails. |

**INVESTIGATION REPORT R18V0127**
Crossing accident, Canadian National Railway Company, freight train Q10521-21, Mile 71.13, Yale Subdivision, Chilliwack, British Columbia, 26 May 2018

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| SAFETY ACTIONS | **Transport Canada** issued a letter of non-compliance and concern to Canadian National Railway Company on 28 May 2019. In the letter, Transport Canada identified a number of safety concerns with the crossing surface flangeway at the Broadway Street public crossing, including the following:<br>• The flangeways on the east side of the crossing exceeded a depth of 75 mm and, because the flangeway filler had dropped down, the measurement from the rail to the concrete pads exceeded a width of 120 mm.<br>• The south rail flangeway filler had rolled over in one section.<br>Transport Canada issued a notice under subsection 31(1) of the *Railway Safety Act* to the City of Chilliwack on 4 June 2018, identifying the following hazards:<br>• There were narrowed sidewalks at the crossing signal masts due to their close proximity to the road, causing pedestrians to veer towards the road.<br>• There were narrowed road approaches due to the median barriers, causing vehicular traffic to veer towards the sidewalks.<br>• The combination of these two characteristics created a hazard, since a moving vehicle might strike pedestrians as they veered around the crossing signal masts.<br>In a letter of concern to Canadian National Railway Company on 5 September 2018, Transport Canada indicated that the recent sidewalk widening at the west end of the crossing that had resulted in the crossing surface not extending 0.5 m beyond the sidewalk would have to be corrected by November 2021. Transport Canada also expressed concern over the faded pathway markings and areas where the crossing surface had cracked and could present a tripping hazard.<br>The **City of Chilliwack** arranged for an engineering assessment of the crossing. In consultation with the railway, city officials finalized engineering drawings for various measures to improve pedestrian safety at the crossing, including modifying the pedestrian walkway and renewing the pavement marking to delineate the sidewalk. The work was completed in April 2020. |

**INVESTIGATION REPORT R18D0069**
Main-track train derailment, Canadian Pacific Railway, freight train 142-14, Mile 36.6, Winchester Subdivision, Saint-Polycarpe, Quebec, 16 July 2018

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| SAFETY ACTIONS | The **TSB** issued Rail Safety Advisory 617-07/18, "Securement of loads on flat cars equipped with an A-frame structure" on 9 October 2018. In the safety advisory, the TSB indicated that Transport Canada might wish to review the adequacy of Canadian Pacific Railway's open top loading practices, particularly when transporting track materials on flat cars equipped with an A-frame structure.<br>In its 15 January 2019 response to the safety advisory, **Transport Canada** indicated that Canadian Pacific Railway had stated that it had based its current loading practices on the new Railway Association of Canada and Association of American Railroads standards on open top loading for track panels of mixed lengths on flat cars equipped with a permanent A-frame structure. Transport Canada inspectors followed up with the company and verified that employees were trained on the proper loading inspection procedures. Transport Canada stated that it believed that the company, having taken these actions, had adequately addressed the TSB's concern. |

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| | **Canadian Pacific Railway** took several other SAFETY ACTIONS:<br>• completed a review of internal top loading practices in August 2018 and documented procedures for securing loads on A-frame cars;<br>• issued a written procedure on 3 August 2018, "Track Panels Loading on Flat Cars," that requires supervisors to inspect loads that have been secured on A-frame cars;<br>• conducted training on the new procedure;<br>• developed, validated and implemented training for employees on securing loads on A-frame cars in accordance with the Railway Association of Canada circular RAC 12010, "Track Panels of Mixed Lengths on Flat Cars Equipped with Permanent A-Frame Structure"; and<br>• inspected and modified its A-frame cars to include a steel material containment box for securement of palletized or loose items, and close-out panels on the A-end and B-end of the cars. |

**INVESTIGATION REPORT R18E0138**
Main-track derailment, Canadian National Railway Company, freight train G83342-24, Mile 24.30, Wainwright Subdivision, Landis, Saskatchewan, 26 September 2018

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| SAFETY ACTIONS | **Canadian National Railway Company** is establishing and issuing guidance to its customer facilities on the inspection and maintenance of indexers to prevent axle damage. |

**INVESTIGATION REPORT R18H0105**
Main-track collision between train and track unit, Canadian National Railway Company, freight train X 14921-01 and Unimat tamper, Mile 84.27, Kingston Subdivision, Crysler, Ontario, 2 October 2018

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| SAFETY ACTIONS | The **TSB** issued Rail Safety Advisory 617-09/18, "Clearing trains through Rule 42 work limits," to Transport Canada on 16 November 2018. The safety advisory indicated that, given the potential risks when trains operate through work sites, Transport Canada might wish to review the application of *Canadian Rail Operating Rules* (CROR) Rule 42 that allows ongoing work activities when a train is passing on the adjacent track.<br><br>**Transport Canada** responded to the safety advisory on 24 June 2019, noting that CROR Rule 42 is not intended to permit or prohibit engineering work while a train is allowed through the working limits. It is the railway's responsibility to determine what type of work can be performed with CROR Rule 42 protection, including when a train is passing on an adjacent track, and to ensure that all personnel working in the vicinity of rail traffic can safely carry out their assigned duties.<br><br>**Canadian National Railway Company** issued Engineering Notice 2018-E-06, "Clearing procedures for Track Services on major rail/tie gangs when working under Rule 842 Multi track territory" on 4 October 2018. As part of this notice, the company added the Unimat tamper to its list of equipment for which work heads (tamping tools) must be pulled in and for which work must be stopped when trains operate on the adjacent track through CROR Rule 42 limits.<br><br>The company also took the following SAFETY ACTIONS:<br>• informed Eastern Region engineering staff of the occurrence;<br>• reviewed the engineering notice for the multi-track clearing policy with all engineering production employees (specifically tamper operators) in the Eastern Region;<br>• placed a copy of Engineering Notice 2018-E-06 in each engineering production machine; and<br>• posted labels inside the cabs of machines that are restricted from working when a train is passing on the adjacent track indicating that work must be stopped until all trains are clear of the limits.<br>Transport Canada issued a letter of non-compliance to Canadian National Railway Company on 11 December 2018 for contravening CROR Rule 803, which requires foremen to ensure, prior to the removal, cancellation or expiration of protection, or prior to providing instructions to a movement, and unless otherwise protected, that the track is safe for movements at normal speed; and that employees or track units for which the foreman is responsible are clear of the track. Transport Canada determined that the measures the company had taken to address the non-compliance, as stated in its 28 December 2018 response to the letter, were sufficient. |

**INVESTIGATION REPORT R19D0065**

Main-track derailment, Canadian National Railway Company, freight train M36921-23, L'Assomption, Quebec, 24 April 2019

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| SAFETY ACTIONS | **Canadian National Railway Company** added a process to its corridor risk assessments whereby it examines the spacing of wayside inspection systems on secondary lines within major metropolitan areas. |

**INVESTIGATION REPORT R19Q0092**

Passenger injury, VIA Rail Canada Inc., passenger train VIA 600, Mile 199.24, Canadian National Railway Company Lac St-Jean Subdivision, Jonquière, Quebec, 28 May 2019

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| SAFETY ACTIONS | **VIA Rail Canada Inc.** launched the Heritage Program in 2018, prior to this occurrence, to renovate and modernize a large portion of its fleet, including 25 of the 43 VIA HEP 1-type Economy Class passenger cars. The company was expected to complete the renovation of the first cars in early 2020.<br><br>Under this program, VIA Rail Canada Inc. had already started to modify the stowable leg rests in these cars by removing the sharp edges of the metal tubes and installing a plastic tip.<br><br>VIA Rail Canada Inc. will continue to examine the stowable leg rest assembly and assess whether other modifications are necessary. |

**INVESTIGATION REPORT R19M0028**

Crossing accident, Canadian National Railway Company, freight train A40711-29, Mile 27.73, Bedford Subdivision, Oakfield, Nova Scotia, 29 July 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |

**INVESTIGATION REPORT R19W0236**

Crossing collision, Canadian Pacific Railway, freight train 320-173 and City of Kenora transit bus, Mile 3.15, Keewatin Subdivision, Kenora, Ontario, 8 August 2019

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| SAFETY ACTIONS | The TSB is unaware of any safety action having been taken as a result of this occurrence. |