



## Reassessment of the response to TSB Recommendation A18-06

### Timing of post-landing procedures

#### Background

TSB Air Transportation Safety Issue Investigation Report A1700038 examined 27 runway incursions that occurred between June 2012 and November 2017 at 2 closely spaced parallel runways known as the “south complex” at Toronto/Lester B. Pearson International Airport (CYYZ), Ontario. The 27 cases studied were not the only incursions at CYYZ during that period. However, their number and similarity raised concern and led the TSB to examine them more closely as a group, in order to determine their systemic underlying causes and contributing factors and to assess the degree of ongoing risk.

All of the incursions occurred on the inner runway (Runway 06L/24R) after the flight crews involved had landed on the outer runway (Runway 06R/24L), had been instructed by air traffic control (ATC) to hold short of Runway 06L/24R, and, despite intending to stop, had missed the visual cues depicting the runway holding positions.

The taxiway layout between the runways has several characteristics that are uncommon compared to those at other airports, both within North America and internationally. The runways are spaced a relatively short distance (305 m [1000 feet]) apart, and the rapid exit taxiways (RETs) provide direct access to the adjacent runway without first progressing to another transitional surface. The runway holding positions are located immediately following a 65° curve and are situated at greater distances from the protected inner runway than they are at other airports.

Regional airlines that are based in the United States and that operate regional jets were involved in a disproportionate number of the incursions, both in total and in terms of the rate of incursions per landing. This was likely due to foreign flight crews being unfamiliar with the uncommon taxiway layout between the parallel runways at CYYZ and to the increased speed at which their smaller aircraft types often approached the runway holding positions.

It is for these reasons that some foreign flight crews did not anticipate the location of the stopping position on each RET and so did not direct their attention outside the aircraft at the required time to identify the visual cues indicating the runway holding positions.

Most of the flight crews were aware of the south complex areas at increased risk for runway incursions because they are designated as “hot spots” on the airport charts supplied to crews. However, that guidance, together with limitations in operators’ requirements for taxi briefings, did not bring crews’ attention to specific strategies to mitigate the risk of incursion. Instead, the crews followed their usual routines after exiting the landing runway and proceeded with their post-landing checks. The timing of those tasks distracted them at a point when limited time was available to recognize the visual cues requiring them to stop, and contributed to their overlooking those cues.

In the occurrences examined in this study, ATC recognized the incursions quickly and took appropriate actions that either caused the incurring aircraft to stop or reduced the severity of the consequences. As a result, most of the aircraft did not reach the inner runway surface. Of the 3 that did reach the surface, 2 were at an intersection beyond the point at which the departing aircraft presented a risk of collision. In the 3rd case, ATC cancelled the takeoff clearance for the departing aircraft before it began its take-off roll.

In another occurrence, ATC instructed the incurring aircraft to stop before it had reached the runway surface, then immediately told the departing aircraft to abort its takeoff. The crew of the departing flight did not recognize the instruction to abort because the phraseology was unfamiliar and because it was not repeated as they were used to; as a result, they continued their departure. The incurring aircraft stopped before reaching the runway surface, and the departing aircraft overflew the intersection without further event.

International guidance for the prevention of runway incursions recommends that, once areas presenting a hazard of incursion have been identified, strategies to manage or mitigate that risk should be implemented and should include awareness campaigns, additional visual aids, alternate routings, or, ultimately, the construction of new taxiways.

Various awareness campaigns and advisories have been issued since 2012, and visual aids have undergone progressive but significant improvements. Those strategies have likely resulted in periodic, but not permanent, reductions in the incidence of incursions.

Revising the post-landing procedures of flight crews may lead to increased vigilance and reduced distraction, but it is unlikely to eliminate crews’ expectations that visual cues will be situated in common locations or induce crews to reduce their taxiing speeds so that they have more time to recognize the cues.

All but one of the applicable strategies recommended by international guidance have been implemented on the south complex; the remaining strategy is to make physical changes to the taxiway layout. A change of this scale may be required to increase the distance and taxiing time between runway holding positions, reduce the taxiing speeds of aircraft approaching hold-short locations, and prevent direct access to adjacent runways from RETs. Among the possible reconfigurations for achieving these objectives is the addition of an intermediate taxiway between the runways and parallel to them, as found at numerous airports with parallel runways, and the re-situating of visual cues in common locations.

The Board concluded its investigation and released report A1700038 on 31 January 2019.

### **TSB Recommendation A18-06 (January 2019)**

Once an aircraft has landed on a runway and the landing roll is complete, the flight crew must perform a series of post-landing tasks. As detailed in this investigation, during normal operations, most flight crews begin these tasks when the aircraft is clear of the landing runway, in accordance with their operator's standard operating procedures (SOPs). These tasks, or checklists, are usually brief and occupy only a small amount of one or both of the flight crew members' attention.

At airports that have closely spaced parallel runways, aircraft that have landed on the outer runway normally exit the runway via a rapid exit taxiway, which sometimes terminates directly on the inner runway. In most cases, ATC will instruct flight crews to hold short of this runway because the runway is in use by other departing or arriving traffic. In these cases, it is essential that, immediately after exiting the landing runway, flight crews focus their attention on acquiring the visual cues necessary to identify the runway holding position in order to prevent the aircraft from incurring on the other active runway.

Most operators' SOPs require that the post-landing checks be conducted once the aircraft is clear of the landing runway. However, as shown in this investigation, if these SOPs are followed when flight crews are operating on closely spaced parallel runways, they may focus their attention inside the cockpit at a time when their full attention and visual focus are required outside. As a result of this distraction, flight crews may miss the visual cues and incur on the active runway, which presents a significant risk of collision.

In 2012, the U.S. Federal Aviation Administration (FAA) published guidance for operators to help them develop and implement SOPs to prevent runway incursions. Although this guidance advises flight crews to initiate non-essential post-landing actions—such as raising flaps or adjusting trim—after the aircraft is clear of all active runways, it does not propose any specific amendments to post-landing SOPs that reflect this advice. None of the operators involved in the occurrences studied had incorporated any changes to their post-landing SOPs to address this concern.

Therefore, the Board recommended that

the United States Federal Aviation Administration work with operators to amend standard operating procedures so that post-landing checks are sequenced only after landing aircraft are clear of both active runways when closely spaced parallel runway operations are in effect, rather than the current common practice of sequencing the checks once landing aircraft are clear of the landing surface.

### **TSB Recommendation A18-06**

### **The Federal Aviation Administration's response to Recommendation A18-06 (July 2019)**

The FAA reviewed this recommendation and assigned it to our Flight Standards Service, Technical Operations Air Carrier Branch, for further evaluation. As part of our evaluation, we will review this issue with our Certificate Management Offices with oversight responsibility of U.S. based air carrier operators, who routinely operate in Canada. We anticipate providing an updated response to this recommendation by March 2020.

### **TSB assessment of the Federal Aviation Administration's response to Recommendation A18-06 (December 2019)**

The TSB is encouraged that the Federal Aviation Administration (FAA) is reviewing and evaluating the recommendation, and has engaged its offices that have oversight over air carriers that routinely operate in Canada.

It should be noted that this safety deficiency may extend beyond those operators that fly directly to Toronto/Lester B. Pearson International Airport (CYYZ), although the TSB acknowledges that the operating procedures of these other carriers were not evaluated as part of this investigation.

Although the FAA has indicated in its response that it intends further evaluation and anticipates providing an update by March 2020, until the evaluation is complete, and actions have been taken, it is unknown whether the risks associated with the safety deficiency identified in Recommendation A18-06 will be addressed.

Therefore, the Board is **unable to assess** the response to the recommendation.

### **The Federal Aviation Administration's response to Recommendation A18-06 (October 2020)**

This is in further response to Federal Aviation Administration (FAA) Safety Recommendation 19.045 received on May 6, 2019, and supplements our previous letter. The Transportation Safety Board of Canada (TSB) issued this recommendation as a result of repeated runway incursions at the Toronto/Lester B. Pearson International Airport (CYYZ), Ontario, Canada. A safety issue investigation was initiated and examined 27 runway incursions that occurred between June 2012 and November 2017 at two closely spaced parallel runways. All of the incursions occurred on the inner runway (Runway 06L/24R) after the flight crews landed on the outer runway (Runway 06R/24L), were instructed by air traffic control (ATC) to hold short of Runway 06L/24R, and missed the visual cues depicting the Runway 06L/24R hold short position.

Air carriers that are based in the United States operating regional jet airplanes were involved in a disproportionate number of the runway incursions. This is likely due to foreign flight crews being unfamiliar with the uncommon taxiway layout between the parallel runways at the airport. In all of the runway incursions examined in this study, ATC recognized the incursions

quickly and took appropriate actions that either caused the airplane to stop or reduced the severity of the incursion consequences.

19.045. The United States Federal Aviation Administration work with operators to amend standard operating procedures so that post-landing checks are sequenced only after landing aircraft are clear of both active runways when closely spaced parallel runway operations are in effect, rather than the current common practice of sequencing the checks once landing aircraft are clear of the landing surface. [TSB Recommendation A18-06]

FAA Comment. The FAA's Flight Standards Service, Air Carrier Branch, has completed its review of this recommendation. A safety alert for operators (SAFO) has been drafted to address post-landing flight crew aircraft operational checklist procedures. Currently, the SAFO is in final review with the FAA's General Counsel Office before it will be published and satisfy the intent of this recommendation.

I anticipate providing an update to this safety recommendation by April 30, 2021.

#### **TSB reassessment of the Federal Aviation Administration's response to Recommendation A18-06 (December 2020)**

In its latest response, the U.S. Federal Aviation Administration (FAA) indicated that it has reviewed the recommendation and has drafted a safety alert for operators (SAFO) to address the safety deficiency identified in Recommendation A18-06. The SAFO is currently in final review before publication.

The TSB is encouraged by the FAA's response to this recommendation, and the planned publication of a SAFO. However, until the planned actions are complete, the TSB cannot assess the effectiveness of the actions taken towards reducing or eliminating the identified safety deficiency.

Therefore, the response to Recommendation A18-06 is assessed as **Satisfactory Intent**.

#### **The Federal Aviation Administration's response to Recommendation A18-06 (October 2021)**

This is our final response to Federal Aviation Administration (FAA) Safety Recommendation 19.045 received on May 6, 2019, and supplements our previous letters. The Transportation Safety Board of Canada (TSB) issued this recommendation as a result of repeated runway incursions at the Toronto/Lester B. Pearson International Airport (YYZ), Ontario. A safety issue investigation was initiated and examined 27 runway incursions that occurred between June 2012 and November 2017 at two closely spaced parallel runways. All of the incursions occurred on the inner runway (Runway 06L/24R) after the flight crews landed on the outer runway (Runway 06R/24L), were instructed by air traffic control (ATC) to hold short of Runway 06L/24R, and missed the visual cues depicting the Runway 06L/24R hold short position.

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FAA Comment. In our letter dated October 13, 2020, we stated that the FAA completed its evaluation of the TSB's recommendation and a safety alert for operators (SAFO) had been drafted to address post-landing flight crew aircraft operational checklist procedures. However, the FAA feels that the below completed actions address the safety intent of this recommendation and no longer plans on issuing a SAFO, as the issuance of the SAFO has been overcome by events for the following reasons:

1. The FAA's Runway Safety Office reviewed U.S. air carrier reports of runway incursions received from YYZ. Currently, no reports have been received to date.
2. Consultation with several FAA principal operation inspectors (POIs) with oversight of U.S. air carriers, such as American, Delta, SkyWest, and United, were held about the details of this and other safety issues. The POIs also stated that hazards, such as airport hotspots, are analyzed by data analysts and the results are evaluated by management. The air carrier flight operations department will then implement and track the appropriate safety risk mitigation(s), such as:
  - Implementing an information campaign for pilots;
  - Dissemination of new or revised procedures;
  - Conduct flight crew training;
  - Dissemination of bulletins; and
  - Ongoing FAA surveillance activities are planned and deficiencies noted will be discussed with the air carrier operators and a plan of corrective action determined.
3. U.S. air carrier operators have implemented their own safety management system-safety risk management procedures-to mitigate runway incursion risks.

I believe the FAA has effectively addressed this safety recommendation and consider our actions complete.

## TSB reassessment of the Federal Aviation Administration's response to Recommendation A18-06 (March 2022)

In its latest response, the Federal Aviation Administration (FAA) indicated that this was its final response to Recommendation A18-06 (FAA Safety Recommendation 19.045) and that it would no longer be issuing a safety alert for operators (SAFO) to address post-landing flight crew aircraft operational checklist procedures. According to the FAA, this decision is a result of various mitigating factors, such as:

- No reports have been received by the FAA Runway Safety Office regarding runway incursions at Lester B. Pearson International Airport (CYYZ) involving United States (U.S.) air carrier operators;
- Consultations undertaken with several FAA principal operation inspectors with oversight of major U.S. air carriers regarding runway incursions and other safety issues;
- Air carrier operations departments plan to implement and track safety risk mitigation strategies (i.e. information campaign for pilots, dissemination of bulletins), including ongoing planned FAA surveillance activities to assess deficiencies with the air carrier operators and determine a plan of corrective action; and
- U.S. air carrier operators have implemented their own safety management system-safety risk management procedures to mitigate runway incursion risks.

The Board notes the progress made by FAA and U.S. air carrier operators toward reducing the risk of runway incursions in general and supports the ongoing efforts to implement and track safety risk mitigation. However, as detailed in the investigation report, some of these risk mitigation strategies, such as awareness campaigns and advisories issued by the FAA in 2012, were historically employed but did not result in the permanent reductions in the incidence of incursions.

In the absence of a SAFO to address the timing of post-landing procedures, the risks associated with the current common practice of sequencing the checks once landing aircraft are clear of the landing surface remain.

Therefore, the response to Recommendation A18-06 is assessed as **Unsatisfactory**.

### Next TSB action

The FAA has indicated that no further responses will be issued in relation to Recommendation A18-06, as it believes it has effectively addressed the risks associated with this safety deficiency and considers its actions complete. The Board remains concerned that there is a residual risk; however, as no further action is planned by the FAA, continued reassessments will not likely yield further results.

This deficiency file is **Closed**.