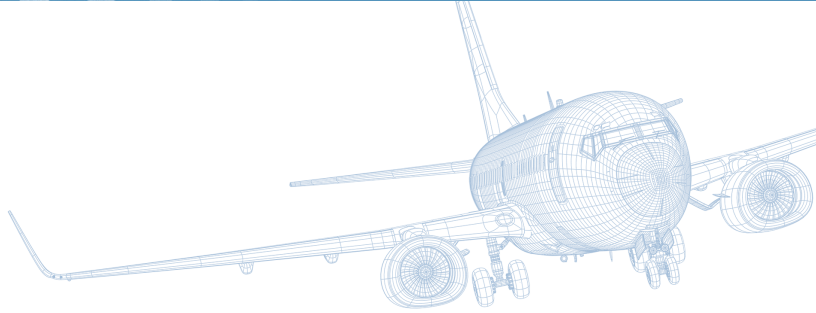




Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada



Occurrences in Quebec and Nunavut on runways undergoing construction that are reduced in width



Air transportation safety
issue investigation report

A18Q0140

Executive summary

This safety issue investigation examines a series of 18 occurrences that took place at certain airports undergoing construction in Quebec and Nunavut between 2013 and 2018.

Further to the investigation of an occurrence that took place in June 2018 when runway rehabilitation work was being carried out at the Baie-Comeau Airport, Quebec, it was discovered that another 14 similar occurrences had taken place at other airports in Quebec and at an airport in Nunavut since 2013. A summary review of these occurrences revealed a particularity in the method used to carry out the construction: the width of the runway was reduced rather than the length. In all but 2 cases, aircraft had manoeuvred on the closed portion of the runway during takeoff or landing.

Considering this a matter of concern, the TSB issued Aviation Safety Advisory A18Q0094-D1-A1, addressed to Transport Canada Civil Aviation (TCCA), on 12 July 2018. However, when 2 more similar occurrences took place shortly after the advisory was released, the TSB launched this investigation to highlight any systemic underlying causes or contributing factors, and assess the risk they pose. Information obtained during this investigation determined that an additional occurrence had taken place in Quebec, at the Schefferville Airport in August 2015, but had not been reported.



The construction method most frequently used for runway rehabilitation in Canada and abroad consists of reducing the runway length rather than the width. A review of international standards and recommended practices and of Canada's regulatory framework for construction revealed the absence of information on which method should be used for runway rehabilitation, and the absence of Canadian standards for airport construction. Neither International Civil Aviation Organization (ICAO) documents nor the *Canadian Aviation Regulations* (CARs) and related standards authorize or prohibit either method. The decision lies entirely with the airport operator.

Given that reducing the width of a runway does not require the runway to be closed completely, this method provides a decisive advantage for operators. It was clear from reviewing these regulations that the various requirements and cases are complex and some concepts not detailed enough. If the wording used in airport standards and regulations is complex and lends itself to several interpretations, these standards and regulations could lead to different measures and solutions that all appear to comply with the requirements, but in reality, may not reflect the regulator's intention with respect to safety.

Furthermore, given the absence of standards related to the safety of operations during airport construction, including standards related to required visual aids, the visual aids used on the reduced-width runways reviewed in this investigation were insufficient for pilots to be able to clearly distinguish the closed portions. The runway markings used for construction at the airports under review were not clear, convincing, and consistent; consequently, the pilots were not able to distinguish the open portion of each runway and manoeuvred the aircraft on the closed portion, which, in some cases, resulted in damage to the aircraft.



Aerial photo of the runway markings used for Runway 24R at the Montréal/St-Hubert Airport during the 1st phase of construction

Source: TSB

If an airport operator plans to carry out construction activities at their airport, they must communicate the necessary information to pilots by having a NOTAM issued by NAV CANADA. However, information pertaining to airport construction, which is temporary and may be complex, can be difficult to communicate clearly and effectively in a NOTAM. Over the years, the way these notices are presented and how they are provided to flight crews have not only been called into question several times, but have also been considered to be contributing factors in a number of aviation occurrences.



Aerial view of the runway markings used at Edward G. Pitka Sr. Airport (PAGA), Galena, Alaska

Source: Google Earth, with TSB annotations

The investigations into those occurrences highlighted certain deficiencies that make these notices inadequate and could hinder the communication of the information. In addition to being written entirely in capital letters and consisting primarily of abbreviations and acronyms, these notices are published in a text format only, which limits how clearly a pilot can visualize areas that are closed due to construction. Currently, NOTAMs in Canada cannot include graphics and only include text, the format and style of which can hinder the effective communication of information. Consequently, even though the pilots involved in the occurrences under review had all read the available NOTAMs related to the partial runway closures, their mental models were inaccurate and they were not able to identify which portions were closed.

Consequently, the TSB recommends that

NAV CANADA make available, in a timely manner, graphic depictions of closures and other significant changes related to aerodrome or runway operations to accompany the associated NOTAMs so that the information communicated on these hazards is more easily understood.

TSB RECOMMENDATION A21-01

Any airport operator planning to carry out construction activities at their airport without interrupting operations must also prepare a plan of construction operations (PCO) and have it approved by TCCA. The purpose of the plan is to demonstrate that the airport will comply with established operating standards for the duration of the construction period. The investigation revealed that PCOs were difficult to prepare given the absence of standards, recommended practices, guidelines, and any other type of information on the subject. The absence of standards for the preparation of PCOs is in addition to the absence of general standards on airport construction and to the complexity of regulations regarding runway markings to be used.



Aerial view of the runway markings used at the Iqaluit Airport during construction

Source: Google Earth, with TSB annotations

The evaluation of a PCO by TCCA staff is vital to the safety of operations at an airport during construction. However, TCCA inspectors do not have standards or recommended practices at their disposal to complete the task. Consequently, in the absence of standards, guidelines, and recommended practices, PCOs were approved using informal procedures, without assessing the risk that pilots might not be able to recognize or distinguish the closed portions of the runways, and without including control measures to mitigate this risk.

The implementation of standards, recommended practices, and guidelines pertaining to the safety of operations during airport construction could improve the quality of PCOs, as well as the management of the risks associated with these temporary conditions and the safety of flight operations in these conditions. Consequently, the TSB issued Aviation Safety Advisory A18Q0140-D1-A1 to TCCA to make the organization aware of the absence of such standards, recommended practices, and guidelines pertaining to the safety of operations at airports undergoing construction, and to encourage the implementation of corrective measures as soon as possible.

Although safety measures are an integral part of airport operations and flight operations, they did not prevent the occurrences under review. Yet, these safety measures are part of a regulatory framework that promotes a systemic culture of safety and risk management for both airport operators and TCCA. The introduction of safety management systems (SMS) changed how safety is managed, by establishing a systemic risk management framework that includes a safety oversight component that should allow for proactive and reactive risk management. The 4 airports under review each had an SMS, but these SMSs did not comply with regulatory requirements and were not effective, given that they did not prevent the occurrences from happening in the first place or prevent repeated similar occurrences from happening. These SMSs were not assessed by TCCA when they were put in place, and the airport operators did not benefit from TCCA feedback and follow-up.

TCCA adopted its own internal SMS, the Integrated Management System (IMS), to implement and manage the Transport Canada (TC) Aviation Safety Program. With respect to the occurrences under review, TCCA was required to take action,



including evaluating and approving the PCOs for the planned construction. However, the investigation determined that the TCCA inspectors had not followed IMS processes. For instance, they had not conducted risk assessments.

Safety management and regulatory surveillance are TSB Watchlist 2020 issues. The TSB has repeatedly emphasized the benefits of an SMS that allows companies to manage risk effectively and make operations safer. Yet, implementing an effective SMS is only part of the issue. Proper regulatory surveillance is also needed.

However, TC is not always able to identify ineffective operator processes and take action in a timely manner. For that reason, safety management will remain on the TSB Watchlist until operators in the air transportation sector that do have an SMS demonstrate to TC that it is working—that hazards are being identified and effective risk-mitigation measures are being implemented.

Likewise, regulatory surveillance will remain on the TSB Watchlist until TC demonstrates, through assessments of surveillance activities in the air transportation sector, that the new surveillance procedures are identifying and rectifying non-compliances, and that TC is ensuring that an operator returns to compliance in a timely fashion and is able to manage the safety of its operations.



Aerial photo of Runway 10 at the Baie-Comeau Airport during the rehabilitation work on the south side of the runway in June 2018

Source: Baie-Comeau Airport, with TSB annotations

This investigation has highlighted these deficiencies regarding airport surveillance. Although the occurrences under review took place primarily in Quebec and Nunavut, the investigation determined that these deficiencies all resulted from systemic underlying causes or contributing factors that a national safety program should have identified. Inevitably, it begs the question as to whether the situation is the same in other TCCA regions. In light of this, the Board is concerned that if TCCA does not provide adequate surveillance of airports in Canada, the risk of an accident related to flight operations at airports increases, particularly when the airports are undergoing construction.