



REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A14-01

Unstable approaches

Background

On 20 August 2011, the Boeing 737-210C combi aircraft (registration C-GNWN, serial number 21067), operated by Bradley Air Services Limited under its business name First Air, was being flown as First Air charter flight 6560 from Yellowknife, Northwest Territories, to Resolute Bay, Nunavut. At 1642 Coordinated Universal Time (1142 Central Daylight Time), during the approach to Runway 35T, First Air flight 6560 struck a hill about 1 nautical mile east of the runway. The aircraft was destroyed by impact forces and an ensuing post-crash fire. Eight passengers and all 4 crew members sustained fatal injuries. The remaining 3 passengers sustained serious injuries and were rescued by Canadian military personnel, who were in Resolute Bay as part of a military exercise. The accident occurred during daylight hours. No emergency locator transmitter signal was emitted by the aircraft.

The Board concluded its investigation and released report A11H0002 on 25 March 2014.

TSB Recommendation A14-01 (March 2014)

In this accident, the aircraft arrived high and fast on final approach, was not configured for landing on a timely basis, had not intercepted the localizer and was diverging to the right. This approach was not considered stabilized in accordance with the company's stabilized approach criteria, and the situation required a go-around. Instead, the approach was continued. When the crew initiated a go-around, it was too late to avoid the impact with terrain. Unstable approaches continue to be a high risk to safe flight operations in Canada and worldwide.

Flight Safety Foundation research concluded¹ that 3.5% to 4% of approaches are unstable. Of these, 97% are continued to a landing, with only 3% resulting in a go-around. To put these figures in context, there were, in 2012, 24.4 million flights worldwide in a fleet of civilian, commercial, western-built jet airplanes heavier than 60 000 pounds. This means that between 854 000 and 976 000 of those flights terminated with an unstable approach, and approximately 828 000 to 945 000 continued to a landing. The potential negative consequences of continuing an unstable approach to a

¹ Flight Safety Foundation, "Failure to Mitigate," *AeroSafety World* (February 2013)

landing include controlled flight into terrain (CFIT), runway overruns, landing short of the runway, and tail-strike accidents.

Occurrences in which an unstable approach was a contributing factor demonstrate that the severity can range from no injuries or damage to multiple fatalities and aircraft destruction. In Resolute Bay, the continuation of an unstable approach led to a CFIT accident and the loss of 12 lives. Without improvements in stable approach policy compliance, most unstable approaches will continue to a landing, increasing the risk of CFIT and approach and landing accidents.

In this investigation, the Board examined in detail the defences available to air carriers to mitigate the risks associated with unstable approaches and their consequences. These mainly administrative defences include:

- A company stabilized-approach policy, including no-fault go-around policy;
- Operationalized stable approach criteria and standard operating procedures (SOPs), including crew phraseology;
- Effective crew resource management (CRM), including empowering of first officers to take control in an unsafe situation;
- Use of flight data monitoring (FDM) programs to monitor SOP compliance with stabilized approach criteria;
- Use of line-oriented safety audits (LOSA) or other means, such as proficiency and line checks, to assess CRM practices and identify crew adaptations of SOPs;
- Non-punitive reporting systems (to report occurrences or unsafe practices);
- Use of terrain awareness and warning systems (TAWS).

Current defences against continuing unstable approaches have proven less than adequate. In Canada, while many CAR 705 operators have voluntarily implemented FDM programs, there is no requirement to do so. First Air was not conducting FDM at the time of this accident. Furthermore, FDM programs must specifically look at why unstable approaches are occurring, how crews handle them, whether or not crews comply with company stabilized-approach criteria and procedures, and why crews continue an unstable approach to a landing. Unless further action is taken to reduce the incidence of unstable approaches that continue to a landing, the risk of approach and landing accidents will persist.

Therefore the Board recommends that:

Transport Canada require CARs Subpart 705 operators to monitor and reduce the incidence of unstable approaches that continue to a landing.

TSB Recommendation A14-01

Transport Canada's response to Recommendation A14-01 (June 2014)

Since 2005, Canadian air operators operating under Subpart 705 of the Canadian Aviation Regulations (CARs) must have a safety management system (SMS). Transport Canada has developed a Civil Aviation Safety Alert (CASA) to communicate to each air operator operating under Subpart 705 of the CARs that they should consider, by using

their SMS, the hazards and risks associated with unstable approaches. This CASA will inform the air operators that the Transportation Safety Board of Canada has determined that unstable approaches are a significant hazard and that Transport Canada has determined that this hazard can be mitigated through an air operator's SMS. The CASA refers to SMS components such as safety oversight (reactive and proactive processes) and training and awareness (promotions). Additionally, the CASA will reference the voluntary use of flight data monitoring (FDM) in order to gain a greater understanding of unstable approaches and the causes.

Transport Canada is committed to reviewing the effectiveness of the recommendations contained in the CASA through inspection activities. Transport Canada will determine if an air operator's SMS is capturing all risks including unstable approaches, and if so, if this risk is being analyzed and addressed properly. This may be determined by performing a proactive assessment of unstable approach hazards (including situations where this is more likely to occur), a review of the SMS database to verify the rate of occurrence, a review of the SMS database to ensure that this is being reported and finally, follow-up with the pilot community to verify that it is being reported and monitored through the SMS in order to verify a decrease in incidents and increased awareness of the hazard and attendant risks.

Canadian air operators are currently subject to a structured surveillance process described in Staff Instruction SUR-001. Transport Canada plans to direct specific surveillance activities, beginning approximately one year after the publication of the CASA, to air operators affected by the CASA. Transport Canada will begin looking for evidence of effective mitigations of this hazard through the recommended SMS processes. Alternatively, air operators that indicate that they do not have a problem with unstable approaches in their operation will be asked to demonstrate how they have reached this conclusion. Air operators with an established FDM program will have a definite advantage in gathering and analyzing this data.

Transport Canada will also conduct internal reviews to verify the effectiveness of voluntary recommendations such as those contained in the CASA.

Finally, as the safety issue may not be limited to Subpart 705 operators, the CASA will also serve to raise the concern with Subpart 703 and 704 operators and encourage them to address it voluntarily.

TSB assessment of Transport Canada's response to Recommendation A14-01 (July 2014)

In its response, Transport Canada indicated that a Civil Aviation Safety Alert (CASA) had been developed to encourage Subpart 705 operators to use their safety management system (SMS) to identify the incidence of unstable approaches and to develop mitigation measures for the risk they pose.

On 27 June 2014, Transport Canada issued CASA 2014-03. The content of the CASA is reflective of the information proposed in the Transport Canada response letter dated

19 June 2014. The CASA also encourages the voluntary participation of Subpart 703 and 704 operators to mitigate the risk posed by unstable approaches. Additionally, the CASA emphasizes the value of voluntary flight data monitoring (FDM) programs to better understand what factors are influencing the occurrence of unstable approaches.

One year after the publication of the CASA, Transport Canada intends to use the existing surveillance system to review operator effectiveness at identifying the incidence of unstable approaches and the implementation of mitigation measures. Air operators that indicate that they do not have a problem with unstable approaches in their operation will be asked to demonstrate how they have reached this conclusion. Additionally, Transport Canada plans to follow up with the pilot community to verify that unstable approaches are being reported and monitored through SMS.

Transport Canada's response relies on the existing defence of SMS to mitigate the risk, and indicates that FDM will remain a voluntary program. SMS has been in place for several years for Subpart 705 operators, yet the incidence of unstable approaches has not been effectively addressed. Although the proposed use of SMS to specifically identify the incidence of unstable approaches and to implement mitigation strategies is a positive step, it will be some time before the effectiveness of this action can be validated. Additionally, without the requirement for an FDM program, operators may not have the data to assess the risk posed by unstable approaches in their operation.

Therefore, the response to Recommendation A14-01 is assessed as **Satisfactory in Part**.

Transport Canada's response to Recommendation A14-01 (January 2015)

Transport Canada agrees with the intent of the recommendation. CASA No. 2014-03 was published on 27 June 2014 as a direct response to TSB Recommendation A14-01 stating that Transport Canada advises operators that deficiency has been identified by the TSB and that CARs Subpart 705 operators should monitor and reduce the incidence of unstable approaches that continue to a landing.

Beginning in 2015/16, Transport Canada will, within the context of normal surveillance activities, assess the effectiveness of the various measures undertaken by airlines in reducing the number of unstable approaches that continue to a landing, including how airlines track, analyze and implement corrective measures.

Through the actions described above, Transport Canada believes that it has fully implemented the intent of recommendation A14-01, and considers this recommendation closed. No further updates will be provided.

TSB reassessment of Transport Canada's response to Recommendation A14-01 (March 2015)

The publication of CASA 2014-03 was a positive first step towards mitigating the risk posed by unstable approaches. Transport Canada has stated that the effectiveness of the various measures undertaken by airlines in reducing the number of unstable approaches that continue to a landing will be assessed during the course of normal

surveillance. Until such time as the results of this surveillance are analysed, it is difficult to determine what measures airlines have implemented, and whether they are effective in addressing the underlying safety deficiency. It will be some time before the impact of CASA 2014-03 can be validated. Additionally, without the requirement for a flight data monitoring (FDM) program, operators may not have the data to assess the risk posed by unstable approaches in their operation.

Therefore, the response to Recommendation A14-01 is assessed as **Satisfactory in Part**.

Transport Canada's response to Recommendation A14-01 (November 2015)

1. The latest issue of the Aviation Safety Letter (ASL), providing safety awareness information related to the theme of unstabilized approaches, has been published.

<http://www.tc.gc.ca/eng/civilaviation/publications/tp185-menu-5395.htm>

<http://www.tc.gc.ca/fra/aviationcivile/publications/tp185-menu-5395.htm>

2. An Internal Process Bulletin (IPB) for targeted inspections to review 705 operator implementation of Civil Aviation Safety Alert 2014-03 has been published: IBP 2016-01 - Assessing the use of SMS to Address Hazards and Risks Associated with Unstable Approaches for CAR 705 Operators.

3. Safety Promotion presentation on unstabilized approaches is also being developed to raise industry awareness. The inspection campaign is to be completed by the end of summer 2016.

TSB reassessment of Transport Canada's response to Recommendation A14-01 (March 2016)

Transport Canada's latest update has identified a follow-up initiative designed to measure the effectiveness of its Civil Aviation Safety Alert (CASA) 2014-03. Specifically, the purpose of its Internal Process Bulletin 2016-01 is to examine an operator's assessment of unstable approaches using its SMS and where applicable, review established mitigations and the extent, type, and frequency of interventions related to unstable approaches.

Transport Canada plans to complete these surveillance activities for all Subpart 705 operators, by April 1st, 2016. Subsequent analysis of the Internal Process Bulletin 2016-01 findings will allow Transport Canada to validate the impact of its CASA 2014-03.

TSB looks forward to the opportunity to review Transport Canada's analysis in order to better understand what measures airlines have implemented, and assess whether they are effective in addressing the underlying safety deficiency associated with Recommendation A14-01.

Additionally, Transport Canada's ongoing Safety Promotion initiatives, related to unstable approaches, will help sustain industry awareness.

Therefore, the response to Recommendation A14-01 is assessed as **Satisfactory in Part**.

Transport Canada's response to Recommendation A14-01 (January 2017)

TC agrees with this recommendation and has leveraged operators' SMS to achieve the desired results.

TCCA surveyed operators on their initiatives and has collected data based on the Internal Bulletin (IPB) 2016-01. TCCA is analyzing the data to evaluate the effectiveness of the approach. The results of the analysis will be used to determine whether further more prescriptive TCCA action is needed to reduce the number of unstabilized approaches that continue to landing.

TSB reassessment of Transport Canada's response to Recommendation A14-01 (March 2017)

TC's latest update states that while its surveillance activity, as called for in its Internal Process Bulletin 2016-01, is completed, its analysis of the resulting data continues.

The issue of unstable approaches is included on the 2016 TSB Watchlist of key safety issues. Consequently, the Board has determined that there needs to be a concerted effort from both the regulator and industry stakeholders to address the underlying safety deficiency associated with Recommendation A14-01.

The Board looks forward to the opportunity to review TC's analysis to better understand what measures airlines have implemented, and assess whether these measures have been effective in addressing the underlying safety deficiency associated with Recommendation A14-01.

Therefore, the response to Recommendation A14-01 is assessed as **Satisfactory in Part**.

Transport Canada's response to Recommendation A14-01 (March 2018)

TC agrees with the recommendation.

TC first issued Civil Aviation Safety Alert (CASA) 2014-03 to recommend Canadian air operators operating under subpart 705 of the CARs that they use - on a voluntary basis - their existing Safety Management System (SMS) to address and mitigate hazards and risks associated with unstable approaches.

TC surveyed operators on their initiatives and collected data based on the Internal Process Bulletin (IPB) 2016-01. TC analyzed the data to evaluate the effectiveness of the approach. The results of the analysis were used to determine whether further more prescriptive action is required by TC in order to reduce the number of unstabilized approaches that continue to landing.

TC completed the evaluation of effectiveness for this approach. In May 2017, TC sent the Board the results of the analysis in an interim report. This interim report highlights some of the work done regarding Stabilized Constant Descent Angle Non-precision Approach.

A recent, unrelated review of missed approaches /overshoots conducted by a major air operator showed a significant year by year increase in overshoots due to unstabilized approaches.

In January 2018, TC organized a safety forum with participation by most of the airlines (CAR 705) participating. One of the panel discussions was on the topic of unstabilized approaches. Several operators described their efforts to reduce the number of unstabilized approaches that continue to a landing. These include changes in procedures, changes in terminology “continue” is substituted for “landing” call out at minimum descent altitude. The forum agreed that:

- it would support a pilot project by Air Canada and Porter Airlines where they agreed to provide data to support the project;
- that TC propose to TSB that Watchlist wording be changed to include unstable approach, landing, and go around decision making; and
- that TC Standards communicate with panel participants to engage expertise in developing guidance material; and

TC will update the TSB on the results of collaborative work with the major CAR 705 operators to reduce the number of unstabilized approaches that continue to landing.

TSB reassessment of Transport Canada’s response to Recommendation A14-01 (March 2019)

In January 2018, Transport Canada (TC) led the Canadian Air Operators Safety Forum, in which the TSB participated. Presentations from some *Canadian Aviation Regulations* (CARs) 705 operators described the overall unstable approach rate observed by their flight data monitoring (FDM) programs. One of the operators described its unstable approach rate for its turbojet aircraft decreasing from 10.18% in the fall of 2014 to 2.47% by the end of 2017. Another CARs 705 operator described its unstable approach rate as decreasing from 1.45% in August 2014 to 0.5% by December 2017.

Both of these air carriers described proactive and reactive efforts in reducing their rates, including changes to standard operating procedures, line-oriented safety audit (LOSA) programs, simulator programs, promotional material for flight crew, and, for one carrier, the installation of heads-up guidance systems.

The TC interim report on the data collected from internal process bulletin (IPB) 2016-01 was shared with the TSB in May 2017. The report identified that 81.4% of CARs 705 operators participated in the review and of those, approximately one third are using an FDM or LOSA program to evaluate unstable approaches. The report identified that FDM

and/or LOSA programs were the most effective in evaluating the unstable approach issues and these programs resided with most of the national scheduled airlines. The report concluded that progress has been made, however, the initiative would benefit from another on-site follow-up.

The data from some CARs 705 operators and the results of the IPB 2016-01 show that the rate of unstable approaches that continue to a landing has decreased significantly since 2014. TC's evaluation of CARs 705 operators through the activities in IPB 2016-01 showed encouraging results. As such, the Board believes that the residual risk associated with this recommendation is low.

Therefore, the response to Recommendation A14-01 is assessed as **Fully Satisfactory**.

This deficiency file is **Closed**.