



## REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A07-03

### Pilot decision making

#### Background

The Air France Airbus A340-313 aircraft (registration F-GLZQ, serial number 0289) departed Paris, France, at 1153 Coordinated Universal Time (UTC) as Air France Flight 358 on a scheduled flight to Toronto, Ontario, with 297 passengers and 12 crew members on board. Before departure, the flight crew members obtained their arrival weather forecast, which included the possibility of thunderstorms. On final approach, they were advised that the crew of an aircraft landing ahead of them had reported poor braking action, and Air France Flight 358's aircraft weather radar was displaying heavy precipitation encroaching on the runway from the northwest. At about 200 feet above the runway threshold, while on the instrument landing system approach to Runway 24L with autopilot and autothrust disconnected, the aircraft deviated above the glideslope and the groundspeed began to increase. The aircraft crossed the runway threshold about 40 feet above the glideslope.

During the flare, the aircraft travelled through an area of heavy rain, and visual contact with the runway environment was significantly reduced. The crew elected to continue with the landing. The aircraft touched down about 3800 feet down the 9000-foot runway; it was not able to stop on the runway and departed the far end at a groundspeed of about 80 knots (SSE). The aircraft stopped in a ravine at 2002 UTC (1602 eastern daylight time) and caught fire. All passengers and crew members were able to evacuate the aircraft before the fire reached the escape routes. A total of 2 crew members and 10 passengers were seriously injured during the crash and the ensuing evacuation.

The Board concluded its investigation and released report A05H0002 on 12 December 2007.

#### TSB Recommendation A07-03 (December 2007)

Based on cues perceived or understood, cockpit decisions can be described as having two components: situation assessment and selection of a course of action. Cues, or information about the situation, can vary between clear and ambiguous. Clear cues allow for an easy decision-making process. Ambiguous cues are much more difficult to capture, understand, and assimilate. Therefore, the more ambiguous or complex a cue is, the greater the likelihood of a decision that is less than ideal.

Much has been written on the issue of pilot decision-making processes regarding landing. Nevertheless, this occurrence and others give a clear indication that there are still risks associated with this task. The Board believes that the ability to capture and interpret cues that are essential in the decision-to-land process is inadequate, especially when the cues are ambiguous or not immediately compelling. Consequently, pilots will continue to land in

deteriorating weather once the landing decision has been made, in spite of cues that indicate that a go-around or balked approach should be executed.

Therefore, the Board recommended that

The Department of Transport mandate training for all pilots involved in Canadian air transport operations to better enable them to make landing decisions in deteriorating weather.

#### **TSB Recommendation A07-03**

#### **Transport Canada's response to Recommendation A07-03 (February 2008)**

In its response, Transport Canada indicates that, although the criticality of proper decision-making with respect to landing decisions in deteriorating weather cannot be discounted, there are other elements for which proper decision-making is equally critical. Transport Canada states it will include a training requirement for pilots operating under Subparts 703, 704 and 705 of the Canadian Aviation Regulations (CARs) to better enable them to make operational decisions when flying into or in the vicinity of deteriorating or challenging weather.

#### **TSB assessment of the response to Recommendation A07-03 (July 2008)**

This response indicates that Transport Canada (TC) believes that a sound pilot decision-making process is critical to the safety of flight, not only when in the vicinity of thunderstorms, but also in other phases of flight. The Board does not disagree with this statement. Transport Canada states that it will include a decision-making training requirement for pilots operating under Subparts 703, 704 and 705 of the Canadian Aviation Regulations (CARs). This action should assist pilots in recognizing the dangers of conducting approaches in rapidly deteriorating weather conditions such as observed in the vicinity of thunderstorms. However, until such proposed action is actually implemented, the risk will remain unabated.

Therefore, TC's response to Recommendation A07-03 is assessed as **Satisfactory Intent**.

#### **Transport Canada's response to Recommendation A07-03 (February 2010)**

TC's latest response states that a draft NPA has been started for operations conducted under Subpart 705 of the CARs and that similar NPAs will be prepared for Subparts 704 and 703.

#### **TSB reassessment of the response to Recommendation A07-03 (July 2010)**

The issue of landing accidents and runway overruns is on the Board's Watchlist. TC updates its previously stated intention to include a decision-making training requirement for pilots operating under Subparts 703, 704 and 705 of the CARs. To date only one of the three NPAs has been drafted. This planned action, when fully implemented, will substantially reduce or eliminate the safety deficiency.

Therefore, the assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (January 2011)**

TC advises that this project had been placed on hold pending the completion of other higher priority projects. Work associated with this recommendation is now planned to resume in June 2011.

### **TSB reassessment of the response to Recommendation A07-03 (March 2011)**

The Board is concerned that TC has placed its action related to pilot decision-making training on hold. The issue of landing accidents and overruns is on the Board's Watchlist and a lack of activity by TC on this issue will not be helpful in mitigating the risks associated with pilot decision-making in deteriorating weather. TC has indicated that its project, intended to address pilot decision-making, will be resumed.

Therefore, the assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (May and September 2011)**

#### **May 2011 input**

Since this issue is largely related to CRM, it will be addressed as part of Recommendation A09-02. Although Recommendation A09-02 only mandates commercial air operators operating under Subparts 703 and 704 to provide contemporary crew resource management (CRM) training, it is our intent to provide the same for commercial air operators operating under Subpart 705 as well. Training for decision making related to critical elements, such as "training for pilots to make landing decisions to deteriorating weather" seems to be a good fit to incorporate under Recommendation A09-02.

ToRs for the creation of a Working Group on CRM will be presented at the September 2011 CARAC Technical Committee meeting.

#### **September 2011**

On September 19th, the Civil Aviation Regulatory Committee directed that a Focus group be established as soon as possible in the fall to address this issue.

A cross reference is to be made on recommendations residing in CRM (A09-02, A07-01, A07-05, A00-06).

### **TSB reassessment of the response to Recommendation A07-03 (March 2012)**

The issue of landing accidents and overruns remains on the Board's Watchlist. The Board is concerned with the pace of TC's activity related to the deficiency identified in Recommendation A07-03. However, the planned action, initiated in 2008 will, if and when fully implemented, substantially reduce or eliminate the safety deficiency.

Therefore, the assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (December 2012)**

TSB Recommendation A07-03 will be addressed by the development of a contemporary CRM training standard, as documented in the CRM focus group report.

It was determined that a contemporary CRM training standard be developed to include the threat and error management (TEM) model to enhance flight crews' ability to assess conditions and make appropriate decisions in critical situations such as convective weather. TC will draft regulations and standards as appropriate, for inclusion in Subparts 702, 703, 704 and 705 of the CARs. Associated recommendations are A00-06 and A09-02.

### **TSB reassessment of the response to Recommendation A07-03 (March 2013)**

The issue of landing accidents and overruns remains on the TSB Watchlist. The Board continues to be concerned with the extremely slow pace of TC's activity related to the deficiency identified in Recommendation A07-03. However, the planned action, initiated in 2008 will, if and when fully implemented, substantially reduce or eliminate the safety deficiency.

The assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (November 2013)**

This item remains a regulatory priority and work to amend the Standard has begun. Recommendation A07-03 will be addressed in conjunction with the work being done on crew resource management (CRM) as described in Transport Canada's response to Recommendation A09-02. (TSB comment - the response to A09-02 is provided below)

Based on the findings and recommendations of the crew resource management (CRM) focus group and the 2012 risk assessment, Transport Canada is developing a project plan, with the following expected to be accomplished over the next year:

- Develop project plan and timelines for 702, 703, 704 and 705 CRM, including information to help determine whether a single rule set or keeping distinct requirements in individual parts is best;
- Consolidate existing information into an Advisory Circular; and
- Publish Advisory Circular following consultation with regional staff.

Advisory Circular 700-005 "Approach and Landing during convective weather conditions" provides material for air operators to include in the required training. Decision making skills (including enhancements associated with updating CRM training requirements) have been enhanced through use of this AC.

### **TSB reassessment of the response to Recommendation A07-03 (April 2014)**

Since the last time this recommendation was assessed, the TSB has released the final report into the crash of FAB6560 in Resolute Bay, Nunavut (A11H0002). That investigation identified ineffective crew interactions as a significant contributing factor to the accident. The crew's CRM training was abbreviated and based on the current, outdated TC standard. The Board issued a safety concern to the effect that without a comprehensive and integrated approach to CRM by TC and aviation operators, flight crews may not routinely practice effective CRM.

This recommendation was first issued in 2007. The project plan has been under development since December 2012. TC progress during the past 12 months in implementing TSB Recommendation A07-03 and proposed actions are preparatory in nature, and changes to regulations and standards are unlikely to occur in a timely manner. Given the number of

accidents involving ineffective PDM and CRM (including A09A0016), the Board is concerned about the slow pace of action to address this recommendation.

If implemented, the proposed course of action will eventually substantially reduce or eliminate the safety deficiency identified in Board Recommendation 07-03. In the interim, this safety deficiency will continue to exist.

The response is considered **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (January 2015)**

Transport Canada agrees with the intent of the recommendation.

Work continues on the development of Standards and Guidance material for crew resource management (CRM) and updated Pilot Decision Making (PDM) to be incorporated in the CRM modules. Public consultation on proposed amendments to the standards is underway, and the standards are expected to come into effect in late 2015.

### **TSB reassessment of the response to Recommendation A07-03 (March 2015)**

The Board is concerned about the slow pace of action by TC to address the deficiency identified in Recommendation A07-03. Until all regulatory changes proposed by TC are enacted, the deficiency identified in Recommendation A07-03 will continue to exist. However, the proposed regulatory changes, if fully implemented, will substantially reduce or eliminate the risks associated with the safety deficiency identified in Recommendation A07-03.

Therefore, the assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (November 2015)**

(This response includes A95-11, A95-12, A00-06, and A09-02.)

Transport Canada agrees with the intent of the recommendation. Work continues on the development of Standards for crew resource management (CRM). A Notice of Proposed Amendment on CRM Standards was developed and will be published in 2016.

### **TSB reassessment of the response to Recommendation A07-03 (March 2016)**

Transport Canada (TC) continues to make progress toward implementation of this recommendation. Until all regulatory changes proposed by TC are enacted, the deficiency identified in Recommendation A07-03 continues to exist. However, the proposed regulatory changes, if fully implemented, should reduce the risks associated with the safety deficiency identified in Recommendation A07-03.

Therefore, the assessment remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (January 2017)**

TCCA agrees with the intent of this recommendation. TCCA proposes to go beyond the scope of the recommendation and require crew resource management (CRM) training for CAR 702 (Aerial work) operations as well. A revised Notice of Proposed Amendment for CRM was

posted to the CARAC Activity Reporting System under Activity #2014-021 and emailed to all CARAC stakeholders on May 9, 2016.

The new CRM Standard will be published in May/June 2017 together, with guidance material for industry, in the form of an Advisory Circular being published at the same time. Industry stakeholders will be briefed before publication.

The new standard will come into effect 30 days after publication.

### **TSB reassessment of Transport Canada's response to Recommendation A07-03 (March 2017)**

TC's latest response suggests that its revised *Notice of Proposed Amendment* (NPA 2014-021) addresses the deficiency identified in Recommendation A07-03. The NPA states that TC's current framework for CRM training does not reflect many contemporary CRM training concepts. The NPA's objective is to integrate such concepts into commercial aviation crew training programs. Additionally, the proposed amendments will see a broader application of these updated CRM training requirements to include *Commercial Air Service Standards* (CASS) subparts 722, 723, 724, and 725.

Once implemented, the proposed enhancements to CRM training requirements, for commercial pilots, should instill sound decision-making skills to assist in recognizing the risks associated with conducting approaches in deteriorating weather conditions. However, progress toward mitigation of the risks associated with this recommendation has been slow. Such extended delays have prompted the TSB to add an item to its key safety issues Watchlist that calls for both TC and the Government of Canada to move towards an improved and accelerated process for taking action on TSB recommendations.

The Board is encouraged that amendments to the CASS, and guidance material for industry, are planned to be published in May/June 2017 and come into effect 30 days following their publication.

The Board is pleased that the intent of NPA 2014-021 is to update CRM training standards across all CASS, including Aerial Work operations, which were not included in the original recommendation. Consequently, if fully implemented, the proposed changes should serve to mitigate the risks identified in Recommendation A07-03.

However, until the new CRM standards are fully implemented, the risks associated with the safety deficiency identified in Recommendation A07-03 will continue to exist.

Therefore, the response to Recommendation A07-03 is assessed as **Satisfactory Intent**.

### **Transport Canada's response to Recommendation A07-03 (December 2017)**

TC agrees with the intent of the recommendation.

The new standards for the crew resource management (CRM) have been published on the CARAC Activity Reporting website on 28 July 2017 and can be found in the following locations: <http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/actr.aspx?id=15&aType=1&lang=eng> and <http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/actr.aspx?id=15&aType=1&lang=fra> (last link on the page entitled 'Standard - Crew Resource Management').

Industry stakeholders were briefed prior the publication and the new standards will come into effect on 31 January 2019.

The amendments will be incorporated into the actual standards on the CARs website as part of the December 2018 CARs amendment (30 days before the amendments become effective).

In the meantime, there will be a new link added to the CARs Index page for 'Approved Standards Not Yet in Effect' when the next CARs amendment is released. The new link will take you to a page providing the text of the amended/new provisions that are not yet in effect. The following link leads to the CARs Index page: <http://www.tc.gc.ca/eng/acts-regulations/regulations-sor96-433.htm>.

Transport Canada has no further activities planned for this recommendation.

### **TSB reassessment of Transport Canada's response to Recommendation A07-03 (February 2018)**

TC's response indicates that the new crew resource management (CRM) standards will come into effect on 31 January 2019, under subparts 722, 723, 724 and 725 of the *Commercial Air Service Standards* (CASS), and apply to aerial work, air taxi, commuter and airline operators. Under these new standards, air operators are required to provide contemporary CRM training to flight crews, flight attendants, dispatchers/flight followers, ground crew and maintenance personnel, on an initial and annual basis.

These new standards will integrate contemporary CRM by applying threat and error management (TEM) concepts for commercial air operators. In order to validate CRM skills, the new standards also require an assessment for non-technical skills, such as cooperation; leadership and managerial skills; situational awareness; and decision making. The training will provide knowledge and skills which can assist flight crews in recognizing risks, such as those associated with conducting approaches in deteriorating weather conditions.

The new CRM standards have been published on the Canadian Aviation Regulation Advisory Council (CARAC) Activity Reporting website. Additionally, TC published Advisory Circular 700-042, which provides guidance to the industry for compliance with the new standards, as well as an article in its Aviation Safety Letter, Issue 4/2017, regarding the need for commercial air operators to prepare for the new CRM standards.

The Board believes that the actions taken by TC will substantially reduce the risk associated with the safety deficiency identified in Recommendation A07-03, once the new CRM standards come into effect.

Therefore, the Board considers the response to Recommendation A07-03 to be **Fully Satisfactory**.

### **Next TSB action**

This deficiency file is **Closed**.