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

REASSESSMENT OF RESPONSES TO AVIATION SAFETY RECOMMENDATION A07-02

APPROACHES INTO CONVECTIVE WEATHER

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 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. 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.

Board Recommendation A07-02 (12 December 2007)

Aircraft penetration of thunderstorms on approach occurs throughout the industry and has contributed to a number of accidents worldwide. Many operators, including Air France, do not provide their crews with specific criteria, such as distance-based guidelines, for the avoidance of convective weather during final approach and landing. Additionally, Environment Canada advises that thunderstorms can present significant risks to the safe operation of an aircraft.

Therefore, there is a need for clear standards for the avoidance of convective weather during approach and landing. This will reduce the ambiguity involved in decision making in the face of a rapidly changing weather phenomenon, and the likelihood that factors such as operational pressures, stress, or fatigue will adversely affect a crew's decision to conduct an approach. Therefore, the Board recommended that:

> France's Direction Générale de l'Aviation Civile and other civil aviation authorities establish clear standards limiting approaches and landings in convective weather.
>
> A07-02

Direction Générale de l'Aviation Civile's Response to A07-02

In its response, the Direction Générale de l'Aviation Civile (DGAC) indicates that, although it would be preferable to have clear standards limiting approaches in convective weather, defining and implementing those standards would require long-range work internationally because the decision criteria should be standardized throughout the countries.

Instead of working on defining standards limiting approaches in convective weather, the DGAC is examining short-term and medium-term alternative measures to better assist crew members in making decisions. In fact, the analysis of many occurrences confirms that this factor is quite sensitive in convective weather, but also for other operating hazards.

Therefore, the DGAC is putting in place a work structure to better assist crew members and to give them the most adapted and accurate timely information. That structure includes the organization that can transmit the information (air traffic control [ATC] or airline operations) as well as the support used (speech or data link). The problematic associated with a more active decision-making assistance (suggestion to divert and even temporary closure of airport) will also be discussed.

For forecast severe convective weather specifically, the DGAC also intends to start an experiment at Paris-Foissy-Charles-de-Gaulle International Airport (LFPG) in order to implement a crisis centre. Such a centre (already active for snow forecast) would include representatives from the meteorological service, the ATC service, the airport manager and the airlines. It could establish partial or full limitations for the flow of departures and arrivals on the basis of the changing situation.

Board Assessment of the Response to A07-02

In its response, the DGAC thinks that the specific wording of this recommendation would require long-range work if we want to establish standard decision criteria throughout the countries. The DGAC is therefore proposing a series of alternative measures to better assist crews in decision making, following the example of Transport Canada's response.

Specifically, it is putting in place a work structure to better assist crew members and to give them the most adapted and accurate timely information. Particularly, in the case of forecast severe convective weather, the DGAC also intends to start an experiment in order to implement a crisis centre, which would include representatives from the meteorological service, the ATC service, the airport manager and the airlines. The crisis centre could also establish partial or full limitations for the flow of departures and arrivals on the basis of the changing situation.

This response, even though not specifically in the context of the recommendation, is positive proof that the DGAC is fully aware that more needs to be done if we want to decrease or eliminate this type of accident. The DGAC thinks that a more thorough training of crews and support units would be more effective in the short term than would be the long-range work of obtaining universal approval of clear standards limiting approaches in convective weather. The response is therefore more in line with Recommendation A07-04.

Consequently, the Board thinks that the action taken by the DGAC will reduce the deficiencies raised in Recommendation A07-02. Therefore, DGAC's response is assessed as **Satisfactory in Part**.

Next TSB Action

TSB staff will continue to monitor accidents in which the causes and safety deficiencies were raised in this recommendation in order to determine if the action taken to date and the proposed action by the DGAC will have a positive impact on the reduction of this type of accident in the short and long term.

Direction Générale de l'Aviation Civile's Response to A07-02 (28 October 2010)

DGAC advises that the definition and establishment of clear standards limiting approaches into convective weather would require a long-term activity at the international level because the decision criteria should be uniform throughout all countries.

Rather than working to define standards limiting approaches for convective weather, the DGAC is considering alternative actions in the short and medium term with the aim to better assist the crew in decision-making. The analysis of many events confirms the high sensitivity of convective weather but also for other operating contingencies.

Thus, the DGAC established a working group on "*Approaches and Landings in Adverse Weather Conditions*." The group, composed of internal experts and aircraft operators, concluded its work and issued a report in mid-2009. Based on the conclusions of the working group, a best practice guide entitled "*Approaches and Landings in Adverse Weather Conditions* " is to be published for distribution to operators.

The DGAC held a symposium in November 2010 for experts of airlines, airports, and government. The central theme of that symposium was guidance to crews when encountering deteriorating weather.

Board Reassessment of the Response to A07-02 (09 March 2011)

The Board is encouraged that DGAC has taken steps, using its working group, to reduce the risks for flights where crews are faced with landing in convective weather. The DGAC has indicated that clear standards limiting approaches into convective weather would involve international coordination and that this is a long-term activity. The Board believes that the action taken thus far by the DGAC will reduce the deficiencies raised in Recommendation A07-02.

Therefore, DGAC's response is assessed as **Satisfactory in Part**.

Next TSB Action (09 March 2011)

The TSB staff will liaise with the DGAC regarding the progress of their working group activity and the international coordination for establishing international standards regarding approaches in convective weather.

Direction Générale de l'Aviation Civile's Response to A07-02 (08 November 2011)

The DGAC provided links to its website pages describing the work completed in response to Recommendation A07-02. It also indicated that it would not be taking any further action regarding Recommendation A07-02.

''La DGAC a bien reçu la lettre du 21 octobre relative aux recommandations de l'accident de l'A340 à Toronto.
Voici le lien qui donne l'état d'avancement de ce dossier sur le site internet de la DGAC
http://www.developpement-durable.gouv.fr/IMG/pdf/e2007_006.pdf
Vous pourrez constater sur cette page qu'elles ont été closes (pour la DGAC) suite au symposium DSAC de 2010
http://www.developpement-durable.gouv.fr/25-novembre-2010-Conditions.html ''

Board Reassessment of the Response to A07-02 (07 March 2012)

The Board is pleased to see that a best practice guide entitled "*Approaches and Landings in Adverse Weather Conditions* " was published for distribution to operators and is available on its website. This guide is based on the conclusions of its working group and aims to better assist the crew in decision-making. It will most likely assist pilots in the short and medium term.

However, the DGAC indicated that it would not be taking any further action regarding Recommendation A07-02 and that it considered this case file closed.

In its initial response to recommendation A07-02, the DGAC had indicated that, although it would be preferable to have clear standards limiting approaches in convective weather, defining and implementing those standards would require long-range work internationally because the decision criteria should be standardized throughout the countries.

While the Board is pleased with the work already accomplished, it is disappointed that the DGAC will not be initiating long term action in line with what it has already stated it believes would be the preferable condition to establish clear standards limiting approaches and landings in convective weather, as called for in Recommendation A07-02.

The response is considered **Satisfactory in Part**.

Next TSB Action (07 March 2012)

The DGAC indicated that they would not be taking any further action regarding Recommendation A07-02 and that they considered this case file closed. Therefore, continued reassessments will not likely yield further results.

The deficiency file is assigned a **Dormant** status.