



REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A00-17

Ineffective methodology for designating fire zones in aircraft

Background

On 02 September 1998, Swissair Flight 111, a McDonnell Douglas MD-11 aircraft, departed John F. Kennedy Airport in New York, New York, en route to Geneva, Switzerland. Approximately one hour after take-off, the crew diverted the flight to Halifax, Nova Scotia, because of smoke in the cockpit. While the aircraft was manoeuvring in preparation for landing in Halifax, it struck the water near Peggy's Cove, Nova Scotia, fatally injuring all 229 occupants on board. The investigation revealed that the flight crew had lost control of the aircraft as a result of a fire in the aircraft's ceiling area, forward and aft of the cockpit bulkhead.

On 04 December 2000, the Board released interim safety recommendations as part of its investigation (A98H0003) into this occurrence.

TSB Recommendation A00-17 (04 December 2000)

The Board believes that the risk to the travelling public can be reduced by re-examining fire zone designations in order to determine which additional areas of the aircraft ought to be provided with enhanced smoke/fire detection and suppression systems.

Therefore, the Board recommended that

appropriate regulatory authorities, together with the aviation community, review the methodology for establishing designated fire zones within the pressurized portion of the aircraft, with a view to providing improved detection and suppression capability.

TSB Recommendation A00-17

Responses to Recommendation A00-17 (Transport Canada - 06 March 2001 and Federal Aviation Administration - 18 January 2001)

On 19 December 2000, Transport Canada (TC) sent a letter to the United States Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA). The letter supported the intent of the recommendations, acknowledged that none of the issues can be addressed in isolation, and invited the major civil aviation regulatory authorities to harmonize a strategy for their resolution.

In this letter, TC also proposed to hold a meeting in March 2001 to discuss the recommendations, to identify existing initiatives and groups that may already address some aspects covered by the recommendations, and to establish a team to develop an appropriate

action strategy. The FAA responded positively on 19 January 2001 and a positive response is anticipated from the JAA.

TC will keep the TSB apprised of the outcome of the meeting and of its progress towards achieving the goals of these recommendations.

The FAA responded that it has added TSB's recommendations to the FAA's Safety Recommendation Program to ensure that they are assigned to the appropriate program offices for evaluation and action as necessary. The FAA also indicates that it has agreed to meet with TC over this matter and that the Office of Aircraft Certification, specifically the Manager of the Transport Airplane Directorate, has been assigned to lead the FAA team in this regard.

TSB assessment of Transport Canada's response to A00-17 (March 2001)

It is apparent that both TC and the FAA agree with the thrust of the deficiencies and are committed, at least in the short term, to examine these issues and map out a course of action. Collectively, these responses are adequate and constitute a logical "first step." Although the declared initiatives will not yield any immediate substantive change, the planned action, when fully implemented, will substantially reduce or eliminate the safety deficiency.

Therefore, the responses are considered to be **Satisfactory Intent**.

Transport Canada's response to A00-17 (December 2005)

In its update of active recommendations dated 14 December 2005, TC indicated that an update to A00-17 was not available due to scheduling conflicts for some Swissair Recommendation team members. Furthermore, TC indicated that an update will follow as soon as team members can meet and draft updates.

TSB reassessment of Transport Canada's response to A00-17 (July 2006)

In its response of 06 March 2001, TC stated that it supported Recommendation A00-17 and intended to coordinate the introduction of harmonized regulations with the FAA. As of June 2006, neither the FAA nor TC has provided an update as to the progress of various initiatives (for example, refine flammability test requirements for materials in inaccessible areas, determine the feasibility of fire detection and suppression systems in inaccessible areas, etc.) intended to mitigate the risks associated with this recommendation. In its 14 December 2005 letter to the TSB, TC did not provide an update with respect to the residual risks associated with Recommendation A00-17.

It is the Board's understanding that TC remains committed to its original action plan, which will, if fully implemented, reduce the safety deficiency described in Recommendation A00-17.

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

Transport Canada's response to A00-17 (February 2007)

TC's response refers to the publication of a Policy Letter on Practical Training - Emergency Procedure Training for Pilots (PL 153) on December 12, 2005. It states that with the publication of PL 153, TC's Commercial and Business Aviation has addressed all issues related to Recommendation A00-17. The response continues with a summary of the activities of TC, FAA, CAA and other regulatory authorities in the International Aircraft Systems Fire Protection Working Group.

There is no mention in the response of the core of Recommendation A00-17 which is to review the methodology for establishing designated fire zones within the pressurized portion of the aircraft, with a view to providing improved detection and suppression capability.

TSB reassessment of Transport Canada's response to A00-17 (July 2007)

TC's response has not provided an update to its previously stated intentions with respect to dealing with the deficiency identified in Recommendation A00-17. Furthermore, TC's understanding of the deficiency described in Recommendation A00-17 may be incorrect as the topics covered in its response seem more appropriate to dealing with the deficiency identified in Recommendation A00-16 rather than Recommendation A00-17.

TC's response does not address the need to review the methodology for establishing designated fire zones within the pressurized portion of the aircraft, with a view to providing improved detection and suppression capability. The Board is concerned that no action has been taken or proposed that will reduce or eliminate the deficiency.

As the Board believes that TC remains committed to its original action plan, which will, if fully implemented, reduce the safety deficiency described in Recommendation A00-17 the assessment remains as **Satisfactory Intent**.

Transport Canada's response to A00-17 (March 2008)

TC's responses, as of 11 March 2008, did not include an activity update for Recommendation A00-17.

TSB reassessment of Transport Canada's response to A00-17 (August 2008)

It is the Board's understanding that TC remains committed to providing an activity update with respect to the deficiencies as described in Recommendation A00-17.

Therefore, in the absence of a response, the assessment remains at **Satisfactory Intent**.

FAA's response to Recommendation A00-17 (January 2010)

In January 2010 the FAA provided an update with respect to its activity related to TSB Recommendation A00-17. The FAA states that it has accomplished the following actions:

- Approved a fire protection system for the overhead area on a non-interference basis; however there are no performance standards for such systems;

- Published Report DOT/FAA/AR-07/58 Aircraft Cargo Compartment Multi-sensor Smoke Detection Algorithm Development February 2008; and
- Conducted research to address fires in inaccessible areas, including the feasibility of utilizing active fire protection systems. FAA Report #DOT/FAA/AR-TN 04/33 refers.

The above mentioned research included the potential use of nitrogen from a fuel tank inerting system to extinguish fires above the cabin ceiling in a narrow body aircraft. Various means of detecting and locating this type of fire to optimize the quantity of nitrogen and the time to extinguish the fire were also examined.

The FAA has also been focusing on fire prevention by reducing ignition sources through initiatives such as the Enhanced Airworthiness Program for Airplane Systems (EAPAS) rulemaking which implemented comprehensive rules intended to ensure the safety of electrical wiring. The new requirements affect design and maintenance of wiring systems.

There is no information in the response that would indicate that the FAA is planning any additional initiatives related to Recommendation A00-17.

TSB reassessment of FAA's response to A00-17 (July 2010)

The Board appreciates the FAA's update. TSB was previously aware of some but not all of the initiatives listed in the FAA response. These initiatives, while recognizing that more should be done to assist in dealing with in-flight fires, are research based initiatives and will not result in improvements in the short term. The safety analyses which lead to the issuance of Recommendation A00-17 identified that risks could be reduced by re-examining fire zone designations in order to determine which additional areas of the aircraft ought to be provided with enhanced smoke/fire detection and suppression systems. However, there is nothing in the response to suggest that the FAA has conducted such a review.

To date, neither the FAA nor the IASFPWG, to which TC in its 06 March 2008 response relinquished leadership on this issue, has indicated any additional initiatives related to Recommendation A00-17. Hence the risks associated with the lack of a re-examination of fire zone designations will remain. Consequently, the Board believes that various initiatives will reduce, but not substantially reduce or eliminate the deficiency identified in Recommendation A00-17.

Therefore, the assessment remains as **Satisfactory in Part**.

TSB review of Recommendation A00-17 deficiency file status (May 2018)

The Board requested that all recommendations 10 years old or more be reviewed to determine if the deficiency file status was appropriate. After an initial evaluation, it was determined that the safety deficiency addressed by Recommendation A00-17 needed to be reassessed.

A request for further information was sent to Transport Canada (TC) and a reassessment will be conducted upon receipt of TC's response. In the interim, the assessment remains at **Satisfactory in Part**.

Consequently, the status of Recommendation A00-17 is changed to **Active**.

Transport Canada's response to Recommendation A00-17 (May 2019)

TC agrees with the recommendation.

As the recommendation states, this matter requires a collaborative approach with civil aviation authorities around the world. Worldwide, the number of experts in this domain is limited. TC will continue to collaborate with other civil aviation authorities in this specialized field of work and is poised to take action if and when technical breakthroughs occur. TC has no additional information to provide at this time.

TSB reassessment of Transport Canada's response to Recommendation A00-17 (August 2019)

Since the publication of Aviation Investigation Report A98H0003, a number of actions were taken to address the risks associated with in-flight fires. These include:

- In 2000, Transport Canada (TC) initiated contact with the U.S. Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) to collaborate on a joint strategy to address the safety deficiencies identified in the recommendations issued as part of Aviation Investigation Report A98H0003, including Recommendation A00-17;
- In 2004, the FAA published Advisory Circular (AC) 120-80, which informed operators about the dangers of in-flight fires, namely those that may not be visible or easily accessed by crew members. This advisory also provided guidance on the procedures for combatting in-flight fires and training on the appropriate use of cabin fire extinguishers. AC 120-80 was updated by the FAA in 2014 to provide additional guidance;
- In 2007, TC indicated that it was cooperating with the FAA, the United Kingdom Civil Aviation Authority (CAA), and other regulatory authorities participating in the International Aircraft Systems Fire Protection Working Group (IASFPWG) to address the safety deficiencies identified in the recommendations issued as part of Aviation Investigation Report A98H0003, including Recommendation A00-17;
- Also in 2007, the FAA released a training video entitled *Fighting In-Flight Fires*, which was produced in collaboration with TC, the United Kingdom CAA, the French Direction générale de l'Aviation civile (DGAC), and the Brazilian CAA. This video was designed to assist in the training of cabin flight attendants on how to combat hidden in-flight fires; and
- In 2007 and 2008, the FAA conducted research and issued reports DOT/FAA/AR-TN04-33, *A Preliminary Examination of the Effectiveness of Hand-Held Extinguishers Against Hidden Fires in the Cabin Overhead Area of Narrow-Body and Wide-Body Transport Aircraft* (published in July 2007), and DOT/FAA/AR07-58, *Aircraft Cargo Compartment Multisensor Smoke Detection Algorithm Development* (published in February 2008). The FAA also focused on initiatives such as the Enhanced Airworthiness Program for Airplane Systems (EAPAS).

In addition to the actions listed above, improvements have been made to the material flammability standards, with, among other initiatives, the amendment to Chapter 525 of TC's

Airworthiness Manual (see TSB reassessment of Transport Canada's response to Recommendation A99-07 [March 2018]). Furthermore, emergency procedures and training, which include the training standards for flight attendants (Flight Attendant Training Standard - TP 12296) and pilots (Commercial and Business Aviation Policy Letter No. 153 - Practical Training - Emergency Procedures Training for Pilots), have been updated.

Through the IASFPWG, industry continues to research and update procedures.

TC's latest response also indicates that it continues to work with other civil aviation authorities and will respond to any developments in this field of work.

The Board believes that the combination of the actions listed above have substantially reduced the risks associated with in-flight fires. However, a review of the methodology for establishing designated fire zones within the pressurized portion of the aircraft did not take place.

Therefore, the Board considers the response to Recommendation A00-17 to remain **Satisfactory in Part**.

Given the combined actions in response to recommendations A00-16 and A00-17, the Board decides that Recommendation A00-17 can be closed.

Next TSB action

This deficiency file is **Closed**.