



## REASSESSMENT OF THE RESPONSES FROM TRANSPORT CANADA TO AVIATION SAFETY RECOMMENDATION A01-02

### MATERIAL FLAMMABILITY STANDARDS

#### 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 28 August 2001, the Board released interim safety recommendations as part of its investigation (A98H0003) into this occurrence.

#### Board Recommendation A01-02 (28 August 2001)

Existing material flammability standards allow the use of flammable materials as well as materials that propagate flame within predetermined limits. In addition to the associated fire risk, the majority of these materials pose additional hazards, as there is no regulation requiring that other flammability characteristics, such as heat release, smoke generation and toxicity, be measured. Currently, the most stringent fire tests are reserved for materials located in accessible cabin areas. As a consequence, some of the most flammable materials within the pressurized portions of an aircraft are located in hidden, remote or inaccessible areas. These areas pose a high risk of being involved in potentially uncontrollable in-flight fires.

The Board believes that the use of a material—regardless of its location, type, or quantity—that sustains or propagates fire when subjected to realistic ignition scenarios, constitutes an unacceptable risk, and that, as a minimum, material used in the manufacture of any aeronautical product should not propagate or sustain a fire in any realistic operating environment. Therefore, the Board recommended that:



For the pressurized portion of an aircraft, flammability standards for material used in the manufacture of any aeronautical product be revised, based on realistic ignition scenarios, to prevent the use of any material that sustains or propagates fire.

A01-02

### **Responses to A01-02 (08 November 2001)**

In its response of 08 November 2001, Transport Canada (TC) agrees with the need to revise, based on realistic ignition scenarios, the flammability standards for materials used in the manufacture of aeronautical products that are installed within the pressurized portion of an aircraft. TC is working in conjunction with the Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA) to promote a harmonized approach on this issue.

The FAA has advised TC that it concurs with this recommendation and that the FAA is developing new test requirements for materials in inaccessible areas of the aircraft to bring the level of flammability of all materials to that proposed for thermal acoustical insulation. These test requirements will include wiring, ducting, shielding and foam, and the test methods will be refined through the International Aircraft Fire Test Working Group. The FAA is also pursuing test procedures and enabling technology for ultra fire-resistant interior cabin materials.

As these improved flammability test standards and increased fire-resistant materials become available, the certification standards and screening tests developed in conjunction with the other airworthiness authorities will be incorporated in Canadian regulatory standards.

### **Board Assessment of the Responses to A01-02 (20 March 2002)**

TC states that both it and the FAA concur with the recommendation. Additionally, TC states that, together, they will advance material flammability certification standards on two fronts: 1) developing improved flammability test requirements for materials in inaccessible area, and 2) pursuing new test procedures and enabling technology for ultra fire-resistant interior cabin materials. Both of these initiatives will be pursued under the auspices of the International Aircraft Fire Test Working Group. TC states that Canadian regulatory standards will be revised in conjunction with other airworthiness authorities. Based on the information provided, the response is considered to be **Satisfactory Intent**.

### **Next TSB Action (20 March 2002)**

TSB staff will closely monitor the progress of the TC/FAA deliberations to determine if their action plan addresses the identified deficiencies.

This deficiency file is assigned an **Active** status.

### **Response to A01-02 (14 December 2005)**

TC's letter of 14 December 2005 indicated that the FAA is developing standards for materials in hidden areas. For a number of years, the philosophy has been to achieve standards so that materials will resist ignition from realistic sources.

Work is under way to develop standards for other “hidden” materials, with the objective to “raise the bar” to a level comparable to that achieved for thermal/acoustic insulation.

The first step is establishing standards for wiring (single, in bundles, including clamps, etc.), planned to be completed by the end of the year, with follow-on work on other “hidden” materials (ducting, foams, seals, etc.).

The FAA has been conducting a long-term program to develop “advanced” fire-resistant materials (ref. report DOT/FAA/AR-97/100, November 1998). TC, though not involved in this activity, follows its progress. Work is ongoing.

### **Board Reassessment of the Response to A01-02 (23 June 2006)**

TC’s 14 December 2005 activity update indicated that the FAA is developing flammability standards for materials used in hidden areas. The continuing development of higher material flammability standards, if fully implemented, will substantially reduce or eliminate the safety deficiency.

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

### **Next TSB Action (23 June 2006)**

TSB staff will monitor the progress of the draft improvements to determine if this course of action addresses the deficiency associated with Recommendation A01-02.

This deficiency file is assigned an **Active** status.

### **Response to A01-02 (07 February 2007)**

TC’s activity update advises that it has amended Chapter 525 of its Airworthiness Manual to include Section 525.856, Thermal/Acoustic Insulation Materials, which requires that new type designs comply with the most recent flammability standard for thermal acoustic insulation material. Likewise, Airworthiness Manual Chapter 525, Appendix F, Part I, was updated to include test criteria procedure for showing compliance with material flammability requirements in sections 525.853 and 525.855 of the Airworthiness Manual. Additionally, TC has published Policy Letter 525-002 entitled *Use of the FAA Aircraft Materials Fire Test Handbook* to assist industry in conducting its material flammability testing.

TC’s response also states that it considers its activity update complete as it relates to Recommendation A01-02.

### **Board Reassessment of the Response to A01-02 (24 July 2007)**

TC’s update of 07 February 2007 is the latest in a series that indicate that TC has worked with other regulatory authorities and industry to mitigate the deficiencies in material flammability standards identified in Recommendation A01-02. These include developing certification test criteria that are based on realistic ignition scenarios, amending the *Canadian Aviation Regulations* to adopt these improved material flammability test criteria, and monitoring FAA’s work in

developing “advanced fire-resistant materials” for use in aircraft design and manufacture. These actions will substantially reduce the safety deficiency as described in Recommendation A01-02.

Therefore, the assessment is now assigned **Fully Satisfactory**.

### **Next TSB Action (24 July 2007)**

Because the safety deficiency associated with Recommendation A01-02 is considered rectified, no further action is necessary.

This deficiency file is assigned an **Inactive** status.