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

REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A01-05

Flight manual modifications

Background

The Bell 214B helicopter, serial number 28025, departed a staging area near Kaslo, British Columbia, at about 0645 Pacific daylight time on a local visual flight rules flight. The pilot and three crew members were on board. The helicopter was observed flying uneventfully in the area for about 10 minutes before the engine noise suddenly stopped. The helicopter, about 400 feet above ground level at the time, descended, made a 180-degree left turn, and landed heavily in a shallow, rapidly flowing river. The helicopter broke apart on impact and came to rest on the rocks in the middle of the river. Three of the occupants were fatally injured at impact; the pilot succumbed to his injuries about 45 minutes later. The aircraft was destroyed. There was no fire.

The Board concluded its investigation and released report A99P0075 on 18 October 2001.

TSB Recommendation A01-05 (October 2001)

The consequences of fuel starvation in flight are serious. There is insufficient information readily available to pilots operating Bell 214B and Bell 205 helicopters to reasonably expect that they would take appropriate action in the event of a boost pump malfunction or a loss of fuel pressure for any other reason. Therefore, the Board recommended, for the consideration of Bell Helicopter Textron and the Minister of Transport, that

> The Bell 214B and Bell 205 flight manuals be modified to provide information regarding the inaccuracy of fuel quantity indications, thereby allowing pilots to make informed decisions in the event of a loss of fuel boost pump pressure.
>
> **TSB Recommendation A01-05**

Transport Canada's response to Recommendation A01-05 (January 2002)

In its response of 10 January 2002, Transport Canada (TC) agrees with the need to modify Bell 214B and Bell 205 helicopters flight manuals. In a letter dated 09 November 2001, TC requested that the United States Federal Aviation Administration (FAA), the regulatory authority responsible for the design standards for both the Bell 214 and 205 helicopters, review the fuel system design and revise the flight manuals and the emergency procedures. In the interim, an advisory will be issued to operators of Bell 214 and 205 helicopters in Canada. TC will monitor and follow up the FAA's response and will carry out corrective action(s) in Canada.

TSB assessment of Transport Canada's response to Recommendation A01-05 (March 2002)

The original certification authority for these two types of helicopters is the FAA. In response to this recommendation, TC has advised that it intends to send an advisory to Canadian operators of these helicopters to reduce or eliminate the risk of recurrence, while it awaits a permanent fix from the manufacturer, the FAA, or both. The manufacturer is in the best position to effect the recommended changes to the rotorcraft flight manuals (aircraft flight manuals), but a Service Bulletin from a manufacturer does not require compliance on the part of the operator, unless the regulator issues a corresponding Airworthiness Directive (AD). TC has forwarded the recommendation to the FAA, but there is no guarantee that the FAA will agree that the manuals in question require to be amended, or that an AD will be issued. As of 21 February 2002, TC had not yet issued the advisory to Canadian operators. Should the FAA decide not to issue an AD concerning the inaccurate fuel quantity indications, it is unlikely that TC would issue one on its own. Consequently, TC's response is assessed as **Satisfactory Intent**.

Transport Canada's response to Recommendation A01-05 (December 2005)

TC has confirmed with the FAA that the aircraft flight manual accurately reflects the unusable fuel available with boost pump failures. Consequently, TC no longer supports amendment to Bell 214B and 205 flight manuals.

TC Commercial and Business Aviation Advisory Circular 0203 will be amended shortly to this position.

TSB reassessment of Transport Canada's response to Recommendation A01-05 (July 2006)

On 02 May 2002, TC issued Commercial and Business Aviation Advisory Circular (CBAAC) 0203 entitled *Bell 214B and Bell 205 Helicopter Fuel Quantity Indication Anomalies*. Subsequently, TC's letter to the TSB dated 14 December 2005 states that it no longer supports amendments to the Bell 214B and 205 flight manuals as it has confirmed with the FAA that the applicable Rotorcraft Flight Manuals accurately reflect the unusable fuel in the event of a boost pump failure. TC further states that Advisory Circular 0203 will be amended to reflect this position.

The Board is concerned that, due to the lack of action regarding flight manual amendments and uncertainty about TC's proposed amendments to Advisory Circular 0203, the deficiency has yet to be substantially reduced or eliminated by the actions taken to date.

Therefore, the assessment is now **Satisfactory in Part**.

Transport Canada's response to Recommendation A01-05 (May 2007)

TC's latest response, in addition to repeating its previously stated position, states that it has withdrawn Advisory Circular 0203 as all directly affected operators are now aware of the lessons learned through this investigation. Additionally, TC will publish in its *Aviation Safety Letter* the safety information related to this accident under the heading "Words on Fuel Management". TC's update concludes by stating that its safety action in response to this recommendation is now considered complete.

TSB reassessment of Transport Canada's response to Recommendation A01-05 (September 2007)

TC's original position agreed with the deficiency as identified in Recommendation A01-05 and supported the modification of the Bell 214B and Bell 205 flight manuals. Subsequently, TC agreed with the FAA's position that the flight manual accurately reflected the unusable fuel available yet published a comprehensive explanation of the phenomenon in Advisory Circular 0203. TC has since withdrawn Advisory Circular 0203 as it declares, but does not explain how all affected operators are to be informed of the lessons learned from this investigation. TC's generic reminder published in its Aviation Safety Letter (issue 02/2007) to all helicopter pilots that fuel gauge errors may be a consequence of fuel boost pump malfunctions, further weakens the specific message called for in Recommendation A01-05. Action taken to better inform operators of the anomalies associated with the deficiencies with the fuel indicating system will mitigate the risks in the short term. However, not including the information in the flight manual will leave significant residual risk for the long term.

As the action taken will not substantially reduce the deficiency, this assessment is rated as **Satisfactory in Part**.

Transport Canada's response to Recommendation A01-05 (March 2008)

In its response of 6 March 2008, TC reiterates its response of 24 May 2007, in particular that it has withdrawn Advisory Circular 0203 because all directly affected operators are now aware of the lessons learned through this investigation. Additionally, TC has confirmed that the 02/07 issue of the 'Aviation Safety Letter' was published disseminating general safety information related to this accident to a wide audience regarding fuel systems.

TC has stated that its safety action in response to this recommendation is now considered complete.

TSB reassessment of Transport Canada's response to Recommendation A01-05 (August 2008)

TC's initial action to issue Advisory Circular 0203 and later to issue Aviation Safety Letter 02/2007 had the potential to better inform operators of the anomalies associated with the deficiencies with the fuel indicating system and, therefore, to mitigate the risks in the short term. Notwithstanding, TC's current position to not take further action results in the continuing presence of the long-term risks identified in the following findings from TSB Report A99P0075:

- The helicopter engine lost power in flight (engine flame-out) because of fuel starvation.
- The usable fuel in the left cell was exhausted. Although there was fuel in the right cell, it was not available at a usable rate because the right boost pump was inoperative and the fuel transfer was slower than engine fuel usage.
- When the right boost pump is inoperative, the fuel quantity gauge indicates more fuel than is actually on board. The actual amount of usable fuel would be difficult to determine in flight.

The action taken will reduce but not substantially reduce or eliminate the deficiency underlying Recommendation A01-05.

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

TSB review of Recommendation A01-05 deficiency file status (September 2009)

In its latest position statement regarding the deficiency identified in Recommendation A01-05 TC declares that its safety action is considered complete.

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

The Board also concludes that, as no further action is planned by TC, continued reassessment will not likely yield further results.

TSB review of Recommendation A01-05 deficiency file status (May 2017)

The Board requested that A01-05 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 A01-05 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.

Therefore, the assessment of the response to Recommendation A01-05 remains **Satisfactory in Part**.

Consequently, the status of Recommendation A01-05 is changed to **Active.**

Transport Canada's response to Recommendation A01-05 (March 2018)

TC does not agree with the recommendation.

Since 2005, TC has confirmed with the FAA (representing the state of design authority) and Bell Helicopter that the Rotorcraft Flight Manual (RFM) accurately reflects the unusable fuel available with boost pump failures.

From TC's perspective, there was insufficient factual evidence presented in the final report to support the postulated evaluation that the crash was precipitated by fuel starvation. In addition, a review of recent service difficulty reports for the Bell 214B and 205 did not identify any safety deficiencies related to loss of boost pump pressure or unusable fuel.

An Aviation Safety Letter (ASL) article titled *"Words on fuel management…."* dated 2/2007 was published to promote awareness of the importance of fuel management.

TC maintains its position that there is no need to modify the Bell 214B and 205 flight manuals and plans no further action.

TSB reassessment of Transport Canada's response to Recommendation A01-05 (February 2019)

To date, the following actions have been taken by Transport Canada (TC) to address the safety deficiency identified in Recommendation A01-05, regarding the modification of the Bell 214B and Bell 205 flight manuals to provide information regarding the inaccuracy of fuel quantity indications:

- In 2002, TC issued Commercial and Business Aviation Advisory Circular (CBAAC) 0203, entitled *Bell 214B and Bell 205 Helicopter Fuel Quantity Indication Anomalies*.
- In 2005, TC consulted the Federal Aviation Administration (FAA) regarding the safety deficiency identified in Recommendation A01-05. After reviewing the flight manuals, both the FAA and Bell Helicopter were of the opinion that the information provided in the respective flight manuals, regarding fuel starvation in the event of a boost pump failure, is accurate and that an amendment is not required. TC amended CBAAC 0203 to reflect this information and, later, withdrew the CBAAC.
- In 2007, TC published an article, in the 02/2007 issue of the *Aviation Safety Letter*, titled "Words on fuel management", to promote awareness of the importance of fuel management. Both this article and CBAAC 0203 served as gateways to help disseminate fuel system information, as well as the importance of fuel management, to a wide audience.

TC plans no further action to address the safety deficiency identified in Recommendation A01-05.

A search of the TSB occurrence database indicated that no other occurrences involving fuel starvation on Bell 214B and Bell 205 helicopters were documented since the occurrence that led to Recommendation A01-05, almost 20 years ago.

As such, the Board believes that the residual risk associated with the safety deficiency identified in Recommendation A01-05 is low.

Therefore, the response to Recommendation A01-05 is assessed as **Satisfactory in Part.**

This deficiency file is **Closed**.