TSB Recommendation A08-01

Regulation of passenger-carrying balloons

The Transportation Safety Board of Canada recommends that the Department of Transport ensure that passenger-carrying commercial balloon operations provide a level of safety equivalent to that established for other aircraft of equal passenger-carrying capacity.

Air transportation safety investigation report	A07C0151
Date the recommendation was issued	27 March 2008
Date of the latest response	January 2023
Date of the latest assessment	March 2023
Rating of the latest response	Satisfactory in Part
File status	Active

Summary of the occurrence

On 11 August 2007 at about 0908 central daylight time, a FireFly 12B hot air balloon, C FNVM, attempted a landing in a field adjacent to Birds Hill Provincial Park near the northern outskirts of Winnipeg, Manitoba. The balloon was operated by Sundance Balloons International under a Special Flight Operations Certificate (SFOC) issued by Transport Canada (TC). One pilot and 11 passengers were on board, for a local sightseeing flight of about one hour's duration, originating in the southeast of Winnipeg and terminating in the northeast of Winnipeg.

The flight had been extended beyond Winnipeg as the pilot searched for a suitable landing area. The winds in the landing area were much stronger than anticipated, and the balloon touched down and skipped several times. The basket was dragged on its side for about 700 feet and tipped far enough for the burners to strike the ground. When the balloon stopped, a propane fuel leak occurred and an intense fire ensued before passenger evacuation was completed. The pilot and two passengers suffered serious injuries. Four other passengers suffered minor injuries, some with burns. Two of the propane tanks and a fire extinguisher canister exploded, and the balloon basket was destroyed.

A balloon is an aircraft as defined in the Aeronautics Act and may be used by a commercial air carrier as defined in the Act. However, although the FireFly 12B and other large balloons can

carry up to 12 fare paying passengers, they are not regulated at a level comparable to other commercial aircraft. The carriage of fare-paying passengers in balloons is authorized by TC by way of SFOCs. To obtain an SFOC, the applicant needs to provide only basic information. In the SFOC, TC states that the operator is able to conduct a safe balloon operation carrying fare paying passengers. In this occurrence, there was no initial inspection of the company by TC to support this statement. The SFOC has no expiry date and there are no audits of the balloon operators as conducted on other air carriers.

On 27 March 2008, the Board released interim safety recommendations as part of its investigation (A07C0151) into this occurrence.

Rationale for the recommendation

While some commercial balloon operators in Canada have fare-paying passenger loads equal to those of commuter and air taxi operators, their passengers are not assured of the same level of safety and oversight by regulations and standards. The Board is concerned that, without adequate standards and regulations for balloon operators, balloon passenger safety will be compromised.

Therefore, the Board recommended that

> the Department of Transport ensure that passenger-carrying commercial balloon operations provide a level of safety equivalent to that established for other aircraft of equal passenger-carrying capacity.
>
> **TSB Recommendation A08-01**

Previous responses and assessments

June 2008: response from Transport Canada

To address the subject of the level of equivalent safety of passenger-carrying commercial balloon operations, TC is conducting a risk assessment of commercial passenger-carrying balloon operations. This study will address the SFOC process and commercial passenger-carrying balloon operation oversight. Once the review is complete, should regulatory changes be required, Notice of Proposed Amendments will be developed and submitted to the Canadian Aviation Regulation Advisory Council for consultation.

July 2008: TSB assessment of the response (Satisfactory Intent)

TC's written response to the recommendation indicates that it intends to conduct a risk assessment and determine an appropriate means of addressing the issue of commercial passenger-carrying balloon operations. This study will address both the SFOC process and commercial passenger-carrying balloon operation oversight. Once the review is complete, regulatory changes will be proposed should they be considered necessary. However, the Board believes that TC's proposed review and regulatory amendment process will not yield any specific course of action that, in the short term, would reduce or eliminate the deficiency identified in Board Recommendation A08-01.

The response is assessed as **Satisfactory Intent.**

January 2011: response from Transport Canada

Issue paper on "Regulation of Balloons with Fare Paying Passengers" was presented at the Canadian Aviation Regulation Advisory Council (CARAC) Technical Committee meeting November 2-6 2009. Valuable information was heard from Stakeholders to determine the way forward. Results are being analysed.

At its June 2010 Civil Aviation Regulatory Committee (CARC) meeting, the CARC approved the formation of a CARAC Working Group on the subject of commercial passenger-carrying balloon operations. The Terms of Reference for the Working Group and its membership were presented and accepted at the November 2010 CARAC meeting. The Working Group activities were forecast to commence in January 2011.

March 2011: TSB assessment of the response (Satisfactory Intent)

TC's response indicates that it continues to progress safety action that, if fully implemented, will address the deficiencies underlying Recommendation A08-01.

The assessment remains as **Satisfactory Intent.**

February 2012: response from Transport Canada

In an email dated 06 February 2012, TC stated the following:

> The CARAC Working Group for Balloons with Fare-Paying Passengers will be submitting a final report containing the WG's recommendations at the fall 2012 CARAC Technical Committee meeting.

On 28 March 2012, TC submitted an update stating the following:

> A Working Group meeting will be held in April/May 2012. The final report containing the Working Group recommendations are expected to be presented at the 2012 fall CARAC Technical Committee meeting.

March 2012: TSB assessment of the response (Satisfactory Intent)

TC indicated that it is progressing with its work and that the CARAC working group for balloons with fare-paying passengers will be submitting a final report containing its recommendations at the fall 2012 CARAC Technical Committee meeting. However, the Board is still concerned that TC's proposed review and regulatory amendment process may not yield any specific course of action that, in the short term, would reduce or eliminate the deficiency identified in Board Recommendation A08-01.

The assessment remains as **Satisfactory Intent.**

December 2012: response from Transport Canada

TC will review the recommendations associated with balloon operations in early 2013 along with our past responses to determine what other steps can be taken.

March 2013: TSB assessment of the response (unable to assess)

TC did not provide details regarding the progress of the CARAC Working Group for Balloons with Fare-Paying Passengers and its recommendations expected to be presented at the fall 2012 CARAC Technical Committee meeting; nor has TC provided any indication of what recommendations it states it is continuing to consider. The Board is very concerned about the lack of concrete plans to address the underlying safety deficiency which supports this recommendation.

The response is considered as **Unable to Assess.**

November 2013: response from Transport Canada

Balloon accident statistics have been reviewed and analyzed. The findings of the analysis and the overall favourable safety record of balloon operators indicate that the need for regulatory intervention to achieve higher levels of safety is not apparent. Transport Canada analysis shows that fare-paying passengers on commercial balloons currently enjoy an equivalent level of safety without additional regulations being put in place. No additional regulatory or advisory material is planned at this time and no further updates will be provided.

April 2014: TSB assessment of the response (Unsatisfactory)

Balloons currently in service in Canada may carry as many as 12 fare-paying passengers. Balloon operators are not subjected to regulations equivalent to other commercial aircraft.

The carriage of fare-paying passengers in balloons is authorized by TC by way of Special Flight Operations Certificates (SFOCs). To obtain an SFOC, the applicant needs to provide only basic information. In the SFOC, TC states that the operator is able to conduct a safe balloon operation carrying fare-paying passengers. The SFOC has no expiry date and there are no inspections or audits of the balloon operators as conducted on other air carriers.

Operations manuals and maintenance manuals, and a requirement to adhere to flight manuals, are recognized means of controlling risks inherent in aviation operations regulated under Part VII (Commercial Air Services) of the *Canadian Aviation Regulations*. Balloon operators do not have to maintain operations manuals or maintenance control manuals. Because balloons are not regulated under Part VII, they are not included in TC's National Cabin Safety Inspection Program. This means that no balloon carrying fare-paying passengers would be inspected under this program. Because balloons are "general aviation" and not in CARs Part VII, no cabin safety standards have been developed for balloons to ensure standardization during certification of new types and no standards have been designed for operators engaged in the transportation of passengers.

The Board continues to believe that the safety deficiency identified in this investigation persists. However, no additional regulatory or advisory material is planned at this time and no further updates will be provided.

Therefore, TC's response is considered as **Unsatisfactory.**

December 2021: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

At the time of the publication of the recommendation in 2007, Transport Canada (TC) committed to conduct a risk assessment of commercial passenger-carrying balloon operations to address the Special Flight Operations Certificate (SFOC) process and commercial passenger-carrying balloon operation oversight. Following the publication of the issue paper "Regulation of Balloons with Fare Paying Passengers"[1] in 2010 and after reviewing balloon accident statistics in 2013, TC concluded that the findings of the analysis and the overall favourable safety record of balloon operators indicated that the need for regulatory intervention to achieve higher levels of safety was not apparent and, therefore, no additional regulatory or advisory material were planned.

In 2014, the work to address this recommendation resulted in a Board assessment of "Unsatisfactory" and was assigned a "Dormant" status given that TC indicated that the need for regulatory intervention to achieve higher levels of safety was not apparent and no additional regulatory or advisory material were planned.

In developing this update, TC reviewed balloon accident statistics and found that there have been only 5 fatalities (all causes) over a 44-year period in Canada, during which an estimated 26,000 passengers were carried annually. The average balloon flight duration may be assumed to be about an hour. Therefore, the fatality rate may be calculated as 0.44 / 100,000 flight hours. Based on the above cursory review of the fatality rates associated with balloon operations in Canada, passenger-carrying balloons are already achieving a safety record that outperforms general aviation (2.2 / 100,000) and commuter airline safety (1.2 / 100,000). Further, balloon fatality rates approach the very low rate of 0.4 / 100,000 flight hours observed for many years for the transport airplane operations.[2,3]

However, the continued improvement of aviation safety is a major priority for TC. Since the 2014 Board assessment of TC's response to this recommendation, the following actions have been taken that are of relevance to commercial balloon safety.

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1 Transport Canada (2010). Issue Paper - Regulation of Balloons with Fare Paying Passengers. Available at: RDIMS 5154209

2 Ibid.

3 Transport Canada (2013). Review of TSB Recommendation A08-02: Mandating Emergency Fuel Shut-Off Valves (FSOV) for Balloons with Fare-Paying Passengers. Issue Paper presented to the Civil Aviation Regulatory Committee. 28 June 2013. Available at RDIMS 8530483 v2.

TC partnered with the Canadian Owners and Pilots Association and SmartPilot.ca to launch a General Aviation Safety Campaign[4] (GASC) in 2017 whose mandate was to promote safety in the general aviation community. In June 2020, the GASC transitioned to the General Aviation Safety Program (GASP). Some of the safety enhancements that have been accomplished by the GASP with respect to balloon operations since October 2020 include:

- Coordinating with various stakeholders, such as the Canadian Balloon Association (CBA) and the "International de montgolfières de Saint-Jean-sur-Richelieu", to engage them in working groups and participate in training activities.
- Engaging in the review and monitoring of the CBA recurrent training program and other training to Canadian balloon pilots via non-profit training organizations.
- Facilitating the publication of the article "The dangerous power of power lines: Tips for avoiding collisions and close encounters[5]" which was published in the Aviation Safety Letter (ASL) in March 2021.

Also, TC inspectors, including members of the GASP, met with the CBA in November 2021 to identify safety concerns in the commercial hot-air balloon sector. This resulted in drafting a preliminary list of potential projects moving forward which includes working groups to establish industry best practices and regional coordination to encourage surveillance.

March 2022: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) indicated that it agrees with the recommendation and provided an update of actions taken since its previous response in April 2014.

The Board is pleased that progress is being made through engagement with TC inspectors and members of the commercial balloon community to identify safety concerns and best practices. However, the Board also notes that no substantial measures to enhance the level of safety of commercial balloon passengers have been taken or planned to date. To that end, the TSB reviewed recent initiatives by other civil aviation authorities and acknowledges the advancements related to commercial balloon safety taken by the Federal Aviation Administration (FAA), the European Union Aviation Safety Agency (EASA) and the Australian Civil Aviation Safety Authority (CASA) as summarized below.

Following a July 2016 balloon accident in Lockhart, Texas, United States, that resulted in 16 fatalities, the FAA took measures to increase the safety of hot-air balloon tourism and to assure passengers that pilots would adhere to higher standards of safety. A two-part "Envelope of Safety" accreditation hot-air balloon safety program was introduced on 13 October 2017 for

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4 Transport Canada (2020). General Aviation Safety Campaign. Available at: https://tc.canada.ca/en/campaigns/general-aviation-safety-campaign

5 Transport Canada (2021). Aviation Safety Letter – Issue 3/2021: The dangerous power of power lines: Tips for avoiding collisions and close encounters. Available at: https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-3-2021/dangerous-power-power-lines-tips-avoiding-collisions-close-encounters

ride operations aboard balloons capable of carrying more than 4-6 passengers and is supervised by the Balloon Federation of America.

A second part of the program provides balloon ride operators with a choice of three levels of safety accreditation: Silver, Gold, or Platinum. While any size company can achieve the highest level, the tiered structure is designed with different size companies in mind. Each level has increasingly stringent safety requirements including, but not limited to:

- Meeting the pilot requirements
- Holding valid aircraft and commercial vehicle insurance
- Not exceeding a minimum specified number of accidents or incidents within a recent time period
- Verifying annual aircraft inspections
- Conducting random pilot drug screening
- Developing written policies for crew safety[6]

In September 2020, the EASA published a comprehensive 345-page electronic *Balloon Rule Book* "in order to provide its stakeholders with an updated and easy-to-read publication related to balloon operations."[7] The EASA "officially published regulations with the related acceptable means of compliance and guidance material (including the amendments) adopted so far and certification and specifications and acceptable means of compliance and guidance material."[8]

Similarly, the Australian CASA issued an updated Advisory Circular (AC 131-01 v2.0)[9] in November 2020 to provide guidance and an acceptable means of compliance for operators of hot air airships and manned free balloons (hot air, gas, mixed (gas and hot air)). A note on quick shut-off valves was added. More recently, CASA issued the updated AC 131-02 v2.0[10] in December 2021 to provide guidance for operators on topics such as passenger safety briefings, flying near sensitive areas, dangerous goods, vehicle assisted deflation and ground handling.

Lastly, while the number and rate of fatalities in Canada over a 44-year period provided by TC are very low, they do not provide a contextualized level of risk of the safety deficiency and do

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6 Federal Aviation Administration (FAA), New Commercial Hot-Air Balloon Safety Program (13 October 2017), at https://www.faa.gov/newsroom/new-commercial-hot-air-balloon-safety-program (last accessed 19 January 2022).

7 European Union Aviation Safety Agency (EASA), *Balloon Rule Book* (September 2020), at https://www.easa.europa.eu/sites/default/files/dfu/Balloon%20Rule%20Book.pdf (last accessed 19 January 2022).

8 Ibid.

9 Australian Government, Civil Aviation Safety Authority (CASA), Advisory Circular AC 131-01 v2.0, *Manned free balloons – Continuing airworthiness* (November 2020), at https://www.casa.gov.au/sites/default/files/2021-08/advisory-circular-131-01-manned-free-balloons-airworthiness-and-operations.pdf (last accessed 19 January 2022).

10 Australian Government, Civil Aviation Safety Authority (CASA), Advisory Circular AC 131-02 v2.0, *Manned free balloons – Operations* (December 2021), at https://www.casa.gov.au/sites/default/files/2021-08/advisory-circular-131-02-manned-free-balloons-operations.pdf (last accessed 19 January 2022).

not consider the number of injuries and the severity thereof. The TSB reviewed data from its Aviation Safety Information System from 01 January 1990 to 10 January 2022 and noted there were 84 occurrences involving balloons in Canada during that period. In over 50% (43) of these occurrences, fatalities and injuries occurred. There were 4 fatalities (between 2001 and 2013), 49 serious injuries, and 37 minor injuries.

As TC has yet to demonstrate a concrete plan of action or specific long-term solutions to improve the safety of passenger-carrying balloon operations, the risks associated with the safety deficiency identified in Recommendation A08-01 remain.

Therefore, the response to Recommendation A08-01 is assessed as **Satisfactory in Part**.

Latest response and assessment

January 2023: response from Transport Canada

Transport Canada (TC) agrees with the recommendation[11].

At the time of the publication of the recommendation in 2007, Transport Canada (TC) committed to conduct a risk assessment of commercial passenger-carrying balloon operations to address the Special Flight Operations Certificate (SFOC) process and commercial passenger-carrying balloon operation oversight. Following the publication of the issue paper "Regulation of Balloons with Fare Paying Passengers"[12] in 2010 and after reviewing balloon accident statistics in 2013, TC concluded that the findings of the analysis and the overall favourable safety record of balloon operators indicated that the need for regulatory intervention to achieve higher levels of safety was not apparent and, therefore, no additional regulatory or advisory material were planned.

In 2014, the work to address this recommendation resulted in a Board assessment of “Unsatisfactory” and was assigned a “Dormant” status given that TC indicated that the need for regulatory intervention to achieve higher levels of safety was not apparent and no additional regulatory or advisory material were planned. As the continued improvement of aviation safety is a major priority, TC continued taking action to improve commercial balloon safety.

In 2017, TC partnered with the Canadian Owners and Pilots Association and SmartPilot.ca to launch a General Aviation Safety Campaign[13] (GASC) whose mandate was to promote safety in the general aviation community. In June 2020, the GASC transitioned to the General Aviation

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11 All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors in the material it reproduces without indication but uses brackets [ ] to show other changes or to show that part of the response was omitted because it was not pertinent.

12 Transport Canada (2010). Issue Paper - Regulation of Balloons with Fare Paying Passengers. Available at: RDIMS 5154209

13 Transport Canada (2020). General Aviation Safety Campaign. Available at: https://tc.canada.ca/en/campaigns/general-aviation-safety-campaign

Safety Program (GASP). Some of the safety enhancements that have been accomplished by the GASP with respect to balloon operations since October 2020 include:

- Coordinating with various stakeholders, such as the Canadian Balloon Association (CBA) and the "International de montgolfières de Saint-Jean-sur-Richelieu", to engage them in working groups and participate in training activities.
- Engaging in the review and monitoring of the CBA recurrent training program and other training to Canadian balloon pilots via non-profit training organizations.
- Facilitating the publication of the article "The dangerous power of power lines: Tips for avoiding collisions and close encounters[14]", which was published in the Aviation Safety Letter (ASL) in March 2021.

In TC's previous update in December 2021, the Department mentioned meeting with the CBA in November 2021 to identify safety concerns in the commercial hot-air balloon sector. This resulted in drafting a preliminary list of potential projects moving forward that includes working groups to establish industry best practices and regional coordination to encourage surveillance.

Since the update, after the November 2021 meeting with the CBA, it became clear that the focus of that organization was recreational and competition ballooning. Because of this, it became evident that TC would need to engage directly with SFOC - Balloons holders. This effort was initially identified as a possible task for the GASP, however, due to inadequate membership in the GASP associated with this segment of this industry, TC did not pursue its effort immediately. It was decided to further delay this discussion until after the industry's operating season in the Fall of 2022.

In November 2022, TC held a meeting with Sundance Balloons, a major Canadian SFOC – Balloons operator. The meeting was to learn about their operations, their safety measures and training requirements and to discuss potential projects to improve commercial balloon safety, such as establishing industry best practices and other non-regulatory efforts like the outputs by the Balloon Federation of America's Professional Ride Operator's Division (PRO). Collaborating with the balloon community to develop educational and promotional tools can indeed further improve safety, similar to the results and ongoing work realized by the GASP and its engagement with the General Aviation (GA) communities. Further discussions are intended in early 2023 to continue our efforts and collaborate to develop best practices and similar promotional and educational tools to enhance safety.

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[14] Transport Canada (2021). Aviation Safety Letter – Issue 3/2021: The dangerous power of power lines: Tips for avoiding collisions and close encounters. Available at: https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-3-2021/dangerous-power-power-lines-tips-avoiding-collisions-close-encounters

TC is planning to propose an amendment to CAR 603.19[15] requiring a validity period to be included on a SFOC – Balloons, which would bring these types of SFOCs in line with other SFOCs issued under CAR 603. This regulatory change would improve TC's oversight of the balloon operators and would better enhance safety as SFOC holders would have to ensure they still meet the SFOC requirements on a regular basis. TC will commence work in 2023 on a regulatory package (relating to General Aviation issues and irritants), which will include this change and will be outlined in the next departmental Forward Regulatory Plan in the fall of 2023.

March 2023: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) indicated that it agrees with the recommendation.

TC indicated that, since the previous TSB assessment in March 2022, it has held a meeting in November 2022 with Sundance Balloons, a major Canadian commercial balloon operator that holds a Special Flight Operations Certificate (SFOC). The stated intent of the meeting was to learn about Sundance Balloons' operations, safety measures, and training requirements, and to discuss potential projects to improve commercial balloon safety, such as establishing industry best practices. TC is planning for further discussions in early 2023 to develop best practices and similar promotional and educational tools to enhance safety.

In addition, TC is planning to propose a regulatory amendment requiring a validity period to be included on an SFOC - Balloons so that it is aligned with other types of SFOCs issued under the *Canadian Aviation Regulations* Subpart 603 — Special Flight Operations. TC further indicates that the amendment would improve its oversight of balloon operators and would enhance safety of SFOC holders by ensuring they continue to meet the SFOC requirements on a regular basis. This proposed amendment is anticipated to be included in the next departmental Forward Regulatory Plan in the fall of 2023.

It should be noted that on 16 November 2022, the U.S. Federal Aviation Administration adopted a final rule requiring commercial hot-air balloon pilots to hold a medical certificate when flying paying passengers, except when the pilot is conducting flight training in a balloon.[16] The rule mandates the same standard required for other commercial pilots.

While the Board is encouraged by TC's efforts to collaborate with a Canadian commercial balloon operator and SFOC holder to develop promotional and educational safety tools and by TC's plan to propose a regulatory change to the requirements of the SFOC - Balloons, it remains concerned that no long-term solutions or regulatory changes to enhance the level of safety of

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15 Transport Canada (2023). Canadian Aviation Regulations (CARs) §603.19 - Contents of Special Flight Operations Certificate — Balloons. Available at: https://lois-laws.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-603.19

16 Federal Aviation Administration (FAA), Final Rule: Medical Certification Standards for Commercial Balloon Operations (16 November 2022), at https://www.faa.gov/newsroom/final-rule-medical-certification-standards-commercial-balloon-operations (last accessed 01 February 2023).

commercial balloon passengers have been adopted or planned to date. The Board is of the opinion that, despite the recent actions taken, the safety risks associated with this recommendation remain.

Therefore, the Board considers the response to Recommendation A08-01 to be **Satisfactory in Part**.

File status

The TSB will continue to monitor the progress of TC's planned actions to mitigate the risks associated with the safety deficiency identified in Recommendation A08-01, and it will reassess the deficiency on an annual basis or when otherwise warranted.

This deficiency file is **Active**.