



TSB Recommendation A24-03

Standard operating procedures for single-pilot commercial operations

The Transportation Safety Board of Canada recommends that the Department of Transport require operators conducting single-pilot operations under Subpart 604 and Part VII of the *Canadian Aviation Regulations* to develop standard operating procedures based on corporate knowledge and industry best practices to support pilot decision making.

Air transportation safety investigation report	A21C0038
Date the recommendation was issued	15 February 2024
Date of the latest response	May 2024
Date of the latest assessment	August 2024
Rating of the latest response	Satisfactory in Part
File status	Active

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Summary of the occurrence

At approximately 1548 Central Daylight Time on 25 April 2021, the Great Slave Helicopters 2018 Ltd. (GSH) Airbus Helicopters AS350 B2 (registration C-FYDA, serial number 4157) departed from a remote camp on Russell Island, Nunavut, on a day visual flight rules (VFR) flight to Resolute Bay Airport, Nunavut, located 87 nautical miles to the northeast. On board were the pilot, an aircraft maintenance engineer, and a biologist. The purpose of the flight was to return to Resolute Bay following 12 days spent conducting polar bear research for a client, given that poor weather was forecast in the area for the next several days.

At approximately 1633 Central Daylight Time, the helicopter impacted the snow-covered terrain on Griffith Island, Nunavut, approximately 12 nautical miles southwest of Resolute Bay Airport, on a near-reciprocal track to the intended route. The helicopter was destroyed, and a

post-impact fire consumed much of the fuselage area. The emergency locator transmitter was destroyed during the impact sequence and did not transmit a distress signal. There were no survivors.

In addition to the circumstances that most likely led to the collision with terrain resulting from a loss of visual references in flat light and whiteout conditions, the investigation examined the factors that likely influenced the pilot's decision-making process, the organizational defences in place at GSH, and the regulatory environment.

The Board concluded its investigation and released report A21C0038 on 15 February 2024.

Rationale for the recommendation

In this occurrence, the VFR helicopter pilot, who had limited training and experience operating "in the white," attempted to cross Griffith Island in flat light and whiteout conditions that were likely created by the uniformly snow-covered and featureless terrain, an overcast sky, and snow squalls. By doing this, the pilot inadvertently flew the helicopter into instrument meteorological conditions. The urgency of the situation, combined with the pilot's lack of experience in similar conditions, likely caused a rapid increase in mental workload as the pilot tried to analyze an unfamiliar situation and select an appropriate course of action. It is likely that while the pilot attempted to visually manoeuvre the helicopter in response to the reduced visual cues, in accordance with his reduced-visibility training, an unintentional descent resulted, and the helicopter impacted the terrain on a near-reciprocal track to the intended route.

There are several ways to mitigate risk when a pilot lacks experience in a specific operational setting. Ideally, multiple defences should be implemented to reduce risk as low as reasonably practicable. For example, operationally realistic training can help prepare a pilot for situations that may be encountered during operational taskings. Another way of mitigating the risk is to increase the level of supervision. During remote operations, this might include implementing enhanced communication protocols, such as mandatory check-ins, to support pilot decision making (PDM). Another risk mitigation strategy, which is required by regulation for multi-crew flight operations, is to develop standard operating procedures (SOPs) for company pilots. As identified by the investigation into this occurrence, single-pilot operations conducted under subparts 604, 702, 703, and 704 of the CARs are permitted without SOPs.

SOPs are widely accepted as a tool to enhance safety in multi-crew operations¹ and many of their benefits apply equally to single-pilot operations. SOPs assist PDM by providing pilots with pre-determined successful solutions, based on corporate knowledge and industry best practices, for specific situations that may be encountered. SOPs are particularly beneficial when a pilot lacks the knowledge or experience in a situation, and a less-than-ideal course of action could reduce safety margins. In those instances, SOPs can help reduce pilot workload, given that

¹ Federal Aviation Administration (FAA) Advisory Circular (AC) 120-71B: Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers (2017).

less mental effort is required to work through the decision-making process because that process has already been done for the pilot. The current regulatory requirements likely contribute to a perception that SOPs are more important in multi-crew than single-pilot operations. As a result, SOPs are less common, and typically less structured, in single-pilot operations than in multi-crew operations.

The TSB has investigated multiple occurrences involving single-pilot operations where SOPs were either absent because they were not required by regulation, or they were inadequate.² To realize the full benefits of SOPs, the regulations should be amended to require SOPs for all single-pilot operations conducted under Subpart 604 (private) and Part VII (commercial) of the CARs.

From 2001 to 2003, Transport Canada (TC) issued several notices of proposed amendments (NPAs) intended to expand the requirement for SOPs to “all operated flights regardless of the number of crew or complexity of the aircraft.”³ More than 20 years after these NPAs were issued, they remain in various stages of review (Table 1).

Table 1. Notices of proposed amendments issued by Transport Canada from 2001 and 2003, and status thereof, intended to expand the requirement for standard operating procedures to all flights

NPA number	NPA title	CARs reference	Status
2003-075	Aircraft Standard Operating Procedures (SOP)	723.107 (Aeroplane)	Legal editing
2003-074	Aircraft Standard Operating Procedures - SOPs	722.84	Legal editing
2003-072	Standard Operating Procedures	702.84(1)	<i>Canada Gazette, Part I</i>
2001-135	Standard Operating Procedures	704.124(1)	CARAC*: Approved
2001-134	Standard Operating Procedures	703.107(1)	<i>Canada Gazette, Part I</i>

*Civil Aviation Regulation Advisory Council

Some companies that engage in single-pilot operations, such as GSH, have voluntarily developed task-specific SOPs. In the absence of formal requirements and clear guidance to assist single-pilot operators with SOP development, these operators may not fully understand how to design effective procedures. For example, GSH had a task-specific SOP for operations above the tree line; however, that SOP consisted mainly of high-level guidance rather than safe flying practices such as establishing en-route decision triggers like minimum height above ground or minimum airspeed. In addition, the SOPs did not include the operational practice, employed by senior

² TSB air transport safety investigation reports A21A0024, A21P0018, A20P0080, A15A0045, A14P0132, A13H0002, A11P0117, A08P0241, A07C0119, A03H0002, A00W0177, and A95A0040.

³ Transport Canada (TC), Canadian Aviation Regulation Advisory Council (CARAC), notices of proposed amendment 2003-075, 2003-076, and 2003-077.

pilots at GSH and echoed by the Polar Continental Shelf Program personnel, of avoiding overflying a barren snow-covered island. As a result, this corporate knowledge was not available to the occurrence pilot who had limited experience in that operating environment.

In Canada, thousands of pilots and passengers travel on single-pilot aircraft every year. In many instances, those flights are conducted in remote areas, with minimal external support. In these environments, additional defences must be put in place to support PDM to ensure safety margins are maintained. SOPs allow for easy sharing of corporate knowledge and best practices, and they help ensure consistency among pilots. Because there is no requirement for CARs Subpart 604 and Part VII single-pilot operations to have SOPs, pilots and passengers who travel on those aircraft are at increased risk of an accident resulting from ineffective decision making and from cognitive workload in response to novel or unexpected situations.

Therefore, the Board recommended that

The Department of Transport require operators conducting single-pilot operations under Subpart 604 and Part VII of the *Canadian Aviation Regulations* to develop standard operating procedures based on corporate knowledge and industry best practices to support pilot decision making.

TSB Recommendation A24-03

Previous responses and assessments

N/A

Latest response and assessment

May 2024: response from Transport Canada

Transport Canada (TC) agrees with the Transportation Safety Board (TSB)'s recommendation, emphasizing the necessity for operators conducting single-pilot operations under Subpart 604 and Part VII of the *Canadian Aviation Regulations* (CARs) to establish standard operating procedures (SOPs) grounded in corporate knowledge and industry best practices to enhance pilot decision-making processes.

For operations under Subpart 604 of the CARs (precisely 604.04(1)(c), 604.05, 604.37, 604.142(2), and 604.197), private operators are required to develop and maintain comprehensive operations manuals for their aviation activities, which may contain SOPs. These manuals must include essential information such as the names of key personnel, aircraft operating procedures consistent with aircraft flight manuals, performance data, limitations, and identification of the relevant aircraft. Additionally, the chief pilot is tasked with developing SOPs for the operator's aircraft operations.

In alignment with international standards outlined in International Civil Aviation Organization's (ICAO's) Universal Safety Oversight Audit Programme (USOAP), TC is actively developing a corrective action plan to ensure that all operators falling under Part VII will be mandated to

adopt SOPs. We are also working on the CARs amendments for Subpart 703 to mandate SOPs. Additionally, we are still assessing the requirements for implementing SOPs in Subpart 702.

Clarification has been provided regarding the inclusion of cabin crew SOPs within the Company Operations Manual (COM) requirements outlined in Subparts 705.135(1) and 705.139(1) of the CARs. Furthermore, updates to the Air Operator Certification Manual (TP 4711) – Volume 2 will incorporate guidance on cabin crew SOP requirements, ensuring alignment with the Flight Attendant Manual Standard.

To further enforce SOP adherence and streamline regulatory clarity, amendments to subsections 703.107(1) and 704.124(1) of the CARs will remove the stipulation regarding operations by two or more pilots, thus encompassing all relevant operations under the SOP mandate. Additionally, comprehensive guidance documents for single-pilot SOPs are being developed, drawing upon existing templates and industry expertise, with a view to enhancing operational safety and efficiency across the board.

TC aims to have the regulatory changes completed and the guidance documents developed in the first half of 2027, with the capacity to provide further timelines and accomplished tasks in a future update to the TSB.

August 2024: TSB assessment of the response (Satisfactory in Part)

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

The Board is pleased that TC recognizes the necessity for operators conducting single-pilot operations under Subpart 604 and Part VII of the *Canadian Aviation Regulations* (CARs) to establish standard operating procedures (SOPs) grounded in corporate knowledge and industry best practices.

TC indicated that it is developing a corrective action plan in alignment with the International Civil Aviation Organization's Universal Safety Oversight Audit Programme to mandate SOPs for all CARs Part VII operators. In addition, it will amend the regulations for CARs subparts 703 and 704 to remove the stipulation that SOPs are only required for operations by 2 or more pilots. Furthermore, TC is developing comprehensive guidance documents for single-pilot SOPs. The Board notes that TC's target completion date for the regulatory changes and the development of guidance documents is the first half of 2027.

TC's response stated that it plans to ensure that all operators falling under Part VII will be mandated to adopt SOPs; however, TC also stated that it is assessing the requirements for implementing SOPs in Subpart 702 and this subpart is not mentioned in the proposed rule changes projected for early 2027. Additionally, TC's response did not specify whether it will mandate SOPs for single-pilot operations conducted under Subpart 604. If TC only mandates SOPs for single-pilot operations conducted under subparts 703 and 704, it will reduce, but not significantly reduce or eliminate, the safety deficiency associated with this recommendation.

Consequently, the Board considers the response from TC to Recommendation A24-03 to be **Satisfactory in Part**.

The Board expects that TC's next update will clarify whether it plans to extend the requirement for all single-pilot operations conducted under Subpart 604 and Part VII of the CARs to develop SOPs based on corporate knowledge and industry best practices to support pilot decision making.

File status

The Board will monitor the progress of regulatory changes with regards to SOPs for all single-pilot operations conducted under Subpart 604 and Part VII of the CARs.

This deficiency file is **Active**.